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Visualizing Climate Change Through Photography: Outdoor Educators Examine Climate Change Within Their Personal Contexts

by

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Abstract

Climate change is one of the most serious threats to Earth and its inhabitants (Intergovernmental Panel on Climate Change, 2007). There are attempts to engage individuals and groups in taking action to reduce climate change in both communication and education. Images are an increasingly significant part of these attempts. Research regarding the use of images indicates that they are capable of affecting a viewer's thoughts about climate change (Leiserowitz, 2006). However, they have met with limited success in terms of encouraging relevant responses to climate change. Hence, there are calls to increase the association between climate change and the personal contexts of viewers. The study draws on a theoretical framework based on the research in education and visual communication of climate change; and a conceptual framework of ecological thinking. The current study utilized autodriven photo-elicitation to explore how outdoor educators visualized their thinking about climate change. Further, it examined how these photographic images relate to those that are found within the variety of communications about climate change. Autodriven photo-elicitation modifies traditional interview formats by using photographs to help guide the discussion (Harper, 2002; Schwartz, 1989). Further, the approach engages participants in generating the topics to photograph and taking the photographs. Analysis was carried out using a framework based on Peirce's understanding of semiotics. The results indicated that the outdoor educators were skeptical regarding their ability to determine that a particular event or scene was related to climate change. At the same time, they showed conviction in relating societal aspects, primarily consumption and reduced connection with nature, to climate change. The

participants even expressed concern regarding their own levels of consumption with regards to participating in outdoor activities themselves. The participants' photographs exhibited differences when compared to the main approaches to climate change photography that have been used within education and communication about climate change indicating the importance of directing photographs towards the personal contexts of specific groups of people. The project also demonstrated the pedagogical potential of autodriven photo-elicitation for engaging individuals and groups with thinking about climate change. Future research and pedagogical opportunities are also discussed.

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1. **Introduction**

Human-induced climate change is recognized as one of the most pressing and dangerous threats to the Earth and its inhabitants (Intergovernmental Panel on Climate Change, 2007; Oreskes, 2004). Every region of Canada is currently experiencing the symptoms and impacts of climate change; it "will exacerbate many current climate risks, and present new risks and opportunities, with significant implications for communities, infrastructure and ecosystems" (Lemmen, Warren, & Lacroix, 2008, p. 3). Addressing climate change requires action from all levels of society: from individual behaviours to international cooperation. We need to "challenge the normative values that organize life in society" (González-Gaudiano & Meira-Cartea, 2010, p. 16). For example, while current neoliberal approaches prioritize the individual, and individual actions can impact climate change when done by millions of individuals, effort must not stop at the individual. Collective action at all levels must also occur. Scientific knowledge is necessary; however, other areas of knowledge are also required to achieve the necessary level of change (Frantz & Mayer, 2009). Opportunities such as artistic expression can facilitate connectedness with the living world (Selby, 2010) and cultivate "a form of rationality that integrates reason and emotion and [inculcates] a balance between the needs of individuals and the imperative of the common good (human and nonhuman)" (Glasser, 2007, p. 36).

Understanding Climate Change

Plumwood (2001) problematized the word nature, stating that "terms like 'nature' lump seals and elephants along with mountains and clouds in the one sphere of alleged mindlessness" (p. 112). The same might be said for how we understand climate change. Included within discussions of climate change are the scientific and technological understandings of its causes, impacts, and possible mitigation practices; as well as social aspects such as issues of privilege and responsibility (Dei, 2010; Manzo, 2010b) and constructs such as neoliberalism (Plumwood, 2001).

Within the rapidly expanding research literature, climate change has been referred to as an issue (T. Clark, 2010), a phenomenon (Shepardson, Niyogi, Choi, & Charusombat, 2009), a topic (Shanahan, 2007), a problem (United Nations Framework Convention on Climate Change, 2012), and a post-normal issue (Lorenzoni, Jones, & Turnpenny, 2006), which is an issue that focuses on aspects such as "uncertainty, value loading, and plurality of legitimate perspectives" (Funtowicz & Ravetz, 2003, p. 1), amongst others. Often climate change is written as a noun, which classifies it as a thing, an event unto itself. Frequently, it is cited as "the greatest threat humanity has ever faced" (Shanahan, 2007). Part of the challenge in pinning down exactly what climate change is, lies

in its classification as post-normal: the scientific and social understanding of climate change is still developing. There is agreement, for the most part, that human-induced climate change exists; however, there is still significant disparity with regards to causes, modeling, predictions, and mitigation (Lorenzoni et al., 2006).

The Intergovernmental Panel on Climate Change (2007) defined climate change as "any change in climate over time" (p. 30); while the United Nations Framework Convention on Climate Change (UNFCCC) established climate change as changes in climate that are the result of human activity (United Nations, 1992). These are purely statistical understandings of climate change, based on measurable changes in climate over a significant period of time. It cannot be restricted to its scientific components however. The UNFCCC (2012) stated:

> Climate change is a complex problem, which, although environmental in nature, has consequences for all spheres of existence on our planet. It either impacts on – or is impacted by – global issues, including poverty, economic development, population growth, sustainable development and resource management. It is not surprising, then, that solutions come from all disciplines and fields of research and development. (Background on the UNFCCC: The international response to climate change section, para. 5)

The intricacy of climate change also includes how people perceive and understand messages about climate change differently based on a complex array of factors including personality, education, prior experiences, socio-economic status, political climate and associations, and the direct impact that climate change may have on their lives (American Psychological Association, 2009; Hulme, 2009). In short, climate change is not a simple issue of increasing global average temperatures as a result of increased atmospheric greenhouse gases. As a result, the present study utilizes a complex theoretical framework that draws on a diverse base of climate change research. The primary focus is on two areas within the extant research: education and visual communication about climate change. Further, with recognition of the interrelatedness of humans and natural/environmental systems the study draws on a conceptual framework of ecological thinking.

Research Background

The visualization of climate change is a broad area of interest which can include different forms such as graphical representation, diagrams, paintings, and photographs. Photographs have been the subject of an increasing amount of research within communication about climate change because they are commonly used to engage people with issues of climate change (Manzo, 2010a; O'Neill, 2008; O'Neill & Nicholson-Cole, 2009). Communication within these contexts is generally understood as providing scientific and social scientific messages about climate change to the general public (Ockwell, Whitmarsh, & O'Neill, 2009). The

photographs typically picture icons that have been predetermined by a group of experts as representative of climate change generally (O'Neill, 2008). Several authors have indicated a need to connect these photographs to the local context of individual viewers (Leiserowitz, 2006; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; Lowe et al., 2006).

Education about climate change also calls for connections between climate change and the local context (Bangay & Blum, 2010; Lotz-Sisitka, 2010). The areas of education that are addressed within include formal education in which there is a formal regulated curriculum, it is teacher led, and generally occurs within a classroom setting and non-formal education which is led by either a teacher or a guide, there are structured learning outcomes but the learning is not usually evaluated, and it occurs outside of the classroom (Eshach, 2007). Within these understandings of formal and non-formal education it is apparent that there will be cross-over such as when a formal class goes on a field trip. The local context is highlighted in both education and communication largely due to its significance within personal contexts. The everyday experience of local places contributes to framing concerns, perceptions, and responses (Bélanger, 2003).

Research Focus

This study examined how outdoor educators related to climate change within their personal contexts. Rather than attempt to generalize across an entire population, even those who live within a single city, there was recognition that within a particular area there are multiple groupings of people, connected based on their various experiences, interests and backgrounds. Accordingly, the study focused on a particular group, outdoor educators.

The label of outdoor educator is a broad one that encompasses a range of groups. It may include educators from both formal and non-formal areas of practice. It may focus exclusively on outdoor activities such as outdoor skills (eg. fire and shelter building), or it may relate to all educational activities that occur in the out-of-doors (Ford, 1986). Within the context of this study outdoor educators were individuals who engaged others in learning about a wide range of topics and disciplines within the context of out-of-doors activities. As many of the activities of outdoor education occur within a landscape where human presence and infrastructure is less prominent to non-human ecosystem elements, or where changes in elements such as weather and terrain are difficult to control and have a significant impact on programming, the so-called natural environment can carry a greater significance for outdoor educators than for many other people. For example, temperatures can affect the conditions for cross country skiing in the winter, even potentially creating situations where skiing is not possible because of safety or a lack of snow. Further, the role of outdoor educators in facilitating experiences for others makes them an important population to convey information about climate change and inspire connections with the more-than-human world.

Research Questions.

The current study investigated how outdoor educators think about and relate to climate change through imagery using photography. Specifically, the research questions were:

1. In what ways do outdoor educators visualize climate change through photography within their personal contexts?
2. How do their images relate to those used in the general fields of education and communication about climate change?

These questions were investigated using autodriven photo-elicitation techniques that engaged the participants in determining topics to photograph, taking their own photographs, interpreting their meaning, and sharing the photographs and their interpretations through group discussions. This method is further explained in chapter 3.

The Chapters to Come

Chapter two consists of the literature review which sets the basis for the study. It addresses semiotics and its relevance to the current study, as well as situating the study in current research regarding climate change in education and communication. The chapter closes with a discussion of outdoor education as a context for education about climate change and a description of the conceptual framework for the study: ecological thinking.

Chapter three explores and describes the methodology for the study. Arising from the field of anthropology autodriven photo-elicitation provides new opportunities to engage participants within research projects and ensure that participants are able to direct research towards the issues that matter to them. The conclusion of the chapter provides the details for the project including the topics that participants photographed.

This is followed by chapter four which focuses on the results of the study including the different photographs contributed by participants, as well as their semiotic interpretation.

Chapter five responds to the first research question. It explores the different topics that were photographed and examines the themes that arose, as well as unique contributions within each topic.

Chapter six focuses on the second research question and situates the participants photos within the topics of photographs commonly used in communication about climate change that were identified in the literature review.

Chapter seven provides a conclusion to the project: identifying key topics that appeared throughout chapters five and six and addressing their significance. It

also highlights future avenues of research which can continue to explore how climate change is visualized within personal contexts.

2. Literature Review

It is prudent to examine how visual images are created and understood in relation to climate change because images are assuming a more dominant role within Western society and have had an ongoing relationship with science that will be discussed later. Climate change is extremely difficult to depict visually, particularly with photography (Doyle, 2007) because it occurs over time spans of decades and more, whereas photography focuses on particular scenes at particular moments. And yet, there is evidence of our frequent attempts to represent climate change with photographs: utilizing images that we can connect to climate change in some way, such as symptoms. Further, Leiserowitz (2006) found that imagery had a strong influence on risk perceptions and policy support, revealing the importance of imagery to responding to climate change.

This chapter examines a wide range of literature which provides a framework for the current study. To begin there is an introduction to semiotics which affords a common way of referring to and understanding images, it also is the basis for data analysis described in chapter three. From there the discussion examines how climate change has been taken up within education. Recognizing that education is not the only, or even the dominant source of information about climate change, the next section explores how climate change has been addressed within communication, with a primary focus on photographic representations of climate change. Both the fields of education and communication have expressed a need to connect to local contexts in order to increase understanding and relevance; this is addressed following the focus on communication. Included here is a discussion of the relationship between personal and local contexts. The chapter then moves into the pedagogical potential for participant or learner created photographs and a discussion regarding the potential embedded within outdoor education to address climate change within a personal context. Finally, the chapter concludes with a discussion of ecological thinking which forms the conceptual basis for this study.

Semiotics – A Brief Overview

Semiotics is a broad field of studies that looks at "meanings and messages in all their forms and in all their contexts" (Innis, 1985, p. vii). It considers how we understand and communicate within the world; but it has also influenced how we view the world (Stables, 2001a). There are two main streams within semiotics. 'Saussurian semiotics', conceptualized by Ferdinand de Saussure, identified two components: the signifier and the signified. The sign, in this sense, is "implicitly regarded as a communicative device taking place between two human beings intentionally aiming to communicate or to express something" (Eco, 1976, p. 15). According to Saussure, semiotics was intentional and inherently human-centred; the sign was a "pre-existing conjunction of a signifier and a signified, a ready-made sign to be recognized, chosen and used as it is" (Kress & van Leeuwen, 2006, p. 8). Further, Saussure placed languages "as the model for all sign

functioning" (Siegel, 1995, p. 457). This approach to semiotics contributed to the cultural conviction that there is an external world of distinct objects or things. Saussure's semiotics is arguably limited by "a static notion of how signs work and was uninterested in how meanings change and are changed in use" (Rose, 2007, p. 83).

Charles S. Peirce developed an alternative conception. A sign, according to Peirce, was "something which stands to somebody for something in some respect or capacity" (Peirce, 1932, 1. Ground, object, and interpretant section, para. 228). Unlike Saussure, Peirce's definition "does not demand, as part of a sign's definition, the qualities of being intentionally emitted and artificially produced" (Eco, 1976, p. 15) thus opening up the possibility of natural signs, an important quality for addressing topics like climate change. Additionally, Peirce suggested that for a sign to become meaningful it "involves an enlargement and expansion of meaning, not a simple substitution of one thing for another" (Siegel, 1995, p. 457).

In Peirce's semiotics, "every thought is a sign without meaning until interpreted by a subsequent thought, an interpretant. The meaning of every thought is established by a triadic relation, an *interpretation* of the thought as a *sign* of a determining *object*" (Peirce, 1991). Peirce argued that "all knowledge of the world was mediated by signs...[therefore] meaning always involved interpretation, and moreover, that there were no single signs but rather every sign was connected to other signs" (Siegel, 1995, p. 459). This results in a different ontological approach – away from an external reality towards a reality that is accessible only through our perceptions. The existence of external reality is not dismissed, but our access to it is always mediated by our perceptions. In the case of humans, these contexts are inherently anthropocentric. Although this anthropocentrism is unlikely to be overcome, recognizing it opens the possibility that there may be other interpretations (Resnick, 2003).

Peirce recognized three kinds of signs that were distinguished by the interpretation of the relationship between the object and the sign (Peirce, 1932):

- Icon – the object and the sign share a likeness. For example, a wind turbine is iconic of wind energy.
- Index – features an inherent relationship between the object and the sign; it would not exist without the object. For example, the turning wind turbine is indexical of the wind.
- Symbol – has "a conventionalized but clearly arbitrary relation between signifier and signified" (Rose, 2007, p. 83); a symbol will not exist without an interpreter. For example, the wind turbine is symbolic of decarbonization.

Social semiotics focused "on the process of sign-making, in which the signifier (the form) and the signified (the meaning) are relatively independent of

each other until they are brought together by the sign-maker in a newly made sign" (Kress & van Leeuwen, 2006, p. 8). As with Peirce, social semiotics does not rely on pre-existing relationships but recognizes the complexity of sign-making and not sign-choosing. Each sign has a potential for meaning making. In other words, different signs may have many different potential meanings connected to them through elements such as societal conventions (Kress & van Leeuwen, 2006), and the meaning is determined by a particular context (van Leeuwen, 2005). Further, social semiotics recognizes the concurrent signification of a range of meanings including potentially concepts, interpersonal meanings, attitudes, and beliefs (Morgan, 2006). In relation to the description of Peirce's semiotics above for example, this understanding recognizes the multiple roles of the symbol of the wind turbine in conveying both the concept of decarbonisation and ideas such as hope, innovation, or economy depending on the context of the sign. Rather than focus on the understanding of signs themselves, social semiotics explores how signs are created and used within social settings (Harrison, 2003). Another important tenet of social semiotics is that the meaning of signs does not exist independently of the social or cultural community (Harrison, 2003). Harrison (2003) provides an example regarding the meaning of the colour red: on the Ivory Coast red indicates mourning while in India it indicates procreation and life.

Semiotics of the visual.

Although Saussure privileged language at the centre of semiotics, Peirce's semiotics included other modes of communication, including visual images. Peirce (1932) himself discussed the place of mediums like photographs as signs. In describing social semiotics, van Leeuwen (2005) described a 'semiotic resource' as the "actions and artefacts we use to communicate" (p. 3). Both Peirce and social semiotics recognize that each sign is tied to other signs and that interpretation too can follow many paths as maybe determined by the context or personal perceptions of an individual. Further, different semiotic resources can convey different meanings, or draw meanings in specific directions.

Siegel (1995) emphasized the importance of drawing on multiple sign modes in order to encourage generative and reflective thinking. She argued that translating between different sign systems requires learners to invent connections between the different systems, a process called transmediation. Similarly, the meanings expressed through language and visual communication share commonalities because they are both structured by the same culture, but they cannot be reduced to mean the same thing because the conventions and needs of each result in different meanings (Kress & van Leeuwen, 2006). "The meaning potentials of the two modes are neither fully conflated nor entirely opposed" (Kress & van Leeuwen, 2006, p. 19) and navigating between the different meaning potentials requires reflective thinking.

In addition to the potential learning and reflective benefits of transmediation between language and visual communication, there is also an ongoing change in Western society that is placing "images, gestures, music, movement, animation, and other representational modes on equal footing with language" (Siegel, 2006, p. 65). Although images have been increasingly important within society, for example in disseminating foundational texts, they are often still secondary to language (Kress & van Leeuwen, 2006, p. 18). In education "materials provided *for* children make intense representational use of images; in materials demanded *from* children – in various forms of assessment particularly – writing remains the expected and dominant mode" (Kress & van Leeuwen, 2006, p. 16, italics original).

At the same time that visual modes of communication have been rising in importance, there has also been a debate regarding their connection to reality. Images are often perceived as being universally understood (Kress & van Leeuwen, 2006). Photography, in particular, has often been identified as a direct representation of the world without interpretation. Hulick (1992) stated that photography "has a direct connection to real circumstance and hence to the diurnal reality of a culture" (p. 80). The association between photography and the truth arose from the earlier invention of the telescope. The telescope revealed that technology could support and even extend the ability of the human senses, "it became understood that to see through an instrument (such as the telescope or microscope, and, eventually, the camera) was to see a more profound reality than could be observed by the eye" (Harper, 2000, p. 718). Thus, photographs have been described as a "message without a code" (Barthes, 1977, p. 17).

As an objective eye, photography became closely associated with science based topics and issues in education (Rosenblum, 1997). As science began to dominate, "images, ever more naturalistic, began to function as 'the book of nature', as 'windows on the world', as 'observation', and verbal text served to identify and interpret" (Kress & van Leeuwen, 2006, p. 18). Consider, for example, the format of nature documentaries. Perceived as a direct representation of reality and thus the truth; photography has had a significant impact on both our activities and our thinking (Neblette, 1940). Thus, the history of photography has been largely dependent on a Saussurian perception because it captures evidence of a reality and was therefore not a sign. Peirce (1932) on the other hand, described a photograph as a sign, specifically an index, which has a direct relationship with reality. At the same time because Peirce further recognized that all three types of signs occur concurrently he did not restrict photographs to being exclusively an index. Social semiotics recognizes the importance of the community in how any semiotic resource including images is interpreted (Harrison, 2003).

Kress and van Leeuwen (2006) suggested that the 'old visual literacy' places visual communications as subservient to language, within this structure, images are "regarded as unstructured replicas of reality" (p. 23). A new developing literacy, in their terms, recognizes spoken language as existing "side

by side with, and independent of, forms of visual representation which are openly structured, rather than viewed as more or less faithful duplicates of reality" (Kress & van Leeuwen, 2006, p. 23). Similarly Srivatsan (1991) stated:

> We make sense of, and respond to, the everyday picture and its messages by a process of self-construction to conform to the pattern it beams at us; a pattern which suits the needs of our specific culture, its politics and economy. (p. 773)

This view is more congruent with Peirce's understanding of signs. Piece's semiotics can then penetrate the often unrecognized ideologies present within images, where ideology is understood as "knowledge that is constructed in such a way as to legitimate unequal social power relations" (Rose, 2007, p. 75). At the same time, any knowledge that "sanctions a particular form of social organization must be described as ideological" (Hodge & Kress, as cited in Rose, 2007, p. 76). Thus, there is a need to be reflexive, recognizing that there are multiple aspects that influence both the creation of signs and their interpretation.

Reflexivity contributes to the current study because there are multiple calls for exploring how "diverse ways of seeing" (Rose, 2007, p. 105) lead to multiple interpretations. Within the realm of education and communication about climate change there are calls to match the approaches and messages with specific populations (Lorenzoni et al., 2007; Lowe et al., 2006; O'Neill & Nicholson-Cole, 2009). Shanahan (2007) describes some of the different ways that climate change has been framed in order to target specific audiences. However, Hulme (2009) questions whether this does any more than add to the disagreement surrounding climate change because multiple framings can lead to multiple and contradictory understandings.

Climate Change is more than a Scientific Issue

Education regarding issues of climate change has most often been framed within environmental education: a field which developed on the assumption that accurate information, of which scientific information was viewed as the most valid and accurate, would lead directly to more environmentally responsible behaviours (McInnis, as cited in A. Gough, 2002). In many places, environmental education has been treated "as an element of formal schooling. It was therefore viewed more as part of a curriculum than as a social process, and was very much focused on the natural sciences" (González-Gaudiano & Meira-Cartea, 2010, p. 14). This can marginalize the area because the topics are often viewed as additional science content, rather than truly questioning the dominant worldview and its associated values (Hart, 2002, p. 1240). This approach has continued to dominate the field, despite its limited success (Kollmuss & Agyeman, 2002). Further, the field has generally focused on carbon dioxide as *the* cause of climate change, limiting attention on the deeper societal causes. Selby (2010) stated that

> There is a tendency throughout the present genre of climate change educational materials to characterize the global heating crisis in terms of overtly presenting cause, that is, as a CO_2 problem curable within largely present terms of reference, rather than a problem arising out of the crisis of the human condition, a crisis arising from a disconnect from the web of life, especially among privileged populations, and, hence, a crisis of exploitation and violence coupled with denial. (p. 38)

As Selby (2010) argued, current trends reveal the dominant ideologies that have guided the development and use of signs within education about climate change. An exploration of the current research in the field of education about climate change in North America reveals underlying ideologies, as well as providing means to explore potential areas of conflict and congruence with the ideologies of specific groups within target populations. This contributes to the growing number of calls and suggestions for new approaches (Kagawa & Selby, 2010) and expansion of the field into out-of-school, non-formal, and adult education opportunities (Bangay & Blum, 2010; Kagawa, 2010; Weston, 1996).

Science Education about Climate Change.

One trend in the education research literature about climate change focuses on the conceptions and understandings of learners. It is often the realm of science education within formal education, particularly the natural sciences (González-Gaudiano & Meira-Cartea, 2010), although it is sometimes considered within social studies. Learner misconceptions regarding climate change are frequently the focus of research in this area. For example, Adams (2001) compared high school students and specialists—scientists and policy analysts—in the field of climate change, regarding their understanding of the reasons for scientific uncertainty and disagreement about climate change, and whether action is needed now. Based on the results, Adams (2001) suggested that students should be presented with both certain and uncertain science on an issue, as well as addressing the reasons for uncertainty and disagreement and "strategies for making decisions given the uncertainties" (p. 58).

Shepardson et al. (2009) explored seventh grade students' understanding of global warming and climate change. They suggested that teaching about climate change is important because it provides a personal and social context for studying science, "an understanding that is essential if future citizens are to assume responsibility for the management and policy-making decisions facing our planet" (Shepardson et al., 2009, p. 550).

Both Adams (2001) and Shepardson et al. (2009) implicitly indicated that scientific understanding, as opposed to other areas of knowledge, was key to participating in future societal decisions regarding climate change. This was also seen in Pruneau, Gravel, Bourque, and Langis (2003) who utilized local observation, conceptual change theory, and experiential learning as a context for

building more scientific notions of climate change. They hoped that these elements would contribute to the youth constructing personal opinions about climate change. Although their scientific conceptions did change, the youth also developed some misconceptions during the research regarding the causes and impacts of climate change (Pruneau et al., 2003). Results like these have led researchers to conclude that the models designed to aid in teaching these multidimensional issues give insufficient attention to the nature of science and of scientific knowledge (Colucci-Gray, Camino, Barbiero, & Gray, 2006).

As these examples demonstrate, much of the research on education about climate change has concentrated within science and technology education in formal education settings. Focusing exclusively within these areas of knowledge may portray climate change as an issue that has been caused by, and will be solved by science and technology, without the need to address other aspects of our lives (González-Gaudiano & Meira-Cartea, 2010). For example, the reliance on the science and technology of recycling shields us from the need to confront our consumerism (Selby, 2010). It should also be noted that there are social aspects which allow us to ignore the true causes and needs by pacifying our personal responsibility through guises of corporate social and environment responsibility such as funding education programs or relief efforts. For example, when purchasing a product where the manufacturer indicates that a certain amount of the proceeds will be donated to particular relief effort it can alleviate the guilt that the consumer might otherwise experience if they were confronted by their own consumption in the face of the need for funds for relief.

The concern, however, is not whether we should or should not teach the scientific aspects of climate change, but that we need to question approaches to education about climate change that elevate science above other aspects of culture. Lewontin (1991) described science as a legitimizing institution that, because of the unrecognized but implicit values and interests, ends up reassuring people that the current direction of society is inevitable. According to González-Gaudiano and Meira-Cartea (2010),

> The problem is that science, understood as a value-neutral and aseptic (allegedly nonsubjective) product, has been the dominant approach in educational programs on climate change….The idea implicit in such an approach is that the problem is so complex and serious that only scientists and specialists know the answers, and thus that they are the only ones capable of defining what political actions should be taken. (pp. 14-15)

This however, has not been the case when examining how people make decisions regarding issues of science and technology. Bell and Lederman (2003) found that both individuals who had high levels of relevant knowledge, and those who were more generally knowledgeable both relied more heavily on factors like values, pragmatism, and morals/ethics than they did on scientific knowledge in decision making scenarios. Interestingly, girls tend to be less optimistic than boys

regarding the future role of conventional science and technology in solving environmental issues (Hutchinson, 1997).

This has resulted in a conflict between theory and practice that has been the subject of extensive research and model building. Although the treatment of issues of climate change within science education focus on scientific and technological causes and solutions, multiple studies have shown that decision making on similar topics actually depends on complex interactions between multiple domains and factors (Aikenhead, 1985; Kollmuss & Agyeman, 2002; Kolstø, 2001). As Fischhoff (2007) stated "it is impossible to judge people fairly or to provide them with needed information without knowing what is on their minds when they formulate, resolve, implement, and revise climate-related choices" (p. 7206). Therefore, it is important to know what domains are interacting during decision making and how personal contexts affect these decisions. An individual's personal context may include aspects such as their personal experience of changes within regions they are familiar with, their cultural background, political position, profession, level and type of education, socio-economic status, and the media coverage that they are exposed to.

The 'gap' between knowledge and environmental behaviour.

There is an ongoing exploration of the 'gap' between knowledge and behaviour (W. Scott, 2002). Kollmuss and Agyeman (2002) proposed a model of the gap based on their review of the field. Their model illustrated how external factors, such as infrastructure and politics, interact with internal factors, such as personality traits and value systems, to affect behaviour. Aikenhead (1985) identified several domains that interact when making decisions in the social context of science, including economics, politics, and fine arts. Kolstø (2001) built on this model and suggested that addressing controversial socioscientific issues in education settings requires a cross-disciplinary approach. This is particularly apparent in post-normal science topics where "science alone cannot provide definitive answers nor 'solutions' and there is a need for involvement of the extended peer community" (Colucci-Gray et al., 2006, p. 233). These issues have high uncertainties and/or high decision stakes; further, post-normal science is issue-driven (compared to mission-driven, curiosity-driven, or client serving) (Funtowicz & Ravetz, 1993).

Others have also taken up the call for broadening the approaches used to address environmental topics. Bangay and Blum (2010) argued that to accurately address climate change we need a contextual approach to education, rather than the typical isolation of subjects and topics. A. Gough (2002) concluded that science education is a necessary component of environmental education, but it is naïve to think that science is the only subject needed. She argued that environmental education needs to adopt a holistic approach in order to move past abstract issues, a characterization that fits climate change. A. Gough's description of a holistic approach appears in line with the contextual approach described by

Bangay and Blum. They each imply systems which view the interrelations and interconnections of systems and subjects, rather than privileging reductionist approaches. However, there are others who suggest that such an approach, which still accounts for the traditional boundaries between different subjects, will be unsuccessful because it draws on the same worldview that has resulted in the very problems that we wish to address (Bowers, 2001a). Keiny (1991) stated:

> Our formal educational system, with all respect to the innovative initiatives, is still dominated by the mechanistic, reductionistic approach to science, making us deal with every problem by analytically fragmenting it to components, and organizing it logically in a hpotheto-deductive [*sic*] (hypothetical-deductive) sequence. (p. 174)

She argued that even our environmental cognition is compartmentalized. Concepts like interdependence are viewed as "an intricate relationship between still separate parts" (Selby, 2000, p. 89). As a result, we imagine that there is an object called the environment that we can understand through scientific study and use for our own needs. Brown (2007) asserted that "by defining our problems as either economic or biological, political or philosophical, we reproduce the structure of the academy, but fail to appreciate the kind of essential interconnections that ecological thinking in particular has emphasized" (p. ix). This related to how the conventional culture of schooling sees learning: "as a matter of developing internal representations of a reality that is perceived to be external to and independent of the cognizing agent" (Davis & Sumara, 1997, p. 107). With humans separate from the environment the latter can be categorized as an object that can be exploited or protected (Plumwood, 2001).

This is similar to the earlier discussion regarding semiotics. Saussurian semiotics relies on a view of the world where there is an external reality that is directly connected to the signs that are available for use within human language. This has been the dominant belief within Western society, with science identified as one means of gaining access to this external reality. Likewise, images, and particularly photographs, are perceived as objective and direct representations of reality.

Bangay and Blum (2010) stated:

> If the role of education is to help learners of all ages to develop the knowledge, skills and capacities which enable them to think critically, to solve problems, and to address uncertainty, then the focus of climate change interventions should not simply be on new inputs/content (although those are also necessary), but also on more holistic ways of addressing climate change through high quality teaching and learning. (p. 363)

Further, Lotz-Sisitka (2010) argued that climate change education needs to "harness creativity and be empowering and thus move beyond awareness of the scientific facts about climate change" (p. 73). Broadening the field has the potential for expanding the range of semiotic modes, for example images, which can be utilized to facilitate the required thinking and knowledge. However, examples of such programs are limited.

British artist and filmmaker David Buckland created the Cape Farewell Youth Expedition to bring scientists, artists, educators, and high school students together to address climate change. He suggested that scientists need to engage with artists to communicate the urgency of climate change (British Council Canada, n.d.). Following the expedition there was an art show, a film about the 2005 voyage, and a book created by Buckland (Daniels & Endfield, 2009).

The Center for Biology Education at the University of Wisconsin Madison also brought together artists, scientists, and educators to explore the potential of art to increase public awareness of science. The artists produced pieces that reflected their perceptions of the science of climate change, current and potential impacts on northern ecosystems, and available actions to lessen the impacts (Center for Biology Education of the University of Wisconsin System, 2009). Following the project, the Center developed a website as a resource for junior high and high school teachers on the topic of climate change. The site focused on scientific understanding but does include language arts, social studies, and art to illustrate the interconnectedness between human activities and Earth's systems, as well as the value and importance of art in expressing concepts and ideas (Augustine, 2008).

A few projects have utilized drawings to advance learner knowledge or clarify understandings, rather than as a form of expression as in the two programs above. Shepardson et al. (2009) asked students to draw diagrams to represent their understanding of climate change. They typically drew a greenhouse or a layer of carbon dioxide in the atmosphere. These were very similar to textbook diagrams which "put forward the notion that in order to resolve global warming humans need to pollute the air less, build fewer factories, or require factories to use 'filters'" (p. 562). Alerby (2000) used drawings to access children's thoughts about the environment generally. Four themes emerged from the drawings: clean and unspoiled nature, the need for humans to use nature, environmental destruction, and protecting the environment. These multimodal approaches offer a starting point for more integrated models of education. Utilizing learner created images as the basis for developing understanding and engaging learners as active agents in their own learning can also contribute new ways of thinking for learners, educators, and the broader society.

Climate Change in the Media

Education, which is understood here as including both formal and non-formal approaches, is not the only, or even the primary, source for information about climate change. Mass media is the main source of environmental information for many people (González-Gaudiano & Meira-Cartea, 2010; O'Neill & Nicholson-Cole, 2009). In addition, movies and mediums such as books, also act as sources of information regarding climate change for the public (Lowe et al., 2006). This has particular consequences for how and what information about climate change is presented. For example, movies often focus on disaster narratives which may increase concern regarding climate change, at least in the short-term (Lowe et al., 2006). Watching the disaster movie *The Day After Tomorrow* (Emmerich & Gordon, 2004) resulted in difficulties in distinguishing fact from fiction, and actually reduced viewers' belief in the likelihood of extreme events arising from climate change (Lowe et al., 2006).

News media often draws on stories of events, to present information; this requires "particulars – *this* storm, *this* city, *these* people. Rising sea surface or average global temperatures by contrast, are abstractions, things that no one in particular experiences" (Kolbert, 2009, p. 71). Therefore, "extreme weather is the lens through which many people see climate change, since these are the events that get media coverage and have the most dramatic potential" (Sobel, 2009, p. 111). When news does cover climate change events that are not related to extreme weather they tend to present voices from both the affirmation of human-induced climate change and the voices of skeptics equally, resulting in an informational bias: the less supported voice of the skeptics is amplified to appear equal, or near equal to voices like the IPCC (Boykoff & Boykoff, 2004). This overstatement has not occurred everywhere world; for example, it is relatively common in newspaper coverage in the United States, but not in the United Kingdom (Boykoff, 2007).

It is difficult to find a specific definition of climate change communication; generally there is an implication that the field entails presenting messages about climate change based on scientific and social scientific research to the general public (Ockwell et al., 2009). Often they also require that communication leads to public engagement with climate change. For example, the Center for Climate Change Communication (2012) at George Mason University stated "we use social science research methods – experiments, surveys, in-depth interviews and other methods – to find ways of effectively engaging the public and policy makers in the problem, and in considering and enacting solutions" (More about us section, para. 1).

Images are an important part of communication about climate change because, as Kress and van Leeuwen (2006) have indicated, they are becoming an increasingly important part of society today. Movies, television, internet, and print all can, and usually do, draw on images in order to emphasize, illustrate, or tell a

story. At the same time, capturing images of climate change is extremely difficult because it is a phenomenon that is abstract (Kolbert, 2009), temporal, and unseen (Doyle, 2007). Accordingly, images used often present technical data such as graphs rather than photographic or similar images. Liverman (2009) describes two such graphical images – "Burning Embers" and "Tipping Points" which are "underpinned by a large number of scientific analyses and legitimated through publication and republication" (p. 285). The 'hockey-stick' graph which depicts global temperatures over the past millennium is probably the most famous graphical representation. However, its meaning is still subject to variable interpretations having been used as both evidence of human induced climate change, and of flawed science manipulated to support the existence of human induced climate change (Brumfiel, 2006). These types of images convey different messages, through different modes than photographic images. The interpretation of such images is an important area of future investigation.

Photographing Climate Change

Most of the photographs that are associated with climate change focus on the symptoms (e.g. extreme and abnormal flooding), the effects of the symptoms (e.g. displaced human settlements), and potential sources of mitigation (e.g. renewable energies) (Manzo, 2010a). As these images compose the primary photographic representation of climate change it is important to examine how they are understood. They have been the subject of research, particularly within the fields of communication and media studies.

Creating an Image of Time.

One technique to deal with the temporal nature of climate change is to show a series of photos of a natural feature, such as a glacier, taken over time. For example, photographs of Mount Kilimanjaro from 1970 to the present day illustrated how warmer temperatures and decreased precipitation have resulted in retreating snow lines (Frantz & Mayer, 2009). Photographer and journalist Gary Braasch focuses on climate change. In November/December 2010 his website featured two images as the photo of the week: both of them were of Lake Mead at Hoover Dam taken five years apart and showing a drop in water level of almost 70 ft (Braasch, n.d.). Two challenges to this approach are the validity of attributing a specific event to climate change, and the images require that we either access historical databases of images or that we wait for a significant time into the future in order to capture the before and after. Braasch's (n.d.) images of Lake Mead are questionable as representations of climate change because they only cover a five year time span, and may be influenced by other conditions such as annual fluctuations in precipitation or activity at the dam. As a consequence, photographers often rely on icons and symbols that encourage the viewer to connect the image to a meaning about climate change.

A Place for Climate Change.

Another approach to portraying climate change visually is through images of the environment itself. There is a historical facet to this approach. The association between photography and science, discussed earlier, resulted in a relationship between photography and the environment: a relationship that was reinforced by the Apollo space missions in the mid-20th century. In the 1960s and 1970s the Apollo astronauts looked back to Earth for the first time and captured images of the planet surrounded by the vast emptiness of space (Cosgrove, 1994). The media circulated these images globally and contributed to changing the way in which we thought about the Earth. Generally, the images were interpreted in one of two ways: as representative "of the Modernist technological faith that had launched the Apollo project ten years earlier and [of] the gnawing sense of mistrust in that faith that was increasingly apparent in the closing years of the 1960s" (Cosgrove, 1994, p. 284).

Cosgrove (1985) described landscape as a "way of seeing the external world" (p. 46) that emerged in the fifteenth and sixteenth centuries: it is a visual term. Landscape painting was often associated with "the control and domination over space as an absolute, objective entity, its transformation into the property of individual or state" (Cosgrove, 1985, p. 46). Patin (1999) argued that the natural landscape has been exhibited and presented in an attempt to adopt nature as a cultural resource. Environmental thinking has taken up the landscape in a different manner. Cloke and Jones (2001), for example, draw on the concept of dwelling to acknowledge and understand "how human actants are embedded in landscapes, how nature and culture are bound together, and how landscape invariably has time – depth which relates the present to past futures and future pasts" (p. 664). Traditional landscape photography has also contributed to the relationship between humans and the environment. In the epic landscapes of Ansel Adams for example "the environment becomes a place of being-with the earth" (Giblett, 2009, p. 787). These landscapes were typically devoid of human influence or presence (Beilin, 2005), emphasizing the belief that the world is much bigger than any possible human impact can endanger. This can also be seen in photographs taken at scales other than the landscape.

Alberta's 2008 Climate Change Strategy (Government of Alberta, 2008) public report was filled with images of untouched nature. There were 59 images in the document, all of them photographs. Three showed renewable energies, two showed power lines with clear blue skies, three implied a presence of people, and five showed tree rings that may be of trees that have fallen naturally or that have been cut down by people. The remaining 45 images were of nature – plants, water, sky, and insects – with not even an allusion to the presence of people. Conspicuously absent from the images in the document were references to the petroleum industry. For example, there were no images of Alberta's Industrial Heartland even though it forms a vast industrial landscape in the capital region and contributes significantly to the Alberta economy and climate change.

This portrayal of untouched nature has been challenged by the photographic exploration of industrial landscapes. For example, Margaret Bourke-White's photography in the United States and the Soviet Union, in the 1920s and 1930s: "implicitly praises energetic capitalism and the march of industrial progress…. It is the triumph of human ingenuity over nature that is glorified in her photographs" (Pauli, 2003, p. 19). Others have focused on landscapes that have been exploited by human action.

In the 1970s, an exhibit titled *New Topographics: Photographs of a Man-Altered Landscape*, began a style of photography that was "noted for its cool, detached, and almost scientific documentation of the landscape" (Pauli, 2003). This relates to the connection between photography and science, and photography and reality. The detached nature of the images conveyed a message that there was no human involvement in creating the image; any person in the same place may take the same image. It is an objective representation. However, there is a message embedded within these images as evidenced by the work of Edward Burtynsky, a modern Canadian photographer, who has a style that is similar to the New Topographics. He captures expansive images of the negative impacts of the human relationship with the Earth. Burtynsky has stated that "my work attempts to identify the marginalization of the processes that exist for us to sustain our lives in the city and to find a visual form that offers the viewer the opportunity to contemplate that phenomenon" (Campbell, 2008, p. 42). There are many who credit Burtynsky with raising awareness and alarm regarding the scale of human destruction on the world. At the same time, he is critiqued for his use of the toxic sublime. Playing on the scale and beauty of photographs like those of Ansel Adams, Burtynsky creates beautiful landscapes of the destruction of nature. "For those who are able to see beyond the beauty of Burtynsky's photos, his images do confront us with the scale of the impact 'progress' has on nature, but most likely only those already aware of the issues will take notice" (Cammaer, 2009, p. 128).

Photographs of landscapes have been one of the dominant signs of climate change. The temporal images described above which feature a particular location, like a glacier, over a series of several years would also fit into this category. According to Brönnimann (2002), print media has often used a motif of glaciers and palm trees. Originally this association arose when discussing climatic change in relation to the ice ages, but it has continued as theories of anthropogenic climate change have grown. Juxtaposing a sign of a warm climate, palm trees, with a sign of a cold climate, glaciers, is intended to signify climate change. However, as Brönnimann (2002) emphasized, this juxtaposition can have two different interpretations. On the one hand, it may convey fear regarding climate extremes, but on the other hand, it holds a degree of hope for warmer climates, commonly associated with things like tourist destinations. Therefore, it "expresses an ambivalence towards climate change" (Brönnimann, 2002, p. 93)

In addition, because these landscapes are often from far away regions, they may also convey the message that "changes are only happening in remote places" (Braasch, 2009). One means of combating this effect is by focusing on extreme weather events. These events, like floods and extreme storms, are often featured in the news media because they are concrete events with specific details (Kolbert, 2009). However, in many locations these events are not as evident. Edmonton, for example, experienced extremely high and extremely low water levels in the North Saskatchewan in 2011. These changes did not have significant, if any, economic impacts, they affected very little infrastructure, and went largely unnoticed by residents who do not rely on the river for either their livelihoods or their recreational activities. The American Psychological Association (2009) found that most people's "exposure to and experience of 'climate change' has been almost entirely indirect and virtual, mediated by news coverage and film documentaries of events in distant regions" (p. 34). While there would be some cases where the climactic changes have a more significant impact on people's lives, the majority of people remain relatively unaware of the changes that are occurring. Further compounding the issue of extreme weather is the confusion between climate and weather (American Psychological Association, 2009), and natural versus anthropogenic climate changes (McCaffrey & Buhr, 2008).

Putting a 'face' on Climate Change.

Another means of conveying messages about climate change is by attributing a face to represent the topic as was done by Coca-cola and World Wildlife Fund Canada in the fall of 2011. The partnership between these organizations was intended to raise awareness and funds to protect polar bear habitat (World Wildlife Fund Canada, 2011). The polar bear has long been associated with the popular drink during the winter and particularly during Christmas time in North America; this association led to the partnership and subsequent funding for WWF Canada campaigns. One of the most significant threats to the polar bear is climate change through changing and disappearing sea ice. Therefore, polar bears act as a flagship for climate change. Flagship species have been defined as "species that have the ability to capture the imagination of the public and induce people to support conservation action and/or to donate funds" (Walpole & Leader-Williams, 2002, p. 544). Verissimo, MacMillan, and Smith (2011) suggested that flagship species be defined as "*a species used as the focus of a broader conservation marketing campaign based on its possession of one or more traits that appeal to the target audience*" (p. 2, italics original). Common to both of these definitions is that flagships are selected on the basis of their marketing potential, rather than their ecological significance. Within the field of climate change, polar bears are the most common flagship species utilized in marketing campaigns (Manzo, 2010a).

Despite this prominence however, polar bears are not the only 'face' to be associated with climate change. Art photographer Spencer Tunick also contributed to the face of climate change with his 2007 partnership with

Greenpeace. Tunick photographed 600 volunteers posing naked on a glacier in the Swiss Alps. Tunick said "I want my images to go more than skin-deep. I want the viewers to feel the vulnerability of their existence and how it relates closely to the sensitivity of the world's glaciers" (Greenpeace International, 2007). The intention was to connect human vulnerability with the vulnerability of the non-human world, in this case glaciers.

Other representations of people often rely on connections between issues of global poverty and social justice (Manzo, 2010a). The depiction of individuals, typically located in developing countries, who are or will suffer hardship because of the impacts of climate change have become another 'face' of climate change. These images can harbor political ideologies as well as connections to climate change. The vulnerable being and "their proffered visions of a warming world are inherently political, and bound up not only with fingerprints and harbingers of climate change but also with geopolitical visions of the present and past" (Manzo, 2010b, p. 97).

As this illustrates, the faces of climate change are not without their issues. Polar bears, for example, may not appeal to viewers who are not interested in polar bears (Hulme, 2009). Further, many of these images include fear appeals, a prevalent element within climate change communications (O'Neill & Nicholson-Cole, 2009), which will be discussed shortly.

Adapting to Change.

Another type of sign is becoming more common: images of adaptation and mitigation. Amongst the most prominent of these are images of alternative energy sources. Wind turbines are the most commonly photographed "because evocative paintings and photographs of windmills are arguably the most inspirational (as well as potent) icons of renewable energy" (Manzo, 2010a, p. 205). However, these can carry mixed messages as well. Personal experience with wind farms may associate these images with negative aspects such as noise pollution, visual obstruction, and interactions with migratory bird patterns. Less common in visual representation are other technological approaches such as carbon capture and storage.

Carbon capture and storage was one of the primary means for climate change mitigation of the Government of Alberta until recently. The government fact sheet (Government of Alberta, 2011) on the process contained three images, one of which was a photograph. The photograph was of a man, wearing a hard hat, holding construction drawings, and looking into the distance. The angle looks up at the individual and then beyond into a clear blue sky, which is also where the subject is looking. This photo draws a connection between jobs, clean air, and the future, with carbon capture and storage. Other images are more direct in their representation such as Joshua Wolfe's image of a methane recovery well at a landfill site which focuses on the well, with a dry field in the background

(Schmidt & Wolfe, 2009). Without the context of the caption and the surrounding text it would not be apparent that either of these images connected to climate change, something that is true for most images in this area.

Evident throughout the topics found within the photographic imagery of climate change, are two overarching themes: fear and inspiration (Manzo, 2010a). Each of these connects with the field of environmental photography more generally, having been used both intentionally and unintentionally throughout photographic history.

Fear.

Fear has long been used in photography of environmental issues. Images of animals coated in oil for example, earned early photographers the label of "the prophets of doom" (Cosgrove, 1994, p. 284). Within climate change, many of the topics discussed above can draw on potential fear appeals. A fear appeal is a message that focuses on content which portrays a risk or danger (Leshner, Bolls, & Wise, 2011). Despite the name, these messages may raise emotions other than fear such as anger or sadness. The image of a polar bear at risk of death in the future is largely dependent on triggering fear, or a related emotion, in viewers regarding the potential loss of polar bears as a species. The problem is, that while fear appeals are a common tactic, their success is limited because, although they may heighten awareness, they are rarely effective if the goal is to motivate "genuine personal engagement" (O'Neill & Nicholson-Cole, 2009, p. 355). Viewers identified climate change as a serious problem, but they had trouble recognizing its personal relevance (Nicholson-Cole, 2005). This belief is confirmed by photographs that portray the danger as to someone else, somewhere else. Compounding the issue is that many of these images rely on the ability of the viewer to imagine into the future, something which research has shown is difficult for individuals to do (O'Neill & Nicholson-Cole, 2009). Even the association of acting now to leave children with a livable world requires future thinking. Consequently, "the constant use of fear appeals may act to decrease issue salience and increase individual feelings of invulnerability, if the narratives of disaster and destruction do not ring true or are not 'proven' within an imaginable period" (O'Neill & Nicholson-Cole, 2009, p. 362).

Inspiration.

Inspiration has also been a common theme in environmental photography. Manzo (2010a) identified the inspirational potential of photographs of a variety of subjects as they relate to climate change. Images of positive changes are primary amongst these, particularly the portrayal of renewable energies. The Alberta Government Climate Change Strategy (2008) used images of beautiful nature and of renewable energy technologies to illustrate their document. Additional components, such as accompanying text, or other images, are required in order to anchor the viewer, allowing them to "choose between what could be a confusing

number of possible denotive meanings" (Rose, 2007, p. 87). Denotive meanings are those which describe something directly. However, this raises the question: do these images inspire individuals to action, or imply that action is taking place? Although both interpretations could lead to positive action by the viewer, the latter may indicate that positive things are happening regardless of their personal contribution, or even imply that no action is necessary.

Based on the discussions from both education and communication about climate change it is apparent that a diverse range of approaches, as well as the integration of multiple disciplines, is necessary if the goal is to contribute to a population which values and takes action towards mitigating climate change. At the same time, there is growing recognition that the citizens who are being targeted by these fields are diverse; therefore, there needs to be a connection with personal concerns (Lorenzoni et al., 2007), creating a tangible connection to the everyday (O'Neill & Nicholson-Cole, 2009). In addition, personal concerns need to be connected to the importance of collective action. This is an issue that has been examined within environmental education generally.

The Local Context in Education

Think globally and act locally has been a common slogan in environmental education (N. Gough, 2002); however, as climate change demonstrates, thinking globally does not necessarily lead to local action. Youth demonstrate higher pro-environmental concern for global issues like ozone depletion and water pollution, compared to issues linked to their own lives and material aspirations which has implications for their level of engagement and action (Rickinson, 2001). Climate change is particularly challenging because "the likelihood of seriously and noticeably adverse events as the result [of] global warming is bound to be small for the foreseeable future for many regions of the world" (American Psychological Association, 2009, p. 36). People identify climate change as generally important but not personally salient because of "the perceived distance and remoteness of climate change from one's everyday experience" (O'Neill & Nicholson-Cole, 2009, p. 371).

In addition, the global scale of climate change can lead people to believe that they have no control over climate change, which can facilitate responses such as denial (American Psychological Association, 2009). People have indicated that personal action is necessary but it is "unlikely to make any significant contribution in relation to the scale of the problem" (O'Neill & Nicholson-Cole, 2009, p. 372). The truth of this led Chawla and Cushing (2007) to ask "how can environmental education promote not simply action for the environment, but the most strategically effective action, which includes collective political action?" (p. 438).

Similar evidence led Yencken (2000) to argue for a reversal of the familiar axiom:

> If we do not think locally, we may ignore rich sources of traditional environmental knowledge and devalue local understanding and experience of environmental problems. If we do not act globally, we will never solve the big issues of the global commons. (p. 4)

We must find a way to see the personal context of climate change, and use that context to inspire action, including collective action, that will have global impacts. Urban contexts are one place where this can occur. For example, Keiny, Shachak, and Avriel-Avni (1999) have suggested that starting inquiries with student-generated questions about their local urban context can facilitate the development of ecological thinking which will affect learners' future interactions with the world. Starting with, or, at minimum, including urban contexts, is key to changing perceptions regarding an artificial separation between humans and nature. Cloke and Jones (2001) suggested that acknowledging the interconnections between humans in landscapes and culture with nature requires that we acknowledge urban and industrial landscapes as well as traditionally natural ones.

Bélanger (2003) stated that "on a daily basis, we experience our surroundings and neighborhood, and these affect the development of our mental concepts and representations" (p. 80). This differs from the experience of statistical descriptions of potential outcomes, which are often used to convey information about climate change. Decisions based on repeated personal experience of possible outcomes rely on different processes (associative and affective) which are fast and automatic (Weber, Shafir, & Blais, 2004); on the other hand, decisions which require processing statistical descriptions require learning and additional cognitive effort (American Psychological Association, 2009). If we can shape this experience, so that learners recognize environmental issues in the context of their lives, rather than as a focus for science concepts, or something that matters somewhere else, we can affect how we interact with our global world.

Artificial Separation from Nature.

The disconnection that often persists between humans and nature makes it difficult to recognize signs of climate change within a local environment. Dillon and Scott (2002) argued that "our identities are only artificially separated from our environment" (p. 1112), and perhaps by looking and studying in our local context, by connecting with topics that have primarily been the realm of science education, we can reunite with the environment. With this recognition several authors have argued that the root of our ecological crisis is the view of a dualism between human and nature (Plumwood, 2001). Boundaries such as those which separate humans from nature are arbitrary; however, they have become so common place in our thinking that we take them as fact (Davis & Sumara, 1997). Plumwood (2001) suggested exploiting nature required us to understand ourselves as separate; in addition to the devastation this has caused we have also lost

"certain abilities to situate ourselves as part of it" (p. 98). To develop an environmentally conscious society we need to move beyond these separations (Oelschlaeger, 2007; Sumara & Davis, 1997). This same issue also arose in the earlier discussion regarding the need to engage in cross-disciplinary approaches to teaching and learning. The separations between disciplines are so ingrained in our culture that they are taken as necessary rather than arbitrary. This may also be connected to how we view the act of photography. If we can be separate from the environment then a photograph can be an objective representation of that external place. On the other hand, if humans are part of the environment than a photograph is also part of a larger system involving interpretation and points of view that must be recognized.

In order to address this issue we need a different approach. As a new literacy which is significantly more multi-modal and places increasing value on visual communication develops, it may also provide an avenue to break down these arbitrary separations. While examples of this are not common they do exist, such as the Cape Farewell Youth Expedition and the Centre for Biology projects described above.

One of the gaps that has been identified in education and communication about climate change is understanding and recognizing connections with the local and personal contexts of specific groups and populations. This is necessary because although there are dominant messages and signs of climate change that are prevalent in society there is still a significant lack of personal concern amongst many in North America (Frantz & Mayer, 2009). For the same reasons, we also need new methods of developing these messages. For example, scientists who are trained in analytical processes and thinking do not require the same processing time when confronted with messages which rely on these approaches (American Psychological Association, 2009), and are more likely to recommend their use. Different groups of people, even within the same community, will have different ways of looking at and interacting with the world around them, framed by their prior knowledge, beliefs and values. Weber and Sonka found that recollections of farmers regarding temperature and precipitation trends over a period of seven years were biased to support their belief or denial of climate change (as cited by American Psychological Association, 2009). Further, there is a need to explore the ambiguities and inconsistencies that appear when comparing beliefs with actions. Lorenzoni et al. (2007) stated that we need in-depth research regarding how "people reconcile their awareness and concern about climate change with lifestyle choices and pressures" (p. 448).

Photography as a Pedagogical Resource

Photography has been utilized in a wide variety of efforts to communicate about climate change. These include media, marketing, and educational efforts. However, it is less common to ask individuals or groups to create their own photographs of climate change. Photography in education may be the subject of a

particular class, or section of a class intended to teach principles and practices of photographic arts; however, it is rarely used as a resource for learning in other areas (Cappello & Hollingsworth, 2008). A few examples exist which focus on the benefits of student generated photography for language arts learning.

Generally, photography has been used to extend learning and thinking related to traditional reading and writing objectives. At the same time, educators and researchers are becoming increasingly aware of the complexity and variety of modes of communication such as "images, gestures, music, movement, animation, and other representational modes" (Siegel, 2006, p. 65) that are required in the world of television, film, and the internet. As a result, there are calls for and examples of multimodal approaches to teaching-and-learning literacy which expand reading and writing beyond the use of written language. This is not dissimilar to the situation in climate change where much of the information is presented using multimodal systems such as still and moving images, in addition to verbal and written language. Consequently, these studies reveal how autodriven photo-elicitation can provide new tools for education about climate change that build on interdisciplinary and holistic approaches.

In response to the changing world, literacy studies are exploring the importance of multimodality. Children, and adults, do not just make meaning through traditional text; "talking, gesturing, dramatizing, and drawing" (Siegel, 2006, p. 66) also play important roles. One of the means of exploring this is photography. For example, Cappello and Hollingsworth (2008) utilized student photography to examine the role that multimodality can play in narrative composition. The students took photographs that they then used as prompts when writing stories. This increased the variety of tools that participants could use to express themselves. As well, the cameras "allow the researchers an opportunity to see the insiders' view" (Cappello & Hollingsworth, 2008, p. 445).

Byrnes and Wasik (2009) used photography with young children in order to improve language learning. They found that when students were allowed to take photographs without adult supervision, the pictures "appeared to capture the children's view of and interest in their world, a view that was not filtered by an adult's perspective" (p. 244). It was not evident in the research literature whether adults or older youth will adjust their photographs to fit with what they think is desired. Marquez-Zenkov and Harmon (2007) used photography to investigate students' literacy habits in order to develop strategies that would promote student engagement and achievement. There is potential to apply photo-elicitation to education about climate change in order to investigate learner experience, which is an area of research that is currently lacking (Rickinson, 2001).

In one final example, Allen and Labbo (2001) used photography with pre-service teachers. Their goal was for the students to take photographs that would help them to recognize the role of culture in their own lives. This was done because culture is often assumed to be something that someone else has, rather

than something that shapes your own life. The acts of photography, in addition to the subsequent discussions, helped participants to recognize elements of their own culture in order to become more culturally aware in their own practice of teaching. These projects each illustrate how photography can be used as a pedagogical tool to increase awareness of taken-for granted assumptions, or serve as another resource in order to stimulate and broaden ways of thinking. They also highlight the potential of photography to reveal an insider's perspective, whether that is the perspective of a child, or of an adult embedded in a particular culture, or lifestyle. All of these are valuable avenues for education about climate change to pursue.

The Opportunity of Outdoor Education

Despite calls for interdisciplinary approaches to education about climate change, there can be resistance from educators, some of whom prefer to maintain the integrity of their subject rather than be involved in extensive interdisciplinary teaching (Gayford, 2002). Further, there can be questions regarding the qualifications of teachers, educated within specific subject areas, to teach holistic programs (Keiny, 1991). Assessment practices may also reduce the ability and/or willingness of educators within K-12 schools to engage in interdisciplinary approaches because the assessments are often discipline based. Thus, educators who are engaged in areas outside of core subject areas may have an advantage. They are often less constrained by the assessment standards of formal schooling or a curriculum shaped by disciplines and may therefore be able to explore topics from different and potentially more contextual approaches. Multimodal approaches, such as the use of art, also show some promise because they do not require educators to be experts: the focus is on learning and discussion. At the same time, they offer learners new tools with which to examine issues and enhance their own learning through the process of transmediation (Siegel, 2006). Transmediation is a process in which learners "retranslate their understanding of an idea, concept, or text through another medium" (Albers, 2006, p. 90). The process does not presume that each individual is creating meaning but that they are interpreting their understanding through multiple mediums. Thus, it provides a way to deepen understanding regarding issues such as climate change.

There are many opportunities for out-of-school and after-school programming. Many of these are designated for learning "that is not designed in many instances to meet the formal institutional structures and demands of schooling" (Vadeboncoeur, 2006, p. 239). Others are designed specifically to contribute to curricular understanding within the formal school system. There are calls to increase these out-of-school experiences within formal science education in order to increase the validity of school science, and motivate students to study science (Braund & Reiss, 2006). Out-of-school groups, when directed towards environmental and outdoor experiences, have been cited as important life experiences in the development of future environmental concern and action (Chawla, 1998a; Chawla & Cushing, 2007). The groups provide children and

youth with safe and respectful places "to play, explore interests, develop talents, and express themselves…. [further, they] allow rehearsals and performances of newly learned abilities, roles, and literacies" (Vadeboncoeur, 2006, p. 243). The safety of these environments, and the absence of formalized testing which may influence how educators and learners respond, makes these non-formal learning groups ideal for exploring education about climate change.

Outdoor education is one method of out-of-school opportunity that can contribute to significant life experiences. The word method draws on an address given by Dr. John Kirk at the *International Congress for Health, Physical Education, and Recreation* in 1968. He described "outdoor education as the method which utilizes the natural environment to cultivate in students a reverence for life through an ecological exploration of the interdependence of living things and to form in them a land ethic illustrating man's temporary stewardship of the land" (Kirk, 1968, p. 1). He continued, stating that good outdoor education integrates all areas of the curriculum and should not be confused with outdoor recreation, although recreation and natural sciences are both involved.

Despite Kirk's (1968) assertion regarding distinguishing outdoor education and outdoor recreation many organizations blur these lines. Organizations generally operate along a spectrum of out-of-doors activities and learning. For example, for one organization the priority may be teaching and facilitating outdoor recreation opportunities; for another the focus may be discipline specific, often science, learning that happens outside. In the middle are organizations who engage in a range of these outdoor recreation activities while also addressing topics such as scientific learning, stewardship, or conservation.

Climate change and outdoor activities.

The impacts of climate change on outdoor activities are a current area of research. Focusing on the outdoor tourism industry, recent research has indicated that travel for outdoor opportunities contributes a significant amount to causing climate change (Hall & Higham, 2005). The activities also have impacts, both positive and negative. For example, campfires contribute particulate matter and greenhouse gas emissions to the atmosphere; on the other hand, cycling can reduce car use significantly, leading to fewer greenhouse gas emissions. These activities are also being affected by climate change. Changes in seasons, biological diversity, and the aesthetics of destinations all have the potential to enhance and hinder outdoor opportunities. In Canada, climate change will likely result in expanded levels of warm-weather recreation; while reduced water availability will restrict recreational opportunities that are water-based or in areas that rely on water allocations to maintain greenspaces such as golf courses and playing fields (D. Scott, 2011). Winter-based recreation will likely be reduced due to warmer winters and less snowfall; this poses a threat, not just to the economy, but also to the "cultural identity of many communities" (D. Scott, 2011, p. 14). Outdoor education has the potential to positively influence this field by

introducing participants to local opportunities, raising awareness of the impacts of both climate change and outdoor activities, and exposing participants to new activities that can help reduce their personal impacts.

In addition, outdoor education can impact the relationship between individuals, communities, and the environment at a broader level. Direct experience with nature, beginning with local spaces, is important to developing future environmentally responsible behaviours (Chawla & Cushing, 2007). Engaging both learners and educators with local spaces through outdoor education has the potential to develop a sense of place, important to developing environmental cognition, attitudes, and values (Giesbrecht, 2008). Urban ecosystems are ideal places from which to begin to understand the complexity of the natural environment (Chawla, 1999) and the social environment, because it is the context that most learners are familiar with and have the greatest opportunities to explore and understand. Outdoor education provides an opportunity for participants to connect with the natural world and begin to re-envision their own positions in "the total spectrum of life and living things" (Kirk, 1968, p. 10). These facilitated experiences are increasingly important as we spend the majority of our time indoors (Frantz & Mayer, 2009) and our natural spaces are pressured by development.

Edmonton provides a relatively unique urban context for outdoor education and recreation. Running through the city is an expansive river valley (Figure 1). The area is minimally developed for recreation, with cross country ski trails in the winter and both paved and dirt trails in the summer. There are some urban park facilities, as well as some manicured parks located throughout the valley. Since the early 1900s, successive City Councils have advanced protection for the region, allowing significant amounts of the valley to develop naturally (The Office of Natural Areas, 2007). However, there is increasing pressure on all of Edmonton's natural areas from rapid development of natural and agricultural landscapes. "It is no longer possible to separate 'environmental issues,' 'quality of life' and 'economic necessity'" (The Office of Natural Areas, 2007, p. 7). It is within this system that a significant amount of outdoor education occurs, thus providing ample opportunities to experience nature and examine the relationships between humans and nature.

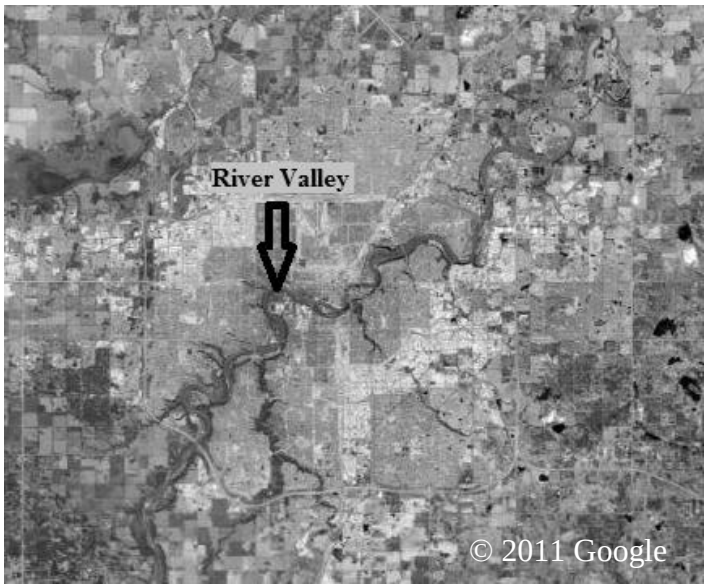


Figure 1: Edmonton and Region with North Saskatchewan River Valley

In order for outdoor education to achieve its potential, educators must be prepared. This does not mean that they will be knowledgeable in all aspects of the scientific, social, and political domains of the field. However, it is necessary to explore their own relationship with the environment on which they rely and thrive. It is also necessary for educators and administrators to engage with each other regarding the contexts of climate change. Photo-elicitation has the potential to facilitate this conversation and better enable educators to act as guides for participants on their own journeys.

Conceptual Framework – Ecological Thinking

One of the goals of education about climate change is to enable learners to respond to the current and future challenges involved in addressing this global issue. While much of the research literature in environmental education has focused on the gap between knowledge and behaviour (W. Scott, 2002), there is growing recognition that education that focused on encouraging specific pro-environmental behaviours has been inadequate to deal with issues like climate change. There are numerous calls for fundamental changes in how we perceive our relationship with the world (Hart, 2002; Kagawa & Selby, 2010; Plumwood, 2001; Selby, 2000; Stables, 2001b; Weston, 1996, 2007). Amongst these calls there are many who recognize the concept of ecology as a basis for change.

The field of ecology has moved from closed to open systems. One of the most significant consequences of this move is the change in how humans are perceived: humans are now "recognized as important components of systems rather than intruders who disturb the system's equilibrium. As insiders, we *interact* within the system, and as *reflectors*, we are responsible for our own actions and knowledge-constructions" (Keiny, 2002, p. 1).

Ecologist Gregory Bateson claimed that "o*ur own survival depends on understanding that not only are we coupled to our own conceptualization of ecosystems and ecological order, but also to embodiments of our own ways of thinking about them and acting on them*" (Harries-Jones, 1995, p. 8, italics original). Building on Bateson's 'ecological consciousness,' Keiny (2002) developed the concept of ecological thinking as a way of "rereading" (p. 204) the world. "Instead of isolating the natural environment, protecting its so-called equilibrium against humans' scientific and technological interventions, human interaction and involvement should be viewed as the fundamental principle of ecological education" (Keiny et al., 1999, pp. 325-326). Ecological thinking is further proposed by authors, such as Plumwood (2001), as a means of escaping the mechanistic and dualistic nature of the current dominant ways of thinking.

This is not the perception commonly understood within the scientific field of ecology. An introductory university textbook defines ecology as "the study of the interactions between the organism and the physical and biological components of its environment" (Krohne, 1998, p. 705). Bateson's theories of ecology, on the other hand, question the quantitative roots of ecological study. As a result "many scientists who have read Bateson remain unconvinced about the validity of his science" (Harries-Jones, 1995, p. 7). Nonetheless, the concept of ecological thinking is one which has enticed educational theorists, and has been subject to a variety of descriptions. Many of its tenets are evident in theories by other names such as systems theory, enactivism, and second-order cybernetics; the framework of ecological thinking includes the following assumptions.

Basic Assumptions.

Ecological thinking draws on the ontology and epistemology of second-order cybernetic theory. Ontologically, we can only see reality as mediated through our human perception; further, "reality is the sum total of all the different conceptions of reality, carried by the participants in a particular context" (Keiny et al., 1999, p. 324). Consequently, knowledge is a construct where what is claimed to be knowledge is that which is agreed upon as the best interpretation at the present time.

Recall, that Saussurian based semiotics recognized an external reality in which signs were available for use (Kress & van Leeuwen, 2006). Peirce, on the other hand, believed that there was always an interpretation that mediated knowledge of the world (Siegel, 1995). Therefore, Peirce's understanding of semiotics is consistent with ecological thinking.

Ecological thinking recognizes that the parts of a system are all intertwined and that the boundaries between them or between systems are arbitrary and ephemeral. Consider, for example, how the boundaries of a city are defined within a larger area. Is a squirrel part of the city if it lives exclusively within the political boundaries of the city? How about a cougar that passes

through the city? What about the abiotic features such as water or air, when are they municipal and when are they not? At the same time, this forms the basis for one of the criticisms of ecological thinking. Ulrich (1993) described why this is problematic: it "requires us to go through a never-ending process of expanding the boundaries of our problem definition" (p. 584). Within the context of climate change, there is a risk that if we acknowledge that we cannot access a *True* description of the problem, we cannot take action because it may be wrong or even unnecessary. It is not that boundaries cannot be created, but that we must acknowledge that they are arbitrary, and acknowledge that past and future excursions will set those boundaries differently. Therefore, we must take responsibility to continually consider our context, and to act with what we currently understand and experience.

The main principle in ecological thinking is "interaction in the sense of interdependence and interrelatedness between the different components of the world, in both the natural and the social contexts" (Keiny et al., 1999, p. 325). Humans are capable of being both embedded in the system and able to reflect on the system. Therefore, "as the learner learns, the context changes, simply because one of its components changes. Conversely, as the context changes, so does the very identity of the learner." (Davis & Sumara, 1997, p. 111). Personal responsibility and involvement are both key values. This is one of the ways in which ecological thinking is distinguished from frameworks like critical thinking and systems thinking: ecological thinking "involves the learners value judgements" (Keiny et al., 1999, p. 315), not just the cognitive domain.

Within education, ecological thinking asks learners to "become *aware* of their relationship within the system and better able to conceptualize it into a model, which could enable them to take responsibility for changing or preserving their urban ecosystem" (Keiny et al., 1999, p. 326). In other words, ecological thinking enables learners to look at a system, with its many inter and intra-relations. This can be applied to both urban and more natural systems because it recognizes that the urban system is part of a larger system in which humans and other elements of nature are all embedded. Other frameworks can enable similar development; however, unlike concepts like second-order cybernetics, ecological thinking views education and the world as organic rather than as "a 'technological' productive enterprise" (Keiny, 2002, p. 201).

> Ecological thinking represents an alternative vision of educational change, replacing current top-down and bottom-up models. The latter, based on linear thinking, imply causality as well as power and control. In contrast, ecological thinking involves a circular, collaborative and interactive orientation of learning. It is both the process and the product, with emphasis placed on the double role of all participants, teachers, students, researchers and all those who take part in the learning process." (Keiny, 2002, p. 197)

As a final note to conclude this section, I am also drawn to ecological thinking because it is the way in which I have thought about the study of ecology. In pursuing an undergraduate degree in biology with a significant ecology focus, I found that I was drawn to the holistic and interactive view of the world, and rejected the quantitative restrictions. That a population should be reduced to an equation of birth and death rates unsettled me in my own studies. Further, my previous experiences and thoughts regarding environmental issues led me to question the superiority of quantitative and reductionist approaches in solving many of our issues. I actually turned to education in order to pursue my interests because I recognized the importance of the social domain in environmental issues. Therefore, ecological thinking, as described by Keiny, fits well with my own interests and experience.

3. Methodology

The current study examined how outdoor educators visualized their own understandings and thoughts about climate change through photography. With this purpose in mind the study followed the tradition of qualitative research. The main principle of ecological thinking is interaction amongst all the different components of the world. Therefore, a qualitative approach was appropriate because it "represents human beings as whole persons living in dynamic, complex social arrangements" (Rogers, 2000, p. 75). Fundamental within the purpose of this study was a need for description and interpretation, which is the goal of qualitative research (Rossman & Rallis, 2003). Speaking directly with regards to understanding how people think and act about climate change Lorenzoni et al. (2007) stated that qualitative methods are more appropriate than quantitative "to explore the reasons *why* opinions are held or *how* they are influenced" (p. 448, italics original).

There are calls for increasing the relevance of education and communication about climate change to specific contexts and groups of people. This has been done to some degree by framing messages to match the ideology of specific groups (Shanahan, 2007). However, with the exception of a few studies discussed in the literature review, the majority of image studies examined images that were created by organizations or individuals in order to relay a message to someone else. This employs a top-down approach, creating and using icons determined by scientific and related experts (O'Neill, 2008). The current study asked how images created by individuals who are not scientific experts are different from these top-down creations. A random sampling of a large and diverse population would not delve into the unique subcultures that exist within any society, it seeks to create an average where there likely is not one; in other words, it would create a generalization which would lead "one to see phenomena more simplistically than one should" (Stake, 1978, p. 7). Further, the "focus is on a contemporary phenomenon within a real-life context" (Yin, 2009, p. 2) and the boundaries between the context and the phenomenon are often blurred. Therefore, a specific case was identified as the unit of study.

Defining the Case

Outdoor educators are well positioned to address issues of climate change within the context of their teaching environments; to be able to do this the individuals need opportunities to examine the issues themselves. Therefore, the boundaries for choosing a relevant case were outdoor educators within Edmonton. Intrinsically, the current project focused on the particularities of a specific case (Stake, 2000); at the same time, it was also an instrumental case (Silverman & Marvasti, 2008) because it provided insight into some of the potential differences and their consequences regarding how climate change is constructed visually from a bottom-up approach, rather than a top-down one. The context and phenomenon investigated the specific group of outdoor educators and the influence of a

particular context on the photographic representation of climate change generally. This is vital if we are to respond to Fischhoff (2007), who suggested that we must know how and what different people are thinking when they make climate related decisions if we are to provide them with necessary information to inform those decisions.

Sampling Method

Although any specific group would potentially be of interest when examining how individuals visualize and relate to climate change, outdoor educators were the focus of this study. This arose in part because of my own experience as an outdoor educator and the interest of a particular group of outdoor educators in the project; but also because of the positioning of outdoor educators within education and society to be able to introduce and educate participants about environmental issues within an outdoor context. This situated the sample theoretically (Silverman & Marvasti, 2008) as a population which has the potential to influence others regarding their interactions with the natural environment and attitudes and actions relating to climate change.

In purposive sampling, a case is chosen "because it illustrates some feature or process in which you are interested" (Silverman & Marvasti, 2008, p. 166). Further, "the researcher actively selects the most productive sample to answer the research question" (Marshall, 1996, p. 523). In order to answer the research questions a particular research population was identified: outdoor educators. Within Edmonton there are four facilities or organizations that engage in outdoor education of some sort; each one might provide the boundaries for a case. Three of these organizations/facilities have a central focus on science and/or social studies education in natural settings. The fourth is unique, focusing primarily on outdoor activities, such as canoeing, cycling, and cross country skiing, but with the intention to address scientific, social, and environmental concepts within the programs. This was the group that was chosen as the sample for this study because its focus on outdoor activities allows the outdoor programming to act as a context and method for exploring the relationship between nature and humans; and cultivate in participants a love of being active in natural environments. The RVP mission is "through directed play, we will instil in Edmontonians skills and values that will remain with them the rest of their lives, including stewardship, companionship, environmentalism and conservation" (River Valley Programs, 2011). At the same time, personal communication with staff indicated that they do not often come to the organization in order to educate or learn about issues such as climate change and can therefore feel unprepared to address the complex topic.

Context of the case.

Edmonton was an interesting location for this research study. On the eastern edge of the city is Alberta's Industrial Heartland, the largest hydrocarbon processing region in Canada (Alberta's Industrial Heartland Association, n.d.). The city has also experienced significant growth within the last decade which has

increased pressure on city resources and natural areas. At the same time, Edmonton was invited to participate in the international project *Local Action for Biodiversity* on the basis of past initiatives in sustainable development and support for biodiversity (ICLEI Local Governments for Sustainability, 2006). The North Saskatchewan River Valley, which runs through the centre of the city, is the largest protected urban parkland in North America (The Office of Natural Areas, 2007). Prior to a major flood in 1915 the river valley had been subjected to industrial use, such as coal mines, brick yards, lumber operations, and gold mining operations (Herzog, 2004). Following the flood the attitude towards the river valley changed and industrial use in the area faded; the first zoning bylaw protecting the area was established by the City of Edmonton in 1933 (Herzog, 2004). The City first implemented a greenhouse gas reduction strategy in 1999 (City of Edmonton, 2010).

The City of Edmonton's environmental strategic plan, *The Way We Green* (2012a), included, as part of the vision, the statement "in the course of everyday life, Edmontonians experience a strong connection with nature and rich biodiversity" (p. ii). There was also discussion regarding collaboration and learning in relation to living sustainably. In order to implement this vision the City of Edmonton (2012a) highlighted the role of educators "to communicate key information about Edmonton's sustainability and resilience challenges, and actions that citizens can take" (p. 14). River Valley Programs is in the Department of Community Services. The Department runs a wide range of programs for schools, groups, families, and individuals. RVP is dedicated to providing outdoor education opportunities for children, youth, and adults through registered and drop-in programs. This focus means that RVP is one of the municipal programs being asked to provide educational opportunities, with the intention of engaging the public in sustainability initiatives. This is emphasized by RVP's mission, which discusses aspects of sustainability including stewardship, companionship, environmentalism, and conservation.

Part of the RVP culture is that former staff are often involved in programming, training, and/or program development with the organization. Further, there are friendships and other relationships between current and former staff that continue to influence the organization. Therefore, former staff were included in the case in order to acknowledge the fluid nature of the staff in the organization.

Individual participants.

The individual participants within this study were considered as part of the case described above. During data analysis the participants' photographs were maintained within groups defined by the individual rather than the theme they addressed. In this way the individuals were embedded within the case, while maintaining distinct boundaries from each other.

Individual participants were recruited through existing RVP communication channels: a Facebook group for past and current staff (16 members), email contacts (six individuals), and at spring training in 2011 (15 individuals). A message was sent electronically or verbally presented with a brief description of the study and an email address for interested individuals to contact for more information (see appendix A). The email message also included a request to forward the email on to other current and former staff who may be interested. There was some overlap between these four approaches and people who forwarded the message did not indicate how many people they had sent the email to themselves; therefore, the total number of potential participants contacted was at least 31. 10 people participated in the project for a response rate of approximately 35%.

Research Design Overview

Within the current study, outdoor educators living in Edmonton, Alberta engaged in visualizing and relating to climate change through photography. The study utilized autodriven photo-elicitation. The photographs were discussed as a group in order to contribute to the social and community learning processes that have been identified as vital to adult environmental education (Bélanger, 2003; S. Kaplan, 2000). The photographs, artist statements, where available, and transcripts of the group discussions formed the data set for this project.

Photography.

Photography has been used within anthropology as a means of documenting the context and the social events of a community (Collier & Collier, 1986). Traditionally, there have been two understandings of photographs: as a work of art which embodies "the personal concerns of the photographer-artist" (Schwartz, 1989, p. 120) or as an objective, unbiased record of reality. The latter perception is based on an understanding which considers the seen "as evidence, as truth and fact" (Bal, 2003, p. 14). The photographer plays an active role in determining the image in both categories because they consciously decide on what highly selective piece of a scene to include; the time, the place, the people, the distance, and angle are also part of the photographic interpretation of reality (Becker, 1974). This recognition has led others to conclude that no photograph is truly an objective replication of reality (Goldstein, 2007). The spectator or viewer also has a role "in the process of constructing photographic meaning" (Schwartz, 1989, p. 120).

Both language and visual communication develop within specific cultures; therefore, there is a "considerable degree of congruence between the two" (Kress & van Leeuwen, 2006, p. 19). However, one cannot be reduced to become the other because each has different requirements based on the conventions of the genre, as well as different needs; consequently, the two modes will always have related but not identical meaning potentials (Kress & van Leeuwen, 2006). Embedded within this, is the recognition that "viewing photographic imagery is a

patterned social activity shaped by social context, cultural conventions, and group norms" (Schwartz, 1989, p. 120).

In addition to the variation in how we respond to, and create visual communication versus language,

> Our world is increasingly inundated with visual representations that contribute to the meanings that our participants carry around in their heads…. image-based research holds great potential for supplementing other forms of social knowledge that will strengthen, challenge, and contradict the way we understand the social world of ourselves and others. (Stanczak, 2007, p. 20)

Therefore, it is important not just for people to develop critical visual literacy in order to participate in our increasingly multimodal world, but also to create their own images in order to interact in multimodal ways. Autodriven photo-elicitation provides one means for research participants to contribute both photographic and language-based interpretations of the meanings that they have.

Photo-elicitation.

Photo-elicitation, in its most basic form, draws on photographs within a standard interview (Harper, 2002). According to Schwartz (1989), "the photo-sets function like a semistructured interview schedule to create an ordered sequence of data elicitation" (p. 143). In the 1960's Collier conducted the first interviews which used photographs as a guide (Collier & Collier, 1986). The photographs were taken by the researcher and then presented to the interviewees as a prompt to stimulate discussion regarding certain aspects of the community. This was an early use of photo-elicitation interviews that continues today.

This approach is different than interviews that are based on words alone because of the "ways we respond to these two forms of symbolic representation" (Harper, 2002, p. 13). Harper expanded this point further, describing how the areas of the brain which process visual information are different than those which process verbal information; therefore, they trigger different ways of thinking and different responses. Photo-elicitation may draw on photographs which document objects, people, and artifacts; the collective or institutional pasts; or "intimate dimensions of the social – family or other intimate social group, or one's own body (Harper, 2002, p. 13).

Another method of utilizing photography within research is photovoice. "Photovoice is a process by which people can identify, represent, and enhance their community through a specific photographic technique" (Wang & Burris, 1997, p. 369). There are three main goals associated with photovoice: 1) "conduct participatory needs assessment," 2) "promote critical dialogue and knowledge," and 3) "reach policymakers" (Wang & Burris, 1997, p. 370). This differs from photo-elicitation which can focus on a wider range of goals and does not

necessarily include a focus on social change; although there may be significant crossover between the two approaches depending on the topic, the researcher, and the participants.

Returning to photo-elicitation, there are different approaches to photo-elicitation interviews. As mentioned above, Collier took photographs that he then used as prompts during the interviews (Collier & Collier, 1986). This approach tends to be utilized within theory driven research, or projects where the researcher wishes to gain a better understanding regarding a particular aspect of society (Clark-Ibáñez, 2007). The photography can help to engage the researcher with the community as community members begin to recognize the researcher and gain understanding of the researcher's intentions and interests (Schwartz, 1989). This approach has a few limitations. First, the researchers' interests and focus can affect the photos taken, potentially missing a meaningful aspect (Clark-Ibáñez, 2007). Second, there is often a tendency towards capturing the visual images that are the most arresting, startling, or beautiful, rather than what is actually meaningful for participants (Clark-Ibáñez, 2007).

A second approach, autodriven photo-elicitation interviews, engages participants in creating and taking the photographs that are used during the interviews. In this approach "the informant's response is driven by stimuli drawn directly from his or her own life" (Heisley & Levy, 1991, p. 257). Typically, the participant takes photos relevant to a particular experience or topic, and then the photos "form the basis for the child's [participant's] discussion of his or her experience" (C. Clark, 1999, p. 40). This allows the participants to self-select pertinent events and experiences from their own lives.

In both types of photo-elicitation the photos can "lessen some of the awkwardness of interviews because there is something to focus on, especially if the interviewee takes the photographs: they are familiar with the material" (Clark-Ibáñez, 2007, p. 173). They also become sites of group communication as the photos often engage individuals who were not initially part of the interview such as family members (Clark-Ibáñez, 2007; Collier & Collier, 1986). Based on evidence from photo-elicitation projects, Harper (2002) concluded that photo-elicitation interviews illicit more and different information because of how an individual responds to verbal versus visual information. When the researcher is responsible for taking these photographs the research "may be limited by the researchers' interests and miss an essential aspect of the research setting that is meaningful to the participants" (Clark-Ibáñez, 2007, p. 171).

In autodriven photo-elicitation the photographs provide a medium to visualize a participant's thinking because "the very act of observing is interpretive, for to observe is to choose a point of view… thus the decisions of the image maker have profound effects on the kinds of sociological statements that result from their images" (Harper, 2000, p. 721). From a research context, this approach simultaneously gathers data and empowers the interviewee (Clark-

Ibáñez, 2007). The conception of learners as active agents, which they become in the process of autodriven photo-elicitation, has not been examined significantly within environmental education (Rickinson, 2001), and can contribute to their personal feelings of self-efficacy, a determining factor in an individual's willingness and ability to act (S. Kaplan, 2000).

Photo-elicitation should be "regarded as a postmodern dialogue based on the authority of the subject rather than the researcher" (Harper, 2002, p. 14). It also creates a more comfortable environment for the interviewee (Clark-Ibáñez, 2007). These factors can contribute to addressing the issues identified above. Individuals in specific populations are empowered to create their own meaningful reflections regarding climate change. And the images can provide stimuli to examine inconsistencies between behaviour and beliefs because the photographs can serve as both "a tool to expand on questions, and simultaneously, subjects can use photographs to provide a unique way to communicate dimensions of their lives" (Clark-Ibáñez, 2007, p. 177).

Relevance of autodriven photo-elicitation for this study.

Autodriven photo-elicitation contributed to examining the personal context in education and communication about climate change in order to increase the relevance of the subject and awareness of issues within our lives. "Education provision is likely to be more meaningful, and participation in learning processes more active, when programmes deliver knowledge and skills which are relevant to local contexts and needs" (Bangay & Blum, 2010, p. 362). Autodriven photo-elicitation provided one means of engaging participants in active creation and exploration of their personal contexts regarding topics like climate change. Further,

> The goal of taking a semiotic perspective is to help teachers and students to become adept, not only at the reading of signs, symbols, values, and meanings about the environment, but to also become skilled as creators of the signs and symbols that allow them to contribute new insights into the ways we use and respect the environment" (Shapiro, 2010, p. 57).

Facilitating the creation of images by learners and educators changes the context from one which is created for them and they are, in some way, required to be able to relate to it; to one which they are embedded within, which is meaningful and familiar to them because it is their personal context.

There has also been discussion regarding learner control within multimedia environments. In traditional learning environments, based on resources like textbooks, the order in which information is examined is dictated to the student, and often the instructor, by the resource. "In contrast, multimedia environments are characterized by the ability to present information in a nonlinear or random access fashion" (Lawless & Brown, 1997, p. 118). Both cases, learner created images and learner control in multimedia environments, encourage the

learner to take control of their own learning which "can positively influence effectiveness and efficiency of learning" (Lawless & Brown, 1997, p. 119). In addition, Papert (1993) suggested that active involvement in the design and construction makes artifacts more personally meaningful and, as a result, learning is more effective. This approach also increased participant/learner ownership of the images allowing the learner to create a narrative which can become a site for broader storytelling and reflection, discussion, and analysis by the broader community (Lykes, 1997).

Beilin (2005) examined the agricultural landscape through autodriven photo-elicitation. Unlike traditional photography where the landscape is perceived as a background with the viewer standing outside of the frame looking in, the agricultural landscape "is the real-life stage, not a background" (Beilin, 2005, p. 57). This is a beneficial direction for research into education and communication about climate change because the landscape of climate change must be understood as connected to people, because it is primarily people acting within, and on, the landscape who are creating human-induced climate change; and the most relevant impacts of climate change for people are those that affect the human landscape.

Photography, in addition to drawing attention to the landscape as the stage of human action and the consequences of climate change, can also draw attention to the elements of the participants' culture that contribute to accentuating or mitigating climate change. Allen and Labbo (2001) utilized participant photography to help pre-service teachers develop an awareness of their own cultures. While Clark-Ibáñez (2007) conducted autodriven photo-elicitation interviews with inner-city children in order to explore aspects of their lives that are normally hidden from adult researchers and "uncover some of the institutional practices that might have served to perpetuate educational inequalities" (p. 168). These examples illustrate Becker's (1974) claim that photography can be used to study communities. Further, they illustrate one of the areas where semiotics can contribute to autodriven photo-elicitation. While the very involvement of participants through determining and taking photographs within autodriven photo-elicitation can result in challenging the researcher's ways of looking as described above, the interplay of semiotics can further draw attention to how the culture of both the researcher and the participants influences ways of looking.

Method

The method was based after Kolb (2008). It utilized autodriven photo-elicitation: participants took photographs which were then used in group discussions. Participants were involved in generating the topics that acted as the stimulus for their photo taking. There were four phases in this approach. The first three were continually revisited throughout the project in order to explore different topics. A general overview of the logistics and the first three phases is

described first, followed by a specific description of the research method. The final phase involved the data analysis which is discussed at the end of this section.

Logistics.

As described above, participants were recruited through existing RVP communication channels. Interested participants were asked to attend an informational meeting at the beginning of May. During this meeting, participants were able to ask questions about the project and their participation. I provided each interested individual with an information letter and consent form at the end of the meeting (appendix B and C). On the consent form participants were asked if they wanted to use a personal camera or to borrow one from the City of Edmonton. All participants indicated that they would use their own digital cameras. At this time, participants were also asked how they would prefer to submit their images: all participants indicated that they would submit their images digitally to the researcher. In a few cases, participants integrated historical photos which were taken on film. These photos were scanned by the participants when possible and submitted digitally; otherwise, a short description of the image which was approved by the participant has been included in the data set. In all cases, the print images were shown at the meetings.

During the group discussions photographs were displayed using a digital photo frame. This format allowed participants to provide their photos in advance by via email, or at the meeting on a portable digital memory device such as USB stick or camera memory card. This display mode was chosen because the location of the meetings was typically outdoors at one of the RVP sites. The two exceptions were the final two meetings which were held indoors at one of the City of Edmonton offices and the University of Alberta respectively because of both daylight availability and weather variability in September. During both of these meetings the photographs were displayed using an LCD projector.

All meetings were recorded using a digital audio recording device. Between meetings I transcribed the recording from the previous meeting, inserted the photographs into the transcript at the point they were discussed, and sent the transcripts to all participants present at the meeting for validation. See appendix D for a sample of the transcripts. The following is a description of the general procedure and then the specific details of the current project.

Phase one, two, and three – general description.

Phase one, two, and three were repeated throughout the project. Initially, the participants were presented with topics by the researcher in order to introduce them to the method and engage them in the project. However, following the first two topics participants generated future topics based on the discussion during the meetings and their own interests. The participants were active participants and contributed to directing the focus, with the researcher, to issues and topics in climate change that are relevant to them or their community.

In phase two, participants took or found photographs that they had previously taken that responded to the topic(s) generated in phase one. During phase three, the participants considered their photos and discussed their images and their thinking with the research group that consisted of the participants and the researcher. The discussion utilized the technique of "save the last word" [for the artist]. In this strategy, the group was invited to share their responses to the images, and then the photographer was given the last word (Albers, 2006) if they wanted it.

These three phases involved all of the participants in group discussions. The group was used, rather than individual interviews, because it coordinates with the ontology of ecological thinking which recognizes reality as the summation of the different conceptions of reality held by different participants (Keiny et al., 1999). Further, the process of social learning can lead to increases in an:

> Individual's or a group's possibilities to participate more fully and effectively in the resolution of emerging personal, organisational and/or societal issues. In social learning, the learning goals are, at least in part, internally determined by the community of learners itself. (Wals & van der Leij, 2007, p. 19)

Phase one, two, and three – details.

The participants met five times during the research period. Meetings one to four each included a segment classified as phase one. Phase two occurred in between meeting times. Phase three was part of meetings two to five. The meetings are described below in chronological order. Each description includes the date, the meeting number, a brief description of the meeting, and a discussion of the topic that was generated between participants and the researcher, along with how this topic was introduced and decided, and any questions that were asked by participants after the topic was set. Except for the first meeting, the meetings provided an opportunity for participants to share and discuss their photographs that they had taken based on the topic generated by the group during the previous meeting.

The information letter indicated that participants would be asked to keep a journal or other form of written record, as well as provide two written statements. However, the majority of participants indicated early in the project that they were either not comfortable with writing or did not feel that they had the time to also prepare written statements; therefore, the written components were removed as a requirement, but remained as an option. Two participants submitted written statements to accompany the final group of photos. The other participants did not submit written statements. Participants therefore were not required to provide anything except for the photograph. They shared their thinking about their photographs as well as responding to other participant photographs with the research group at each meeting they attended. If they did not attend the meeting

they were not required to submit photographs for that topic unless they wanted to provide it with a written statement. This was not done by any of the participants.

The participants of this project were very comfortable taking the photographs and discussing the photographs and future topics as a group. This was likely, at least in part, due to the nature of the group who were all familiar and comfortable with each other. Although the group did discuss how to photograph the topic for meeting three as discussed below, overall each participant showed significant interest and independence in photographing the different topics. One element that did reflect their interpretation of the project was that for the initial meetings I had suggested one to two photographs. Although Dorothy, Jen, and Lora each brought in two photographs for the second meeting the rest of the participants brought in several images. They expressed that it was a result of their inability to isolate the topic to such a small number of images therefore the recommendation for the number of images was dropped for future topics in order to allow the participants to express themselves more fully.

Each of the meetings was audio recorded and transcribed as described above. Other than the first meeting the meetings focused around the participants' photographs. I would put the photographs onto a USB which could then be displayed using either the digital photo frame or the LCD project depending on the location. Each participant would show all of their photographs before the next participant showed their images. The participant would talk about each photograph with an opportunity for other participants to share their thoughts as well. Often these turned into discussions regarding different aspects that the photographer chose to represent in their image. Examples of the transcriptions are in appendix D.

May 4, 2011, Meeting #1 – Recruitment meeting.

- Potential participants who had expressed interest following the recruitment methods described above were invited to attend a meeting at Kinsmen Park to learn more about the project, meet each other in the case of former and current staff, and ask questions regarding the project. I began the meeting with an introduction to the project from my perspective including my experiences as a RVP program staff and interests as an outdoor and environmental educator. I then asked each of the attendees to share their reasons for coming to the meeting. The reasons included personal concern regarding the causes and implications of climate change, interest in photography, and the role of outdoor educators in communicating and educating about climate change. Following this I shared my intentions for the work to be collaborative and guided by the participants; as well as the time line and time commitment that was required. I then gave all of the attendees the information and consent letter (appendix B and C). Ten of the

attendees returned the signed consent letter. Two attendees opted out of participating due to the time requirements.

- During this meeting I proposed that as a starting point participants take photos which shared different aspects of their lives. There was some discussion surrounding this topic but it focused on the logistics: how many photos, what format is best.
- The topic was set as everyday life.

May 18, 2011, Meeting #2 – Everyday life.

- The meeting lasted one hour and was attended by seven participants.
- Participants each shared two or more photographs that they indicated represented an aspect of their lives. These included recreational activities, work activities, daily sights, as well as the introduction of concerns relating to climate change such as consumption and waste production.
- Like the previous meeting I introduced a general question for the group to consider: how would you photograph climate change in your lives? There was discussion surrounding this question; participants decided that although they could not photograph climate change directly they believed they could take photographs that were related to or representative of climate change because it is the signs, symptoms, and causes of climate change that we are most able to see.
- The topic was set as representative or related to climate change.

May 30, 2011, Meeting #3 – Representative or related to climate change.

- The meeting lasted one hour and was attended by eight participants.
- The participants met to discuss their photographic connections to climate change.
- The photographs shared during this meeting focused primarily on the signs and symptoms of climate change, such as signs of extreme weather and insect activity, but did not generally include people. Other participants focused on consumption, ways of thinking, and positive actions that can contribute to mitigating climate change.
- Following the discussion I asked the participants if they had any suggestions for the next topic. Two suggestions were made: examining differences between childhood of the participants and childhood of children today; and positive actions that contribute to mitigating climate change. Based on the discussion it was decided

to focus on childhood for the next meeting, and to save the positive actions for another meeting.

- The topic was set as childhood then and now.

June 7, 2011, Meeting #4 – Childhood then and now.

- The meeting lasted one hour and was attended by six participants.
- The photographs and discussion at this meeting focused on some of the differences that participants observed between their own childhood and childhood today. These included increases in technology and consumption. Participants concluded that opportunities for out-of-doors experiences still exist so long as someone is able to facilitate those experiences.
- Based on the discussion at the previous meeting the participants decided that the next topic would be positive actions.
- The topic was set as positive actions/things.

Study interruption, mid-June – end of August. In mid-June there was a staffing change at RVP that affected the availability of participants. We did not meet again in June or July. We met in mid-August to discuss how to proceed with the project. The decision was made by the group to use email to identify several topics of interest to photograph and then have a final meeting to share these images in September. Seven of the eight participants at the time sent potential topics to me via email. The number of topics suggested differed among participants from one to four. I then collected the different suggestions and sent them back out to the participants with the request that they select the topics they were most interested in. No limitation was put on the number of topics they could select. The following twelve topics were the ones that were most selected by participants. Seven other topics were excluded based on low interest which the participants decided was less than three expressions of interest. When the final list of topics was sent out via email it included a description which included a greeting and thanks to everyone for their efforts. Along with the following statement:

> These photos can be new or older photos in order to represent your thinking on the topics. As well, you may choose to use a single photo for more than one topic. You do not need to photograph every topic; the idea is to photograph the ones that you can connect to in some way, with enough options to give everyone something to connect to.
>
> We will touch base again in two weeks to see how everyone is doing and stay motivated. The final meetings will be a couple weeks after that in order to allow ample time for photographing multiple topics, as well as to accommodate everyone's busy schedules at the wrap up of summer and beginning of September.

The topics were:

- The urbanization of nature (for example pictures of lush green parks with refineries in the background).
- The way we live versus the way of the natural world - connecting our lives with the environment.
- Changes and trends in outdoor recreation (for example the growing amount of water sports and the spectrum of man-powered to gas-powered).
- Weather trends and changes through our lives and their effects on leisure activities.
- Seasonal change of one location (e.g. winter vs. summer, or changes from week to week, or even day to day).
- Everyday climate change photos (i.e. things you encounter everyday that have a climate change connection).
- How am I affected by climate change? (perhaps a more personal, emotional, look at climate change).
- I feel powerless when... (I see a large truck idling in the Mall parking lot or a city building with all the lights on).
- Here are some small changes I can do with my life or at our programs that have an impact.
- People, places or things - ideas that inspire me.
- Childhood then and now.
- Positive actions/things.

Via email several participants expressed to me that the topics were helping to both guide and challenge their thinking on climate change. The topics provided a framework within a seemingly endless number of possibilities, while also challenging them to see how some of the topics did connect to climate change.

There were two meetings held for the final discussion in order to engage all participants, while being respectful of their schedules. Both meetings were held in the evening. These were the only meetings not held outside.

September 26, 2011 Meeting #5a – Topics listed above.

- Three people shared their photographs during this meeting. Two others came to the meeting intending to share their photographs but were unable to do so because of individual circumstances. Both of them came to the second meeting this week to share their photographs. The meeting lasted one and a half hours and was held at the RVP office.
- Each person shared their photographs with the group.

- These photos, in addition to those from meeting #5b, form the basis for the majority of the discussion within chapters five and six.

September 29, 2011 Meeting #5b – Topics listed above.

- Five people shared their photographs during this meeting. The meeting lasted three hours and was held at the University of Alberta.
- Discussion around several of the photos was extensive leading to the inclusion of related images and conversations.

Phase four.

The final phase consisted of data analysis: examining the photos and conversation transcripts that were generated during the first three phases. The data analysis was framed in relation to the inquiry outlined above in order to look for answers to the primary research questions. The first step in the data analysis was to determine the topics that participants had connected their images to for the final meetings. Four participants labelled their photos with their associated topics prior to submitting the images. The remaining four participants did not identify the theme in writing. In these cases the photos and transcripts were examined to determine if the participant had identified a specific topic(s) verbally during the meeting, this was the topic the image was then classified under. In the final case, when participants did not directly identify the topic, their discussion of the image was examined to determine the latent topic that they had attributed the image to.

Semiotic Analysis

Semiotics is concerned with the representation and interpretation of meanings. It relies on the idea that "reality is not disclosed directly, but is experienced through symbols and activities mediated by language and culture" (Shapiro, 2010, p. 53). This is congruent with the ontology of ecological thinking. It recognizes that aspects like language and culture influence a person's mode of thinking but it does not assume that they determine how the person thinks. At the same time, it can be very difficult to recognize certain taken-for-granted assumptions, that are so ingrained that they are perceived as real (Plumwood, 2001). Many signs are presented to us with the assumption that we have the necessary knowledge to understand their meaning. Lefebvre (2007) described how our interpretation of a photograph as having a direct relationship with reality, an index in Peirce's terms, is dependent on our previous knowledge regarding how the camera works. The proliferation of digital editing is raising awareness and doubts in this assumption. Similarly, the polar bear, iconic of climate change, only serves as a sign of climate change if we know of the reliance of polar bears on sea ice in order to hunt, and the relationship between climate change and the amount of sea ice at certain times of the year. Maran (2007) makes this argument clear in his discussion of nature essays: "the adequate interpretation of the nature

essay is only possible if the reader has a nature experience that is at least to some extent similar to that of the author" (p. 288). In other words, if the reader does not have a frame of reference that is similar to that in the message they will not be able to access many of the connections that point to the natural environment (Maran, 2007).

Although images, and photographs in particular, have been referred to as having uncoded meaning (Barthes, 1977), the reality is that they rely on extensive cultural coding in order to be interpreted. For example, because of the way in which text is read in Western cultures, from top left to bottom right, there is a tendency to privilege the top left section of an image (Kress & van Leeuwen, 2006).

Peirce identified three kinds of signs which were discussed in chapter two. To review, the three kinds of signs are:

- Icon – the signifier has a likeness for the signified;
- Index – there is an inherent relationship between the signifier and the signified which is often cultural;
- Symbols – which have a "conventionalized but clearly arbitrary relation between signifier and signified" (Rose, 2007, p. 83).

These "three ways of representing [icon, index, and symbol] must be present for a genuine sign to really represent its object" (Lefebvre, 2007, p. 225). According to Rose (2007) the first step in semiological analysis is to determine what the signs are. Within an image it can be difficult to distinguish individual signs because the boundaries between different parts of an image are not clear (Bal & Bryson, 1991). Once you establish what the individual signs are it is possible to explore their meanings (Bal & Bryson, 1991).

Based on the research questions, analysis focused on the primary focus of the photograph identified by the participants when they were discussing their photos. For example, if a participant indicated that the reason they took the photograph was to show the tree with the dead branches at the top, that tree with the dead branches was identified as the sign to be interpreted. This was done following each meeting based on the discussion during the meeting and the transcript of that discussion. This placed the group discussions in a role of annotating the photographs as opposed to the photographs being understood as additions to the discussion. While an analysis of the transcripts themselves could be carried out through various means of analysis this was not done for the purposes of this project. Further, "every part of the photographic image carries some information that contributes to its total statement" (Becker, 1974, p. 7). Hence, it is possible to further examine each of the photographs for elements such as perspective, framing, and spatial arrangement. The current approach does not account for this; however, it directs the analysis towards the research questions, and sets boundaries for the analysis.

Once the signs were identified the transcripts were further examined in order to draw out the meaning intended by the photographer. This meaning was classified as an icon, index, or symbol. There are several cases where more than one of a particular kind of sign was indicated, as well as cases where more than one kind was indicated by the photographer. Although, in theory all three ways of representing are present within each image, the dominant representations were the primary focus. The participants' photographs were then examined for how they revealed the interpretation of the topics commonly used within communication about climate change. This was done based on the semiotic interpretation of each image. The following is an example of how this analysis was carried out.

Sample analysis.

Figure 2: Sample Participant Photo Meghan 07

From my perspective, this picture demonstrates what happens when we allow wildlife to become accustomed to our cities and our development. Here this deer has become urbanized and no longer follows natural barriers to contact with humans. As humans expand into the environment and take over landscape previously used by animals, these occurrences might become more common. While the deer may seem harmless, it may cause increased car accidents and promote other wildlife to enter into human contact. (Meghan)

Meghan implicitly identified the 'deer in an urban area' as the focus of the image; therefore this was determined to be the primary sign. She further indicated that it had a direct relationship with reality ("*this picture demonstrates what happens…"*). Therefore, her interpretation was classified as indexical. It was a direct representation of wildlife that has become accustomed to human presence and infrastructure. Her discussion further projected onto the sign a connection

with the potential consequences of the urbanization of nature, which was the topic under which Meghan submitted the image.

Synthesis.

Once the signs and their representation(s) were established for each image, the photos were grouped within their specific topics and examined for themes, variations, and unique attributes. This forms the content of chapter five. Chapter six then examines how the images created by participants and their subsequent interpretations in this project compare to the topics identified within the literature review as common in the communication of climate change.

Ethical Considerations

Notions of power are significant within research projects and within education. Authority is most often associated with the researcher or the educator. As a result, participants/learners can experience diminished senses of control and self-efficacy. Methods which relocate power with participants such as autodriven photo-elicitation can provide opportunities to challenge and recreate these relationships. However, Lind (2008) found that participants struggled with this different approach to research, raising concerns that arose from their greater familiarity with empirical research. My role as a program staff with River Valley Programs influenced this relationship. Although, I am rarely involved in RVP now, occasionally filling in for another staff in a program, all of the participants knew me as a member of the program staff. This reduced the dichotomy of researcher/participant because the other participants recognized me as a member of the RVP culture. The participants verbally expressed their interest and comfort with the project; there were no occasions when the participants asked what I wanted them to do. Throughout the project they took ownership, determining topics and setting meeting dates. The only area they expressed a visible reliance on my role as the coordinator of the project was in creating an opportunity for them to share their photos and the project with others following the project. This opportunity was planned for the opening of a new RVP building at one of the programming sites; unfortunately the construction was delayed and thus was not possible.

An additional concern within this project was the inclusion of both current staff and the supervisory team as participants in the project. However, RVP has a relatively non-hierarchical structure in that the different positions are understood as having different roles within the organization, rather than truly supervisor and employee. The program staff are considered to be the program specialists, although they can turn to the supervisors for support and training. In addition, the program staff are often asked to assist with planning and running training opportunities, further recognizing their specialized skills in this area. None of the participants in this project expressed concerns regarding the composition of the group despite a verbal invitation to discuss concerns with me.

The participatory nature of the research means that it was not possible to fully inform participants regarding the course of the project in order to gain their consent (Collins, 2004). As a result, the initial meeting with participants, and the information letter included an explanation of the self-evolving nature of participatory research. Although this ethical perspective was in contrast to more typical utilitarian ethics where everything is controlled from the start, it was not unique within the practice of education where there are often unpredictable events (Collins, 2004).

Photography is an intrusive medium. In order to ensure that the rights of all of the participants and their subjects were respected the group discussed what constitutes appropriate images, in that they respect the rights of viewers and subjects. In order to encourage participants to share photographs of their thinking without feeling constrained by ethical limitations they were not required to have subjects sign release forms prior to sharing the images with the research group. Following this, most of the participants who did include images of people took release forms (appendix E), provided by the researcher, and had their subjects sign the forms so that the photos and discussions could be included fully. This demonstrated that the participants primarily photographed within their personal contexts: the people in their photos are people they knew personally. This helped to reduce the intrusive nature of the photograph because the photographer is generally already known to the subjects (Becker, 1974). In a few cases the participant was unable to have a release form signed, most often because they would not see the individual again within the scope of the project. These images have been described in the results chapter, but the images and any identifying items such as names or associations have been removed.

Finally, because the participants were the artists and creators of their images, they were asked when providing consent how they wanted to be identified in the research. All participants chose to be identified by their first name.

Summary

Autodriven photo-elicitation was used to examine how outdoor educators visualize their own understandings and thoughts about climate change. This method allowed for participants to express their thinking using two modes of communication which can lead to different and deeper understanding (Albers, 2006; Siegel, 1995). The project utilized a qualitative case study approach to examine this topic. Purposive sampling resulted in the definition of the case as the current and former staff of River Valley Programs with the City of Edmonton. Analysis drew on a semiotic perspective based on Peirce which required identifying the signs, followed by the interpretation of those signs with regards to their icon, index, and/or symbol representations. The following chapter presents the photographs submitted by participants, as well as the relevant analysis.

4. Results

Different numbers of participants attended each meeting based on their availability and circumstances. Nine individuals signed the consent form at the start of the project. Each of these individuals attended at least one meeting. Two of these individuals withdrew from the project due to time constraints following the second meeting. Another individual joined the project in June, resulting in eight participants at the end of the project.

Participant demographics

Demographic information was collected at the end of the project. Therefore, the two participants who had to leave the project are not included other than in the current staff numbers.

Ages: 23-37

Years experience with River Valley Programs: one – 11 years

Role in River Valley Programs:

- **Start of Project (May)** – three supervisory team, two former staff, four current staff
- **End of Project (September)** – two supervisory team, four former staff, two current staff

Education Backgrounds:

The majority of the participants had post-secondary education in the field of education or physical education. All participants had at least one completed undergraduate level degree at the time of the project.

- Bachelor of Arts (English), Bachelor of Education (Elementary After Degree)
- 2 Bachelor of Physical Education
- Bachelor of Science (Environmental Biology), Master of Arts (Environmental Education and Communication)
- Bachelor of Science (Biology), Bachelor of Education (Elementary After Degree)
- 2 Bachelor of Education (Elementary)
- Bachelor of Physical Education (Healthy Lifestyle and Wellbeing), California Multiple Subjects Teaching Credential

Generalized Participant Description

The participants in this project are all white, middle class individuals. There were two males and eight females who participated. All participants had some previous background in outdoor recreation except for Julie who indicated

that she had picked up most of the activities after being employed with River Valley Programs. The others had various experiences including family outings, prior work experience, and involvement in groups such as Girl Guides and Scouts. All of the participants had attained post-secondary education as indicated above. The participants each had different levels of national and international travel experience, with one individual never having visited outside of Alberta and British Columbia, while others have made multiple international trips around the world. Regional travel within Alberta however was a common occurrence amongst all participants.

Photographs

A total of 187 photos were contributed to this project from 10 participants. The remainder of this chapter contains the photos with the following information:

- the photo name,
- the photo,
- the topic (attributed directly or latently by the participant as described in the previous chapter),
- the semiotic interpretation of the image and statements (determined by the researcher based on the process described in the previous chapter), and
- notes to explain the topic and interpretation drawn from the transcripts, participants' written statements when available (indicated by italics). The majority of these are in the form of direct quotations from the photographer; however, in some cases I provided a summary of the description by the photographer in order to facilitate readability.

The photo names were determined by photographer. A number was assigned to each photograph based on the order that it was submitted. If applicable the title given to the photograph by the participant was included. References to these photo names are provided throughout the next two chapters to identify the relevant image. The information is organized by participant in alphabetical order.

Participant Photos, Topics, and Analysis

Carolyn

01_dandelions

Topic: Representative or related to climate change
Index: not using chemicals to control nature
Notes: "*This woman has decided to just not do anything about them [dandelions] and it's her entire yard. She told me that she chooses not to use pesticides because they are bad for the environment and I was like cool that works then*" (Carolyn).

02_downtown from river

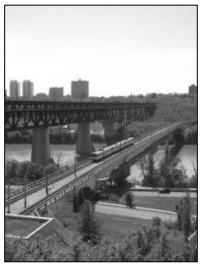
Topic: Representative or related to climate change
Index: need to commute to work
Symbol: centralization of work, urbanization, corporatization
Notes: "*It was all the buildings downtown and all the big corporations downtown and all the people who choose to work and commute*" (Carolyn).

03_LRT1

Topic: Representative or related to climate change
Icon: possible modes of transportation
Symbol: alternative choices of transportation to decrease contribution to climate change; difficult in distinguishing "*smart choices*." (Carolyn said LRT or drive as though they are both positive options).
Notes: "*But it shows people trying to make smart choices about how they get to work, you can take the LRT or you can drive across the bridge. If you zoom into it you can see that there are people walking to and on both parts, on the pedestrian bridge and on the actual High Level. I think one of the last pictures of it has the trolley as well"* (Carolyn).

04_LRT2

05_LRT3



06_riverdale net zero house

Topic: Representative or related to climate change
Index: use of solar energy
Icon: renewable energy technologies
Symbol: doubt in effectiveness of alternative energies
Notes: "*Most of you know this if you have been on our lovely river valley programs before. That's our lovely solar paneled house that apparently, according to some people, puts power back in. I've never heard of anything like that*" (Carolyn).

07_Rutherford

Topic: Representative or related to climate change
Symbol: the importance of education
Notes: "*The next photo I had was about how a lot of people are oblivious to climate change itself and Tai you were talking about you take classes and courses and all of that, but a lot of people are like so I can hear about it on the news. So I took a picture of the University of Alberta*" (Carolyn).

08

Topic (Latent): The urbanization of nature
Symbol: viewing the present as without culture; urbanization; travel as a form of consumption
Notes: "*It's neat to walk through all the old homes and down all the side streets too because there's so much charm and so much culture; and so much that's still there that speaks to what and how the city grew from such a small little community into this huge major city... It makes me giggle when people are like I have to travel the world to see the same things that we have in our own backyard"* (Carolyn).

09_chicoutimi

Topic (Latent): The way we live versus the way of the natural world
Symbol: humans living separately from nature; resilience of nature
Notes: Not seen in the photo is a river with a man-made dam on it. At one point there were houses along the upper bank but severe rains caused the dam to overflow and all but the one house and the church were destroyed. "*Sometimes we build so close to things and we don't realize the damage that can come or how we try to change our landscapes with the dams and with all these other things and the ways we move water and we move things to suit our needs*" (Carolyn).

10

Topic (Latent): Changes and trends in outdoor recreation
Topic (Latent): Weather trends and changes through our lives and their effects on leisure activities
Index: effects of weather on landscape
Symbol: newer is not always better
Notes: An RVP van with voyageur canoe trailer at Terwillegar Park in Edmonton's river valley, one of the launch sites for voyageur canoe programs. Carolyn related the photo to the year's weather which impacted programs because of making this site difficult to launch canoes from and causing extremely high water levels that resulted in cancellation of programs. As well she looked at the change in equipment from the canoe trailer pictured here to new ones, reflecting that the new one is not any better or safer than the old one.
"*You can see where with all the rain that we had this year it cut through the sand and you can't actually see where it just drops off. All of a sudden, you get these huge craters in the sand, it's really cool. I just thought it was neat because then I looked up, it was supposed to be one of the last days with the old trailer and I just thought it was a really cool picture with the van and the sky and the old trailer and how we're getting these fancy new ones that are just as scary death as the old ones*" (Carolyn).

11

Topic (Latent): The urbanization of nature
Symbol: habitat destruction/degradation
Notes: "*We bring all these animals and we put them in zoos but it's not their natural habitat and how we've impacted their habitat in a way where a lot of them can't even live in their own habitat now and the Tigers are endangered, but there's zoo rehabilitation programs and breeding programs and all these things, but we've impacted their lives so much that they can't actually live in their own home now*" (Carolyn).

12

Topic (Latent): The urbanization of nature
Icon: Alberta natural resources
Symbol: changing ways of life
Notes: "*It made me realize that when people first came to Alberta it was about the farming and it was about the agriculture and it was really homey and very community-based and people knew everyone in these communities... I just thought it was a very neat picture of how we've grown and expanded and how people now come to our province for the oil industry and for the gas industry and not really for, at the expense of the agriculture and where we came from before and it's kind of hard now to find people who actually grew up here and know and care for the Prairies the same way we do, and care for the mountains the way we do, and care for these small things that make our home our home*" (Carolyn).

13

Photo consent unavailable
Group of girls with backpacks hiking with adult on wide trail in Rocky Mountains

Topic (Latent): Small changes I can do with my life or programs that have an impact
Topic (Latent): People, places or things – ideas that inspire me
Icon: people/nature experiences
Notes: "*They were all joking around about how they wish they could come back in the snow but because none of them actually live in the province, most of them had never seen mountains, most of them had never gone on a hike like that. It was fun to be there for really special moment for them. I just really liked it. It was a happy fun place; it was a great thing to get share with them*" (Carolyn).

14

Topic (Latent): Small changes I can do with my life or programs that have an impact
Symbol: devaluing human/environment relationships
Notes: "*Each of the beads represented something at camp, I decided it is interesting that the green bead in the middle always represented the environment but it was always the bead that we gave out just kind of for shits and giggles. It was kind of the bead that we always gave out just to make the kids feel happy that they got one something. They would work hard for the other ones…. I kind of put it in just because it did represent something bigger then I think most people actually took it for*" (Carolyn).

15

Topic (Latent): I feel powerless when...
Topic (Latent): Changes and trends in outdoor recreation
Symbol: outdoor recreation as a form of consumption
Notes: "*I just thought it was interesting that we spend a lot of money to get to see some of this stuff but we're impacting it in a more negative way than we are actually doing good with it"* (Carolyn).

16

Topic (Latent): Changes and trends in outdoor recreation
Symbol: consumption in recreation
Notes: "*It's kind of a showpiece of what was and what it now isn't. Now they've filled the ponds with dirt, or what the pools used to be, with dirt and trees and just left it just because people needed newer, bigger, and better*" (Carolyn).

17

Topic (Latent): I feel powerless when...
Symbol: excessive consumption
Notes: "*There is so much light leaking out there, I don't think it's necessary to have all the blinking shiny lights, but apparently that's what makes the games and snacks appealing*" (Carolyn).

18

Topic (Latent): The urbanization of nature
Topic (Latent): Everyday climate change
Symbol: encouraging the status quo; accepting current ways of living
Notes: "*They hum and ha all day long and I love it when the kids in our programs panic, ah the whole world is a nuclear explosion, it's not nuclear its fine"* (Carolyn).

19_summer camp 07 1181

Topic (Latent): Changes and trends in outdoor recreation
Topic (Latent): The urbanization of nature
Symbol: loss of connection with nature because of access to civilization
Notes: "*We had paddled out there for four hours; they took a 20 min. speedboat ride and brought birthday cake. It was just one of those moments where later on we were like so much for being in the wilderness, hey we got cake*" (Carolyn).

20_summer camp 07 1188

Photo consent unavailable

Two girls in life jackets dropping homemade fishing lines over edge of dock. Two canoes tied to dock. Forested area in background

Topic (Latent): Changes and trends in outdoor recreation
Topic (Latent): The urbanization of nature
Symbol: loss of connection with nature because of access to civilization
Notes: "*There were also a lot of fish in the area and so the girls were, this is before the cake happened, they were determined to try and catch a fish because they thought you know we're in the wild, we're in the wilderness, we can catch fish. After the motorboat arrived they knew better but originally their thought process was if we catch a fish we can cook it and eat it*" (Carolyn).

Chris

01

Topic (Latent): I feel powerless when...
Topic (Latent): Everyday climate change
Icon: the dependence on car transportation; infrastructure to support the car
Notes: "*This is one of the ferry terminals in Vancouver. The amount of energy required so that you can take a car to a small island that you can really walk around or take a bike and such"* (Chris).

02

Topic: People, places, or things – ideas that inspire me
Symbol: finding inspiration in nature; potential loss of that inspiration
Notes: "*Things that inspire… It was also interesting because it's an Arbutus tree which is supposed to be very common for Vancouver Island and we didn't really see them. They weren't as prevalent as I expected, given that each of the towns has that as their town tree*" (Chris).

03

Topic (Latent): The way we live versus the way of the natural world
Symbol: disconnection between humans and nature
Notes: Chris talked about the contrast between the shape ("*the form of a wave*") and purpose of the bicycle racks ("*energy efficient transportation, low CO*") outside of a local elementary school with the material it is made out of ("*stark, shiny metal*."). Therefore "*the intent is environmental and the shaping has a natural feel to it but the metal just doesn't give it that*" (Chris).

04

Topic (Latent): Positive actions/things
Index: informational sign on a tree planted in an outdoor classroom at an elementary school
Symbol: expanding education beyond the classroom and into the community
Notes: "*The same school has an outdoor classroom, they actually have cards on the trees so that members of the public actually can learn something about it as well which I thought was kind of neat because really the classroom setting is 10 trees*" (Chris).

05

Topic (Latent): Positive actions/things
Index: tall grasses in an outdoor classroom at an elementary school
Notes: "*This, in that same little garden, is a spot where you can go down and actually feel like you are in a forest, feel like you're in a savannah type setting with tall grasses and you look out, you can sit behind it and no one knows you're there because it's pretty bare in there but I had people walking by and nobody even really noticed*" (Chris).

06

Topic (Latent): Changes and trends in outdoor recreation
Symbol: "p*rescribed viewing of a natural experience*" (Chris)
Notes: "*We want you to have this experience in this way*" (Chris).

07

Topic: Seasonal change of one location
Topic: Changes and trends in outdoor recreation
Icon: the impact of seasonal changes on recreation opportunities
Notes: "*This is an outdoor hockey rink when it's winter and it's such a unused space in the summertime*" (Chris).

08

Topic: Positive actions/things
Symbol: opportunities to get people excited regarding outdoor recreation activities
Notes: Chris talked about seeing two kids riding their bikes and jumping them off of the edge of the curb: "*They were having a blast. And they were outdoors doing something active that we want people to be doing and in something that would be, we think of driveways and stuff like that, people would be this is really only for cars, but this thing for cars is actually getting kids outside, active. They will bike again*" (Chris).

09

Topic: Changes and trends in outdoor recreation
Topic (Latent): Positive actions/things
Index: long board (type of skate board) as a means of alternative transportation
Notes: "*We talk about alternative transportation and skateboarding is never in that and a long board is really a transportation piece it's not the trick piece that skateboarding is lumped in with. So this to many people is standard transportation, this is how they get around"* (Chris).

10

Topic (Latent): Positive actions/things
Index: getting distracted by nature
Symbol: the culture of RVP
Notes: "*We were talking about our pictures and a hawk of unknown species flew by very low, and everyone up and bolted. At first I was going to go and take pictures of the birds, but [the pictures of the people were] more telling of what the culture of us*" (Chris).

11

Topic: Positive actions/things
Index: importance of Recycling
Notes: "*To actually have that as a reason to go to a town, to do recycling, is a big deal*" (Chris).

Highway sign for a local town, indicates that you can go to the town to recycle

12

Topic (Latent): Positive actions/things
Index: gravel parking lot (instead of asphalt)
Notes: Chris talked about the gravel being a positive because in many ways it is more natural. The gravel/dirt absorbs the water when it rains reducing the need for infrastructure to deal with the water.

13

Topic (Latent): Everyday climate change
Index: large paved parking lot with unused basketball net
Notes: Chris talked about the space feeling un-environmental and "*it just felt wrong*" (Chris).

14

Topic (Latent): Positive actions/things
Symbol: choosing what to work on
Notes: Same facility as the previous picture this one shows a sign advertising a reuse fair at the church. "*Looks are deceiving and you pick the things you are going to work on. You can't do everything, so the church needs a parking lot. They have another use in it, whether or not it is used one doesn't know, but they are still doing things that they think are going to help the environment*" (Chris).

15

Topic (Latent): The urbanization of nature
Index: restricting access to nature
Notes: "*This is a fence that sticks out from the school and it actually is a goes nowhere, does nothing fence. It's open at both ends, there is not actually a field there that would be, say a ball would come across and you are just trying to protect soccer balls from going on the road or something like that. It's there to block your view or your access to the space*" (Chris).

16

Topic (Latent): The urbanization of nature
Index: prioritizing people and infrastructure over nature
Notes: "*The people and the sign block out the nature that is in the picture. The only thing you see are the people and then the school behind the fence. The nature that is in the banner are behind, it has actually disappeared*" (Chris).

17

Topic: People, places, or things – ideas that inspire me
Index: creating natural spaces
Icon: challenge in distinguishing nature from man-made
Symbol: inspired by nature
Notes: "*It's one of those little hidden spots of nature…. It's in the middle of the city, most people will have no idea it's there amongst the manicured stuff*" (Chris). Chris found the spot inspirational as a natural spot in the middle of a manicured park. The waterfall and creek however is man-made and can be turned on and off; something which Chris knew but still identified it as a natural spot

18

Topic (Latent): The urbanization of nature
Topic: I feel powerless when…
Index: restricting access to nature
Notes: "*I hate these. Why should nature be closed?*" (Chris)

19

Topic (Latent): The urbanization of nature
Topic (Latent): Changes and trends in outdoor recreation
Index: artificial grass for a field playing surface
Symbol: challenge of making the "*right*" decision
Notes: Chris talked about the reduced water usage required for artificial grass and the increased physical stress on humans running on the surface.

20

Photo consent unavailable
Group of adults sitting in circle on grass outside with trees in background. Individuals are engaged in a class.

Topic (Latent): The way we live versus the way of the natural world
Index: increased ability to pay attention in nature
Notes: "W*e actually sat outside in the park that was going to be closed and that was the only time that we were actually focused the entire classroom session, was the two hours we did outside. Everyone was much more focused and relaxed. You could tell that they were all happier to be outside*" (Chris).

21

Topic (Latent): The way we live versus the way of the natural world
Icon: taking a different perspective on the world
Notes: "*It's a perspective that people don't take of the world, of trying to look up at the trees and things and being that calm*" (Chris).

22

Topic: Changes and trends in outdoor recreation
Index: used gear sale at a local outdoor store
Symbol: reducing consumption, while consuming; used as socially acceptable
Notes: "*That idea of reused goods being useful for their activities, not having to go buy something new*" (Chris).

23

24

Topic (Latent): Everyday climate change
Index: campfire as activity throughout human history that has been sustainable
Symbol: living within current means versus drawing on ancient resources
Notes: "*I was thinking of this at the time, it was a good representation that we have been putting greenhouse gases into the air for a long time and we think that it has been sustainable, maybe there was extra usage in the past but it is hopefully that use within your means. If you are just burning trees, if you burn up all the trees, you can't have any more fires, you can't produce anything more. Whereas the idea of gas and stuff is that it's... extra stuff, that ancient sunlight idea. Wood is current sunlight that is being used and you can stay within your means there*" (Chris).

Dorothy

01

Topic: Everyday life
Symbol: disconnection with nature even for people who work in areas that relate to nature
Notes: "*That's a little bit of my work and that's also about as close to nature as I get these days*" (Dorothy).

02

Topic: Everyday life
Icon: decreasing waste production
Notes: Two vermicomposting bins that Dorothy has just started

03

Topic: Representative or related to climate change
Index: orange tint in sky reflected on sidewalk; orange tint caused by wildfires (according to Dorothy)
Symbol: doubt in personal memory
Notes: "*I included that because we are getting more of these days. If we get more fires we'll get more days like this and it seems like, from what I can remember from growing up, that we have more of them already, but that could be just my imagination*" (Dorothy).

04

Topic: Representative or related to climate change
Index: dead birch trees in forest from drought
Notes: "*There are a whole bunch of dead birch trees in the river valley because of the drought a few years back and it, again, could be related to climate change but you don't really know because it is so hard to make direct links that way. That is one of the big problems scientists are having these days, is actually making that direct link*" (Dorothy).

05

Topic: Representative or related to climate change
Index: tree with dead top;
Notes: "*I'm wondering if it is linked to acid rain because I remember, in Junior High, learning about the signs of acid rain and one of them was these trees that had dead tops. If that's the case there could be a problem in Edmonton. In my mind now, thinking about it, it seems like these trees are near roads but that could be my mind adding in that detail and I think they are mostly poplar trees so it may be*" (Dorothy).

06

Topic: Seasonal change of one location
Topic: People, places, or things – ideas that inspire me
Icon: changing seasons
Notes: The two photos are from the same location that Dorothy found inspiring because she has spent a lot of time there. They show how significant the seasonal changes are in terms of how the landscape looks.

07

08

Topic: Changes and trends in outdoor recreation
Topic: Seasonal change of one location
Icon: seasonality of outdoor recreation around Edmonton
Symbol: loss of self propelled water recreation
Notes: Based on the extreme differences between seasons, in areas like Edmonton recreation changes depending on the season. Dorothy also talked about a lack of self-propelled boats on the lake where the canoe is. She talked about sailboats and camps that have canoes but doesn't see these getting a lot of use: "*you don't really see the average family out canoeing*" (Dorothy).

09

Topic: The way we live versus the way of the natural world
Topic: Weather trends and changes through our lives and their effects on leisure activities
Topic (Latent): Everyday climate changes
Icon: variable weather patterns
Symbol: is it true or is it what I remember?
Notes: This is the site of an annual international cross country ski race (Birkebeiner) that happens in Blackfoot, a provincial recreation area near the city. "*I included this one because every year you're not sure if the Birkie is going to run: is it going to be too warm? Is there going to be enough snow? And it seems like over the last four or five years it's been more variable... but on the other hand is it just that I'm thinking it's more variable now because I'm hearing more about climate change, is it actually because it was cancelled once or twice"* (Dorothy).

10

Topic: The urbanization of nature
Topic: The way we live versus the way of the natural world
Topic: People, places, or things – ideas that inspire me
Index: natural park in middle of major city
Symbol: can nature exist within urban locations?
Notes: "*And you have this extreme between urban as supposedly not natural therefore we can't be in the city because we have this great park"* (Dorothy).

11

Topic: The urbanization of nature
Topic: The way we live versus the way of the natural world
Index: placing human constructions on the natural landscape
Symbol: humans creating a shadow on the natural world
Notes: Dorothy talked about the bridge not fitting into the natural landscape because it is shinier metal and less wood than other bridges in the area. Dorothy took a photo of the shadow of the bridge rather than the bridge itself. This is reflective of her comments about the bridge not fitting in; it is casting a shadow on the landscape because it does not fit in.

12

Topic: The urbanization of nature
Index: it is positive to have the river valley through Edmonton, but it forces humans to work around or, in this case, over the valley, creating a barrier to urbanization.
Notes: "*It is so lucky to have this River Valley but we don't get away from it's in the middle of the city. You have bridges and other signs*" (Dorothy).

13

Topic: Everyday climate change
Topic: I feel powerless when...
Topic: Small changes I can do with my life or programs that have an impact
Symbol: conflicting ideologies – change to do something positive but bounces back and we do it too much
Notes: "*I try to take the reusable bags to the grocery store although it's not happening nearly as often. But you see them everywhere, and in fact I now wonder if we are not actually using more resources than we were before*" (Dorothy).

14

Topic: The urbanization of nature
Topic: The way we live versus the way of the natural world
Topic: How am I affected by climate change?
Topic: Small changes I can do with my life or programs that have an impact
Icon: low impact living
Symbol: reconnecting urban living with nature
Notes: "*When I bought my condo I made a conscious effort to keep reducing my footprint and so the neighbourhood I live in is just by MEC. It's close to bike routes, bus routes, I walk to work, and I walk to church. That's my not so small change... when I chose the neighbourhood it wasn't just because it was close to stores and all of that but it also had a lot of big old tree. We were talking about how Edmonton has a lot of green space but I don't know whether that's equally spread throughout or whether a lot of that is in the older neighborhoods. There are so many parks in my little neighborhood and they're lovely little parks. They're not necessarily flat bare ground"* (Dorothy).

15

Jen

01

Topic: Everyday life
Index: barbequing as a summer activity
Notes: Jen's first barbeque attempt on her new barbeque. Focus in on the product she was cooking therefore the utility of the barbeque.

02

Topic: Everyday life
Index: doodling as art
Notes: Sample art project for Jen's class. Inclusion of nature in the form of the butterfly

03

Topic: Everyday life
Symbol: the benign consumption of nature
Notes: Jen talked about trying not to disturb the rabbit while also trying to get a photo of it.

04

Topic: Everyday life
Symbol: nature/human interaction
Symbol: importing/exporting resources
Notes: The train and wetland were located on Jen's drive out to work.

05

Topic: Representative or related to climate change
Icon: changes in the weather
Notes: "*I was thinking about the changes in the weather, it was raining. We didn't have any really dramatic weather over the last week, but I took the opportunity to try out my zoom and got a picture of rain drops on the ground from my balcony*" (Jen).

06

Topic: Representative or related to climate change
Index: drought conditions leading to high number of fires
Notes: "*With the really dry conditions, there have been a lot of people at our school who have been affected by the dry conditions and fires. One of the people at our school, their acreage burned last year, it's something that affects the people I'm working with as well. Their livelihood*" (Jen).

07

08

Topic: Childhood then and now
Icon: watch movies based on books rather than read books; allowed to watch movies that are more mature than what used to be allowed; change in graphics;
Index: cards are personalized for the person giving the card not for the person receiving the card
Notes: Jen's collage captured some of the changes she had noticed. The hat and the tiara are discussed in the next photo.

09

Topic: Childhood then and now
Icon: change in Halloween costumes from homemade to store bought
Notes: "*Thinking about, looking at all the kids' costumes that came in this year at Halloween, probably 80% of them were store bought and they'll buy a brand new costume every single year and never actually make their costumes*" (Jen). – The princess hat borrowed from a student. Compared to the tiara made by her mom for Jen when she was in Grade 2.

10_bins

Topic: I feel powerless when...
Topic: Positive actions/things
Icon: recycling as part of consumption
Icon: societal barriers to reducing impacts on climate change
Notes: "*It's kind of a catch 22 at our school because we encourage them to recycle but in order for us to be able to recycle paper and things like that we have to pay an extra fee for someone to come out and pick up*" (Jen). In an earlier meeting Jen told the group that the staff at her school were told to stop recycling as much because they could not afford/justify the pickup fees.

11_book orders

Topic: I feel powerless when...
Icon: societal barriers to reducing impacts on climate change
Notes: These are the extra book order forms sent to Jen's school to give to students. Each package contained about 50 forms. On top of these, a package is sent to each teacher because each teacher has an account so that they can earn coupons towards purchases themselves. There is no way for the teachers to get the coupons and share the orders, and it is very difficult to stop the order forms from coming.

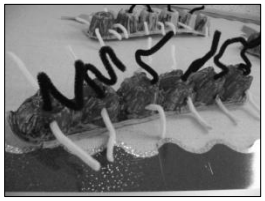
12_buried in paper

Topic: I feel powerless when...
Icon: societal barriers to reducing impacts on climate change; conflicting messages regarding environmental impact
Notes: "*These are ATA newsletters, or newspapers. These are the extra ones that got sent to our school and then each teacher got one as well. I have yet to actually read one. Most of us they just go straight from our mailbox into the recycling. We might take a quick glance through. I find it interesting because one of the reasons that they gave us for not giving a conference booklet anymore and it's completely online is to reduce paper waste. But then they send these out and they could easily send like three copies to a school for us to put on a staff room table and cut their costs and cut the amount of paper greatly"* (Jen).

13_classroom recycling

Topic: I feel powerless when...
Index: the waste that is produced perhaps because it can be recycled.
Notes: The school was sent several copies of a local newspaper to use in the classrooms each day. "*That's my recycle center. It was slightly overfilling. See those are the papers and I only took four copies for my class each day and that's in a week*" (Jen).

14_crafty



Topic: Small changes I can do with my life or programs that have an impact
Symbol: meeting people at the level they are at
Notes: "*One of our teachers is probably one of the least eco-friendly teachers in our school she does this craft every year for her animal lifecycle unit. They are caterpillars with the egg cartons, so reusing. She teaches them about reusing and is actually teaching about nature at the same time, although it's not a very nature way she teaches it. When she and I were working together I think we did more of those types of things but this is one that she does every year and then the other one that she does, she does butterflies on used laminate stuff. There's always that big extra piece of laminating film that goes through and what she does, she used to just use the overhead sheets that you buy but we started having the kids trace them onto the laminate sheet and then they cut it out and color it and they have this butterflies sun catcher thing. And it's reusing the materials instead of buying new*" (Jen).

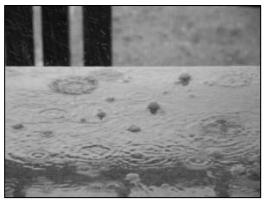
15_drive to work

Topic (Latent): Everyday climate change
Topic (Latent): People, places, or things – ideas that inspire me
Icon: commuting for work
Symbol: naturalness of rural settings
Notes: "*On the way out there I see so many cars coming into the city but very few going out. Most of them are coming into the city, it's a constant stream of traffic, and we've had a few discussions about driving distances to get to your place of work. For me there was no option, I couldn't find a job in the city so I had to go out there and I can't afford to live out there. But a lot of these people live way out on the acreages and stuff like that and they choose to commute into the city every day... I always find it, I find it a very relaxing drive, so I love working out in the country. I find the drive, except for some days in winter, I find the drive very relaxing*" (Jen).

16_garden

Topic: Small changes I can do with my life or programs that have an impact
Topic (Latent): People, places, or things – ideas that inspire me
Index: small space gardening
Symbol: connecting with natural environment
Notes: "*That's my garden, the start of it. There's a lot more resources out there now on small gardens, like square foot gardening or container gardening, so that people who don't necessarily live in an area where they have a backyard, I've a balcony that looks over the top of the parking lot but I was able to do a nice little garden. I got some lettuce out of it, my carrots, I got them in way too late so they weren't that big [shows with hands a very small size], but they looked pretty. And I felt like I grew something this year because I don't have a green thumb*" (Jen).

17_hail



Topic: Everyday climate change
Index: summer storm
Notes: "*Climate change makes more sense because it's more encompassing of other things. I was expecting us to get some big storms this year because everywhere else around us was getting these massive weather shifts and we got nothing this summer*" (Jen).

18_hail2

19_incoming storm

20_gull lake 2011

Topic (Latent): Weather trends and changes through our lives and their effects on leisure activities
Index: rise in water levels at lake
Notes: "*The beach was much shorter from the water and even when we hiked over to the other campground, or walked over to the other campground, right by one of the docks, it was so deep that it was, the trees were actually in it. It looked more like a swampy area or marshy area than a beach area. I hadn't seen it that deep in years"* (Jen).

21_roasting marshmallows

Topic: How am I affected by climate change?
Icon: activities that contribute to climate change
Notes: "*I know we had been talking about how you choose your activities and how some of them will have an impact but you still love to do it: roasting marshmallows. I had to put a picture because we quite often will have, we go to a park to have a campfire and we roast marshmallows. Now this fire here, we probably burnt more wood in 20 min. than we did in our entire dinner cooking up hot dogs and marshmallows. But the people I was with on that one, it was more about let's just make a nice big fire. It's really interesting, depending on what group you're with what size of fire you have when you go camping. We quite often have the little tiny fires when we go down to Gold Bar and stuff, but then these ones here it was more just completely recreational. Where we didn't cook hotdogs or anything, we just did the marshmallows, but this one is also in a fireplace*" (Jen).

22_row boat

Topic: Changes and trends in outdoor recreation
Icon: self-propelled transportation
Symbol: activities which enable a greater connection with nature
Notes: "*Personally, I like this kind of boating better than boating with the motor because you get to see more. If you were taking this with a motor, going across, there is no way I'd be able to see the elk that decided to walk across the lake or the little birds that I was watching play around in the water right on the edge*" (Jen).

23_salamanders

Topic (Latent): The urbanization of nature
Symbol: degradation of natural habitat; Nature as a resource for humans; Impact of natural conditions on interaction between humans and nature
Notes: "*We had a guy show up with a bucket of about 10 salamanders that he had rescued from a well. He cleans wells out and there were all these salamanders at the bottom. What he does is he brings them to school groups and sees if they would like them to teach about lifecycles and things like that. Well, in talking to one of my students, apparently this year has been an insane year for salamanders. Absolutely insane*" (Jen).

24_taking its own path

Topic (Latent): The way we live versus the way of the natural world
Symbol: resilience of nature
Notes: "*We were walking down Millcreek, they made a special pathway for the water to go... a culvert, and it refused. It decided it was going to go across the path and create its own little path into the creek*" (Jen).

25_uncas wetland before

Topic (Latent): The urbanization of nature
Symbol: human wants/needs considered before needs of nature
Notes: "*This is my pretty wetland that is no more. My school is just on the other side of the train tracks there and I took this last July and this morning I tried to take another picture because they're expanding the tracks. They've taken and they have cleared that entire side part there and piled all the dirt that they've cleared onto the wetland area. The wetland area is no more; it's been covered up by dirt and things like that"* (Jen).

Julie

01_Big Trucks and McDonalds

Topic: Everyday life
Symbol: self implication in consumption
Notes: "*Horseback riding is a nice way of non-gassy travel but in order to get out there we had to drive a big truck and I like how corporate McDonald's is in there too. To get out there, you know we pleasure ride, we don't use it as an actual method of transportation, but to get out there we have to drive out of town*" (Julie).

02_Farm and Manure

Topic: Everyday life
Symbol: wasted opportunities
Notes: "*That one is out at the farm and I know manure can be used for fertilization and things but I think they literally just pile it and throw it out. They don't do anything with it, which I thought is kind of sad, because they don't have farmland, they just have horses and animals there so you know it's something that can be used that doesn't get used*" (Julie).

03_Forest Family

In the distance in the photo is a man and two children focused on the forest floor

Topic: Everyday life
Icon: interacting with nature
Symbol: stopping to look at the details in nature
Notes: "*There was a guy and his two kids and they were searching through the grass. I just thought that was really cool, because it was like, right on, so people do play. Normally I don't see that, normally I see people just riding bikes and running but just seeing their focused looking at the details in the forest so I just thought it was neat*" (Julie).

04_Garbage

Topic: Everyday life
Index: graffiti and garbage in a greenway
Notes: The photo was taken from where Julie lives. It shows the garbage that she can see that ends up behind her building.

05_Garden and Garbage

Topic: Everyday life
Index: gardens contrasting with the graffiti and garbage
Symbol: different relationships with the natural environment
Notes: This was one of several containers that Julie had on her balcony that she had planted with different plants, including trying to grow vegetables.

06_on the River

Topic: Everyday life
Index: high water levels on the North Saskatchewan River during an RVP voyageur canoe program
Notes: Water level was significantly above average. Can also see how much silt was being carried by the river, based on the colour, indicating the increased speed

07_Spring Sunshine in the River Valley

Topic: Everyday life
Index: sunshine in the River Valley
Notes: Part of the everyday experiences of RVP staff

08

Topic: Representative or related to climate change
Index: environmental destruction for human development
Symbol: excessive consumption; disconnection between humans and environment
Notes: "*We were in Canmore and there is a nice big, huge construction zone. You can see the nice pretty mountains in the background and land has been pillaged in this little spot here... The thing with Banff is it's a National Park so there are still restrictions on the building there; whereas Canmore is outside and everyone is like woohoo! If you guys have ever been to Canmore, their houses are massive, the condos and all these places you stay are massive and they just keep building and its growing and growing and growing. It's just outside. Everyone wants to be close but this way they can still build what they want, the excessive amount that they want, while being close to the mountains still*" (Julie).

09_bouncy castle

Photo consent unavailable
Adult lifting small child up next to inflatable bouncy castle. Fenced yard in residential area.

Topic: Childhood then and now
Symbol: increase in consumption, decrease in creativity
Notes: "*The first one is a friend's kid's birthday party and they are in a bouncy castle and I'm just thinking when we were kids you usually got creative and you'd make a piñata or something but now it's ya, this is my kid's birthday. This is my friend's kid's first birthday; the kid couldn't even go in there but they had it for the rest of the kids in the neighbourhood.... so that's things are in excess I find*" (Julie).

10_community

Photo consent unavailable
Group of children standing outside house. Three children are older, one younger, one infant being held by one of the older children.

Topic: Childhood then and now
Symbol: decrease in sense of community overall
Notes: "*I guess it depends on the community but, I remember growing up we used to run around the neighbourhood rampant and we'd hang out with all the other kids and you'd like basically have different gangs of kids, have shooting kids, have fake guns and run around and have water gun fights and you're outside with all these kids and I just found it was really cool that these kids will all come over to her house and be like, hey what's going on and they'll just come and hang out, hang out with the little kid and they're very community based which I think is really cool because I find that's one of the biggest differences is that I found things seemed a lot more community base. We had big barbeque street parties when I was a kid and you hardly see that*" (Julie).

11_football

Topic: Childhood then and now
Symbol: getting competitive younger
Notes: "*It seems like all the sports, kids are getting a lot more competitive in a lot sooner*" (Julie).

12_martial art

Topic: Childhood then and now
Symbol: getting competitive younger
Notes: "*I did organized sports as well and I just ignored the competition stuff because I didn't like it but same thing right. They have the full helmets, padding, everything for these kids, and they are eight years old. And half of them the jersey's down to their knees and it's adorable, but I think how do you guys do anything. There's tackling and they're set in groups. So I think that's kind of cool, like you say it's organized but..."* (Julie).

13_Jasper

Photo consent unavailable
Two children, one girl, one boy, sitting on rock in forested area next to stream/river

Topic: Childhood then and now
Symbol: showing a sanitized version of childhood
Notes: "*She likes to display them [her kids] so she's showing the good pictures but I've seen that little girl, she's messy, she's dirty, she rolls around, she comes in disgusting after the football game. She's like come give me your hand; she's wiping them off because she's been running around touching everything. So she gets just as grubby and dirty, and those pictures you can't tell but she really does, and the similarity there are pictures of me rolling around in the mud, literally*" (Julie).

14

Photo not available digitally

Julie as a young child running the hose into the dirt to make mud

Topic: Childhood then and now
Symbol: playing outside does not necessarily mean being environmentally responsible
Notes: "*My play was also wasteful sometimes. There are pictures of me and my brother playing in the sprinkler; there's a picture of me, in that one, I turned on the hose and I let it run into the mud so that I could have mud to play in. There are pictures of me with my head in the fridge, so quite wasteful my playing, plus pictures of me playing in the sink, playing flushing things down the toilet, playing flush, flush, flush, so more creative maybe but..."* (Julie).

15_kite flying

Topic: Childhood then and now
Symbol: opportunities still exist
Notes: kids flying kites now which is something Julie did as a kid

16_simple Halloween

Photo consent unavailable
Four people – two adults and two children – dressed in Halloween costumes posing for photo inside a house.

Topic: Childhood then and now
Icon: change in Halloween costumes from homemade to store bought
Notes: "*It's so basic, it's a headband with some ears and a shirt pretty much on top and I'm a pumpkin so it's really basic stuff. Whereas, as you say now, that kid would be lit up, a blow up, air filled, with glowing lights in it*" (Julie).

17_technology Photo consent unavailable Adult holding young child who is playing with a smart phone	**Topic: Childhood then and now** Icon: increase in available technology for kids Notes: "*Where does the technology come into play and it's just like how kids are so much more advanced. They have more opportunity to play with. Maybe if we were kids and we had all these cool games to play with we would have played inside more, I don't know, I don't think so but….*" (Julie).
18_bundled kids Photo consent unavailable Two young children wearing snowsuits, standing outside near parked cars	**Topic: Childhood then and now** Icon: opportunities still exist for outdoor recreation Notes: "*The next picture is just two kids in their snowsuits and then there's a picture of us playing in the snow*" (Julie).
19 Photo unavailable digitally Julie playing outside in the snow as a kid in her snowsuit.	
20_trees Photo consent unavailable Two children climbing a tree.	**Topic: Childhood then and now** Icon: role of the supervising adult in how children interact with nature Notes: Julie talked about the mom of the children in the photo telling them not to touch things and not to crawl on things; whereas Julie with the same two kids was encouraging them to play and climb the tree.
21_wagon and pop cans Photo consent unavailable Young child sitting in wagon. Three pop cans tied to string being pulled behind the wagon	**Topic: Childhood then and now** Symbol: role of the supervising adult in how children interact with nature Notes: Julie talked about the role of parents in influencing the experiences that children have

22_change trend rec

Topic: Changes and trends in outdoor recreation
Topic: I feel powerless when...
Icon: increase in motorized recreation options
Symbol: tourism as a source of consumption; personal implication in activities
Notes: This was a motorcycle tour based out of a small town in Australia known for inexpensive tourist experiences. Motorized transportation purely for the sake of recreation.

23_Changes in rec – family

Topic: Changes and trends in outdoor recreation
Symbol: family connections
Notes: "*It's that whole idea of drop your kid off at the little sporting thing, whereas this is the dad taking his kid out surfing. It's still that family involvement I'm going to take you to try all these things and then, I think they learn more too and they learn maybe the enjoyment of stuff, I don't know*" (Julie).

24_Climate affects

Topic: How am I affected by climate change?
Topic (Latent): Changes and trends in outdoor recreation
Symbol: environment restricting human behaviour
Notes: "*We can't control always the weather and it's closed, they taped it off, we weren't allowed in because of safety*" (Julie).

25_Every day climate change

Topic: Everyday climate change
Icon: daily weather fluctuations
Symbol: challenging in understanding climate change as a global issue in the local context
Notes: "*It's just amazing because how we were walking along, it was a beautiful day and then all of a sudden it was just pouring rain. Then, on the way back within however long, less than an hour, it was just half-flooded*" (Julie).

26_Hmmmm

Underneath the painted phrase "you will never change the world" is the phrase "unless you try" written in pen

Topic: I feel powerless when... and People, places, or things – ideas that inspire me
Symbol: mixed messages
Notes: "*I thought, is that inspirational, or is that uninspirational? You will never change the world, unless you try. I didn't really know what to do with that one but I definitely thought it was interesting, it was a whole topic*" (Julie).

27_Inspire

Topic: People, places, or things – ideas that inspire me
Symbol: resilience of people
Notes: "*I guess it's inspirational in terms of you can live there and all the stuff that we have that, who is to say though that going back to using donkeys to carry your stuff and wheeling things around is going to do benefit anyone really. But you can survive off of so little*" (Julie).

28_Positive – Bikes

Topic: Positive actions/things
Index: prioritizing bicycle transportation
Notes: The photo was taken in Amsterdam where many areas prioritize bicycles over other modes of transportation. There is societal support for cycling, making it a more feasible mode of transportation.

29_Positive – Don't be a tosser

Topic: Positive actions/things
Icon: targeting market messages for particular populations and cultures
Notes: A campaign in Australia to decrease littering. ."*Different marketing, just trying to get people to do things. This is in Australia: don't be a tosser. A tosser obviously is kind of making fun of people but that's what they have on their things, like, don't be a tosser, use the garbage*" (Julie).

30_Positive – garbage placement

Topic: Positive actions/things
Index: with appropriate resources people can behave appropriately
Notes: "*That beach is clear, with the amount of tourists it gets in Surfer's Paradise and the beach doesn't have garbage on it and the garbage is [snapping sound]. It's not to say that the ocean won't come up and take it away but they have garbages placed all along that beach. That's actually one of the things I saw and it's one of the more touristy ones as well"* (Julie).

31_Powerless

Topic: I feel powerless when...
Symbol: separating personal implications through cultural stereotypes
Notes: "*You can see all the air conditioners. At the same time, with how many people who live there what do we expect. I think this is in Malaysia. What do you expect though, like people just live in the heat*?" (Julie).

32_Powerless 2

Topic: I feel powerless when...
Symbol: separating personal responsibility through cultural stereotypes
Notes: "*I mean that goes back to, you're going to have developing countries and they're going to have more garbage, they have more people, less places to put it*" (Julie).

33_season changes and how climate effects

Topic: Seasonal change of one location
Topic: How am I affected by climate change?
Index: seasonal variation in natural conditions
Notes: "*You can see all the streams where the water was, so it's just interesting how that affects us too, because we do have so many seasons, whereas there's some countries where they don't obviously, so they can do the same things all year round. Whereas here, we're very, our activities and recreation is very based on the seasons that we have. We have clothing for each season, we have equipment for each season, and it almost sounds wasteful right*" (Julie).

34_urbanization of nature

Topic: The urbanization of nature
Symbol: resilience of nature; disconnection between human activities and nature
Notes: "*It's a little plant being very stubborn and growing. There was actually a whole bunch of them so I don't know if this is a poorly made slab or what the case is but, yeah, it's growing out of the asphalt, it made itself a home. But we put things down, you know that's the thing, people try to weed the grass out of the cracks in their walk ups and stuff*" (Julie).

Karina

01

Topic: Everyday life
Index: moose licking salt off of the roads in the winter
Notes: Karina commented on how habituated to people the animals are that they will lick salt from the roads

02

Topic: Everyday life
Index: Megan at work in the RVP office
Notes: "*That's Megan, being safe at work, wearing her helmet*" (Karina).

03

Topic: Everyday life
Index: skiing in the mountains on Easter Monday
Icon: variation in timing of seasons
Notes: Skiing at this point in the year is unusual "*That's Monday after Easter, we're still skiing*" (Karina).

04

Topic: Everyday life
Index: unique architecture in Edmonton's downtown
Notes: This is Edmonton's art gallery. The architecture is very different from the rest of the buildings downtown and in Edmonton generally

05

Topic: Everyday life
Index: RVP programs exposing people to new opportunities
Symbol: challenge in seeing the opportunities in what you do for someone else
Notes: The sign in the bottom corner of the sandwich board is for a RVP program called the Try-It Library. The program provides an opportunity for the public to try out different types of bicycles like electric and recumbent bikes, among several others. Karina expressed her surprise that people get excited by this program.

06

Topic: Everyday life
Index: multi-person pedal bike
Notes: This is not an RVP program, Karina commented that it would "*be a good way to get to work, be more fun*" (Karina). She recognized the opportunity of the big bike but has trouble seeing the uniqueness of the bikes in the Try-It Library (above).

07

Topic: Everyday life
Index: construction site by RVP office
Notes: The reality of many commutes to work is that dealing with construction is a constant occurrence in Edmonton.

08

Topic: Everyday life
Symbol: trying to get closer to nature
Notes: "*There is Megan sitting in the sun because she is trapped inside"* (Karina).

09

Topic: Representative or related to climate change
Index: prescribed burn to control for mountain pine beetle
Notes: "*This is a prescribed burn in one of my happy places. The reason why it had to happen was they thought there would be pine beetles, but mostly what they did was wrecked many acres of forest by burning it badly. It's a nice pretty little mountain scene where I like to go camping and it's half-dead trees*" (Karina).

10

11_Nikolas B-day 2011

Photo consent unavailable
Karina's nephew Nikolas is opening presents. He is surrounded by piles of childrens' books and toys. Another child is leaning over the presents towards him.

Topic: Childhood then and now
Symbol: increased consumption; connection between childrens' lifestyles and parents'
Notes: "*He does play inside way more than me and this is him at his birthday party where he got copious amounts of presents. So I intentionally juxtaposed his childhood versus mine. He probably will not get to play outside as much as I did just because that is his parents' lifestyle choice. I was definitely able to distract him with a pine cone and a dandelion but..."* (Karina).

12_Kma and Bro at Crimson Lake 1980ish

Topic: Childhood then and now
Symbol: time spent playing outside has decreased
Notes: Photo is of Karina and her brother playing outside on the beach when they were young. (Nikolas and Claire are Karina's niece and nephew, i.e. the children of the boy in this picture) "*And Nikolas doesn't mind being outside but he definitely doesn't like it as much as my brother and I did. We used to get so tanned that we would have sunglass lines the whole year round. And then we had goggles for skiing as well*" (Karina).

13_Kma's Niece Claire 2011

Topic: Childhood then and now
Symbol: increased consumption; connection between kids' lifestyles and parents'
Notes: "*This is Claire, his [Nikolas'] little sister; it's her birthday this weekend so I'm sure there will be presents because it's got to be even [between the two kids]"* (Karina).

14_1 Goldbar with Esso refinery winter

Topic: The urbanization of nature
Index: river valley park with refinery in the background
Notes: This is the main site for cross country ski programs for RVP. It is a relatively natural setting, with a very unnatural backdrop

15_2 FLOOD! Capilano WGD June 19 2011 a

Topic: Everyday climate change
Index: high water levels on the North Saskatchewan
Symbol: Confusion regarding the more scientific signs of climate change
Notes: "*That's underneath the bridge when it [the water] was really high, kind of an impact that climate change may have if you want to say that that is climate change*" (Karina).

16_4 plus 11 during Jan xc ski training

Topic: Weather trends and changes through our lives and their effects on leisure activities
Index: cross country skiing during a very warm January
Notes: Staff training for RVP for winter programs was in January in 2011. The temperature on the day was +11°C. The normal average daily temperature in Edmonton in January is -11.7°C (Environment Canada, 2007)

17_8 powerless

Topic: I feel powerless when...
Index: high consumption vehicles
Notes: "*Things that make me sad*" (Karina). The truck has higher consumption than is necessary for most people.

18_9 & 12

Topic: Small changes I can do with my life or programs that have an impact
Topic: Positive actions/things
Index: lower consumption vehicles
Notes: Karina contrasted the big truck in the previous picture with the hybrid vehicle in this one

19_9 carbon reduction programs

Photo consent unavailable
Open walled tent set up outside. Youth riding bike attached to bike power generator. Adult (staff) standing and talking to him. Other youth in background looking at incoming steam train.

Topic: Small changes I can do with my life or programs that have an impact
Index: educating people about greener power options with a bike powered generator
Notes: "*This is programming, so this is Ian and I doing a carbon footprint discussion with kids about how riding their bike, how much power you would need to power the stereo that we were listening to dance music and it was nice because the old locomotive engine managed to come by and puffed smoke at us and we would talk about carbon versus green"* (Karina).

20_9 encourage others to cycle

Topic: Small changes I can do with my life or programs that have an impact
Icon: encouraging others to engage in more climate friendly behaviours.
Notes: "*My staff's bikes at River Day, I think that was used before so that's encouraging others to cycle, small changes*" (Karina).

21_10 inspired by my happy place and nephew

Topic: People, places, or things – ideas that inspire me
Symbol: adults inspired by the children they share natural experiences with
Notes: Karina talked about flying a kite with her nephew, helping to expose him to a natural environment

22_11 & 10

Photo consent unavailable
Adult with young child looking under hood of hybrid car. Second adult a few feet away

Topic: Positive actions/things
Topic: Childhood then and now
Index: child getting excited over green technology that is relatively new; someone owning a hybrid car
Notes: The child was very excited about the different car

23_11 childhood now

24_11 childhood then Kma and Bro at Crimson Lake 1980ish

\

25

Topic: Childhood then and now
Icon: different levels of exposure to nature
Notes: "*That is children then and now, my niece and nephew playing in the water and then us playing in the water, my brother and I… us just full on nature… they've got hats, and they're in a little shaded tent and my brother and I are just out there, probably no sunscreen on, playing*" (Karina).

Topic: People, places or things – ideas that inspire me
Index: engaging in climate friendly travel
Notes: "*This is an inspiring photo of Karly who biked with the really heavy tent from her work and in the background is the vehicle that I had to bring*" (Karina).

Lora

1

Photo consent unavailable

Child holding paper doll on bike seat of bike hooked up to bike power generator inside building

Topic: Everyday life
Icon: getting children excited about the environment
Notes: The child in the picture wanted to ask questions about the bike power generator at an event on biodiversity at City Hall in Edmonton.

2

Topic: Everyday life
Icon: the relationship between weather and outdoor recreation
Notes: Lora was excited to fly a kite for the first time this day. She did not fly kites growing up because there was not a reliable wind for it.

Megan

01

Topic: Representative or related to climate change
Symbol: resilience of nature
Notes: "*I have a Mayday tree in front of my house, and I have lived in my house for my entire life. It blooms every year on my birthday, so I took this picture on my birthday, last Friday, and my tree bloomed that day for me. The funny thing about my tree is that my mom planted it when she moved into the house 30 years ago. So she has seen this tree grow through everything. We tend to have some fairly hardy plants around Canada and I think that we take for granted how hardy the vegetation is here, and how resilient it is to some of the change that happens around us*" (Megan).

02

Topic: Childhood then and now
Symbol: annual arrival of summer and summer recreation; summer as a time to be outside with nature
Icon: motorized recreation options
Notes: "*I was at the lake this weekend and that is where I spent most of my childhood in the summers, I was at the lake. That is where I relate a lot of my outdoor, nature experiences to. I remember growing up we always had a motorboat; this is a picture of me just hanging out in the motorboat right after we got it ready for the summer. As environmentally unfriendly as motorboats are I associate them with my childhood and it was something that I did*" (Megan).

03

Topic: Childhood then and now
Symbol: consistency in signs of summer
Notes: "*The second picture is a picture of a flower that I look forward to every year. It comes right before the summer time every year"* (Megan).

04

Topic: Childhood then and now
Index: water recession in lifetime
Notes: "*The picture after that is the lake and how much it has receded"* (Megan).

05_a natural cycle

Topic (Latent): The way we live versus the way of the natural world
Symbol: controlling or allowing natural cycles to happen
Notes: "*I took this picture because it's a representation of a forest that had a natural forest fire and we often look at forest fires as a very negative thing, and they can be because they can be quite destructive, but before we settled in these lands forest fires happened naturally on a cycle and I think this picture highlighted the regrowth of the new trees and how it is a natural process. Yes these trees were burned in a fire but they are making way for new growth and can still be beautiful*" (Megan).

06_apples

Topic (Latent): The way we live versus the way of the natural world
Symbol: disconnection between humans and nature
Notes: "*You see apples in the grocery stores and they all look alike. The apples on the tree in our backyard that has been producing apples my whole life, growing up I didn't consider them food they were just, oh look our tree grows apples*" (Megan).

07_driving to paradise

Topic (Latent): Changes and trends in outdoor recreation
Icon: experiencing nature, while protected from nature
Notes: "*That's how we see the mountains a lot of the time is as we drive through them in our cars with the bug splattered across it*" (Megan).

08_I call this my summer home

Topic (Latent): Weather trends and changes through our lives and their effects on leisure activities
Index: water recession at Megan's family cabin
Notes: "*So I was standing in between where the lake is now and then where the water used to be in the halfway point. There is probably 2 km in my lifetime of water recession*" (Megan).

09_luxury in the wilderness

Topic: The way we live versus the way of the natural world
Symbol: separating ourselves from our own nature
Notes: "*I always find it hilarious that you go to nature to get back to nature and we still have some sort of fairly modern outdoor facility for taking care of your natural business*" (Megan).

10_Nature's virtual postcard

Topic: Small changes I can do with my life or programs that have an impact
Icon: reducing personal consumption by creating low impact souvenirs
Notes: "*I just wrote it in the sand and I had written this one as a memento, I tried not to buy any souvenirs when I went to Tofino this year, so I made souvenirs and this is one of them. I wanted to frame it at some point and put it up*" (Megan).

11

Topic (Latent): Positive actions/things
Topic (Latent): People, places, or things – ideas that inspire me
Index: low impact wedding
Notes: "*They did everything they could recycled everything and they didn't have a lot of your usual wedding disposables. Everything that they used was reusable, recyclable, or donated, or community collaborated*" (Megan).

12_sunset over suburbia

Topic (Latent): The urbanization of nature
Symbol: changing reality of the nature we experience
Notes: "*I thought yeah well that's the reality of our sunsets these days. We live in the city even if you don't live in the city*" (Megan).

13_the nature we chase

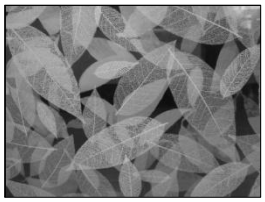
Topic (Latent): People, places, or things – ideas that inspire me
Topic (Latent): Changes and trends in outdoor recreation
Symbol: the vision of nature that we want to consume
Notes: "*It's like the classic nature; this is the nature we chase. In a sense it is, that's how we picture nature. There's these wild rushing waves and beautiful blue sky and mountains in the background and when people think of nature and outdoors we think of big and grand and bold and beautiful. Unfortunately that accessibility is limited these days; limited by our location, by cost, and by a lot. It's kind of a select few who actually make the effort to make it possible for themselves to see*" (Megan).

Meghan

01

Topic: Representative or related to climate change
Index: changing ocean conditions due to people
Notes: "*It made me think about climate change and how sometimes it changes the currents of the ocean and it makes changes to the El Ninos and El Ninas and it affects the ocean currents themselves and so that was to represent the changes in oceans due to people. At the same time, when I took the picture, I felt really bad because I had flown to Mexico and probably contributed to a wave or two that was crashing my nice sunny beach*" (Meghan).

02



Topic: Representative or related to climate change
Symbol: climate change as an either/or, it's happening or it's not
Notes: "*It's a bunch of leaves and they're all in black and white because I was trying to show that some people when they start looking at the world and climate change they see it as black and white. It's either happening or it's not. They don't really see all the small things they can do, or ways it can be fixed, it's all one way or nothing. We'll either have all these industries or we'll have total parks and conservation, they don't really see compromise*" (Meghan).

03

Topic: Childhood then and now
Index: opportunities to connect with nature still exist
Notes: "T*his is us, me and my sister and two friends and we went to Johnston's Canyon I think this is. So this is, it isn't kids nowadays it's adults, but I'm sure that kids still go with their families and look at the scenic places in Banff and Jasper National Parks. They've been doing that forever and we've been doing it since we were little"* (Meghan).

04

Topic: Childhood then and now
Index: opportunities to connect with nature still exist
Notes: "*They still do fun things like fishing and being out in nature, so, if you really want to, the activities are out there for kids. It's just that some of them choose to stay inside with their video games but some of them do go outside*" (Meghan).

05

Photo not available digitally

Beach at Elk Island National Park with people swimming in the water

Topic: Childhood then and now
Icon: restricted access today due to safety concerns
Notes: "*This is the beach at Elk Island where there is actually people swimming in the water and it was actually an active place whereas now it has don't swim signs because of water levels and goose poop. There was an actual beach, so that's different*" (Meghan).

06

Photo not available digitally
Meghan and her sister as young children playing outside in park in Edmonton's river valley

Topic: Childhood then and now
Index: opportunities to connect with nature still exist
Notes: "*I have some pictures of Terwillegar I think, it looks like Terwillegar, of me when I'm littler and then me when I'm older. And I guess I could go back now and take a picture of the same location*" (Meghan).

07

Topic: The urbanization of nature
Index: wildlife becoming accustomed to human presence
Notes: "*From my perspective, this picture demonstrates what happens when we allow wildlife to become accustomed to our cities and our development. Here this deer has become urbanized and no longer follows natural barriers to contact with humans. As humans expand into the environment and take over landscape previously used by animals, these occurrences might become more common. While the deer may seem harmless, it may cause increased car accidents and promote other wildlife to enter into human contact*" (Meghan).

08

Topic: Positive actions/things
Symbol: humans becoming more natural
Notes: "*This picture captures the first time I saw a wind powered turbine out on land near Pincher Creek. I was astonished by the sheer size of the structure. Although it was a man made structure it was very beautiful for me to look at over the scenery and I hope to see more in the future*" (Meghan).

09

Topic: Positive actions/things
Index: use of renewable and sustainable technologies
Notes: *"This is a picture taken on a hike in Kananaskis Country at the Elbow Lake Backcountry Campground of a solar powered composting outhouse. This is an example of positive actions taken by people to promote sustainable living which will help in the fight against climate change. However, those using this particular outhouse are those who are already connected to nature so word and use of composting toilets needs to be spread and encouraged*" (Meghan).

10

Topic: People, places, or things – ideas that inspire me
Iconic: places worth protecting
Notes: "*For many personal reasons, I have a connection with this place and would hate to see it change due to climate change. We have always skied Fortress and Nakiska every spring break however one of those hills is now gone and the other may disappear if climate change alters the snowfall or temperature of this region. This picture was taken on a backcountry hike to Rae Lake which passes by alpine meadow (represented in the next picture) which may also experience change since they are sensitive ecosystems like many others on this earth and need to maintain their balance"* (Meghan).

11

12

Topic: Changes and trends in outdoor recreation
Symbol: opportunities will continue to exist but the context/environment may change
Notes: "*I took a picture of this cute family doing their recreational activity of relatively low impact on the environment but then this is a major fishing Lake. What you can't see in the picture is gazillions of other speed boats and fishing boats on the outside of it but I just took it because one of the topics was about recreation in the past or how it's changed. I still think that canoeing has been there for a while and it will still be there in the future but it could change because the water could get grimier or you can have too many powerboats so that people don't want to canoe"* (Meghan).

13

Topic: I feel powerless when...
Symbol: privileging animals over plants; plants are worthy of protection too
Notes: "*I feel that people often think of plants as not being as important as animals in the environment. There are countless ads towards saving cute and fuzzy polar bears and cuddly and innocent pandas. I urge people to view plants as needing equally important attention and protection. This picture symbolizes a plant (taken at Muttart Conservatory) which appears to have blood flowing through its veins, just as animals do. I would like to stress the importance that plants are also worthy of positive action from people who care about the earth and all of its species"* (Meghan).

14

Topic: Childhood then and now
Symbol: nature distorted by human structures
Symbol: carelessness of people
Symbol: protecting nature for future generations
Notes: "*This picture, with the metal fence in focus and the hoodoos in the background unfocussed represent a way of experiencing nature and how that has changed from when I was younger. When I visited Drumheller, Alberta in my childhood, the hoodoos were free standing interesting pieces of environmental processes and had their own beauty and story to them. Now, when I view them again, they are covered with fences and metal walkways and their beauty has been distorted. In one way, these fences are positive since it protects the hoodoos for future generations to come. In another way, it shows me how some people are careless about the effect they have on the environment and do not give it the respect it needs, therefore needing a fence to keep them under control*" (Meghan).

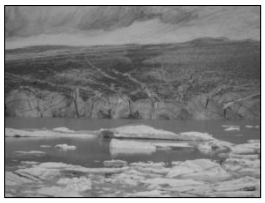
15

Topic: People, places, or things – ideas that inspire me
Icon: the survival of nature
Symbol: hope for beauty and life in the face of hardship
Notes: "*While visiting Drumheller, Alberta, I came across this unique view and decided to take a picture. To me it represents a lush oasis of green leaves, fertile soil, and food sources for other animals amongst the dry badlands of the area. It was a symbol of hope that some places around the plants which are protected may still retain their beauty and life even if the areas around them are facing hardships*" (Meghan).

16

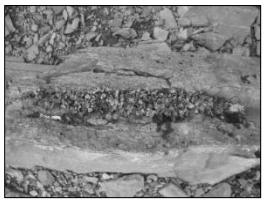
Topic: How am I affected by climate change?
Symbol: caring about things we have lost, instead of things we are losing.
Notes: "*A lot of the enthusiasm that revolves around dinosaurs stems from the fact that dinosaurs are now extinct. They are fascinated by these powerful creatures and the ways in which they went extinct. I feel that animals today will possibly experience their own mass extinction due to climate change, overfishing, pollution, etc. These issues are caused, in part, by us humans. Will these animals gain the enthusiasm of dinosaur lovers once they become extinct? Will they also be placed on display in a museum for everyone to view and learn about after they are gone? Why not learn about them now and take the appropriate actions to prevent animal extinctions caused by humans and climate change*" (Meghan).

17



Topic: Weather trends and changes through our lives and their effects on leisure activities
Index: melting glaciers
Notes: "*This picture of a glacier on Mount Edith Cavell. This picture should be self-explanatory. The glaciers around the world are melting due to climate change and we need to do something about it*" (Meghan).

18

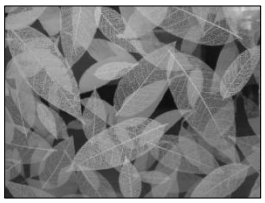


Topic: The way we live versus the way of the natural world
Symbol: finding ways to make a difference even when things look bleak
Notes: "*This is a picture of a high altitude plant surviving in one of the harshest environments on earth. I took this picture as a reminder to myself and others that while sometimes the outlook on the environment may be bleak, you can still make it through the cracks and shine, just like this plant*" (Meghan).

19

Topic: Changes and trends in outdoor recreation
Icon: disappearing winter sports
Notes: "*It is hard to predict how regional weather will shift with climate change but with overall global warming it is likely that many winter sports may change due to reduced snowfall. So instead of gearing up for a fun trip to the Rockies to go skiing, future generations may enjoy sliding down sand dunes instead, as I was in this picture taken in South Africa*" (Meghan).

20



Topic: How am I affected by climate change?
Symbol: viewing climate change as a black and white/yes and no issue
Notes: "*This photo represents how I believe other people may perceive the world as climate change progresses. Some people see climate change as black and white. They believe there is a way or there isn't. You either develop industries to reap the benefits of the earth or you shut everything down and build nothing. Also, they may no longer take pleasure in the colours of nature and the happiness and warmth that it can bring. They may see the nature as having lost its colour and therefore have lost its importance and worth in their personal lives*" (Meghan).

21_photoshopped flower

Meghan turned the photo black and white and then re-coloured one of the flowers.

Topic: I feel powerless when...
Symbol: remembering that there is hope and you can make a difference
Notes: "*I have chosen to represent this picture in black and white, except for the one flower of brilliant colour. Sometimes I feel downhearted and powerless when I learn about how climate change affects our rainforests. However I need to stop and remember that there is some hope to the picture and that with positive action we can make a difference against the fight for climate change, represented by the one colourful and radiant flower"* (Meghan).

22_Zebra

Topic: How am I affected by climate change?
Symbol: hiding ignorance or lack of care by being with others the same
Notes: "*This picture was taken on a trip to Botswana, Africa. I feel it represents that some issues in climate change, for example, environmental destruction, are camouflaged by larger corporations so they become less visible to those around. Also, zebras also have their colouration so that predators have a hard time picking out individual zebras in a group to hunt. Sometimes, I feel that groups/individuals that are oblivious or uncaring towards climate change band together to make signaling out more difficult and act as a barricade to those who are willing to take action against climate change*" (Meghan).

23

Topic: The way we live versus the way of the natural world
Symbol: changing plants and animals to make them hardier or more profitable
Symbol: need to put our efforts in other places
Notes: "*When is the last time you ate double yoked eggs for breakfast? My friend raises her own chickens to produce eggs for her family so for our breakfast we were able to enjoy fresh eggs. With today's technology we are able to genetically modify animals and crops to better handle extreme weather conditions and become more profitable. However, I feel there is a limit to how much we can alter plants and animals with our technology. I believe our time, effort, and resources would be better spent creating new and innovative ways to combat climate change"* (Meghan).

24

Topic: Seasonal change of one location
Index: uncertainty of weather and the possibility that climate change will accentuate this
Notes: "*This picture was taken on a hiking trip to Jasper National Park in the month of July during a period of heavy consistent rain. It symbolizes to me the uncertainty of weather patterns and how the continuing climate change may make these weather patterns more erratic and unpredictable which could have an effect on outdoor recreational activities, such as hiking"* (Meghan).

Rob

01

Topic: Everyday life
Index: discovering new places at home
Notes: Karina showed Rob a jump in the river valley that he didn't know about before. This was him after going over the jump. Moreover, the area reminded him of places he played in as a kid: "*I used to love playing in gullies as a kid and that reminded me*" (Rob).

02

Photo consent unavailable
Rob and a friend showing off their wounds after crashing their bikes, mountain biking in Edmonton's river valley

Topic: Everyday life
Icon: exposing people of all ages to the outdoors, and outdoor recreation
Notes: Rob talked about two of his friends not being very interested in the outdoors and he took them biking to show them how much fun it could be. "*You can change minds really close to you and all sorts of different people, a different concept of what's acceptable for even themselves to put an effort in*" (Rob).

03

Topic: Everyday life
Symbol: "*pest or pretty*" (Rob)
Notes: Canada geese have mixed reputations in the river valley. There are many people who feed the geese during the spring and summer; this has resulted in high population numbers which then overrun several city parks. The geese can be very aggressive and they leave their feces everywhere.

04

Topic: Everyday life
Icon: high mosquito population
Symbol: some types of nature are valued over others
Notes: "*We played a game called kill as many mosquitoes as you can and then put them in a bucket so we'd know how many there were*" (Rob).

05

Topic: Everyday life
Index: the view when walking
Notes: "*You get really different shots I find being on foot, totally different so seeing a city is going to be totally different if you do it on a bike than if you drive it so I recommend, any new city you go to, even get a scooter, just something that's open*" (Rob).

Representation of People

The photographs contributed by participants cover a range regarding whether or not they include people. As shown in Table 1, 51% of the photographs imply the presence of people through elements such as municipal infrastructure, buildings, or evidence of human activity such as bicycles. Related to this group is the 32% of the images which directly include people. The remaining photographs do not include or imply people. This was the smallest of the three groups at 18%.

Table 1

Photographs by inclusion or implication of people

Participant	With people	Without people	People implied
Carolyn	7		13
Chris	5	5	14
Dorothy	1	6	8
Jen	1	5	19
Julie	18	1	15
Karina	14	3	8
Lora	2		
Megan	2	5	6
Meghan	7	8	9
Rob	2		3
Total	**59**	**33**	**95**

Location of Photograph

Table 2 provides the numbers of photographs provided by each participant that are located within municipal, regional, national, and international settings. One final category is not applicable. The not applicable group includes scenes where the location of the setting in terms of these categories is irrelevant to what

the participant was using the photograph to illustrate. For example, in Karina's (11_Nikolas B-day 2011) photograph of her nephew's birthday, the focus is on the quantity of gifts and the indoor setting rather than whether it is local or otherwise. Jen's images (10_bins to 13_classroom recycling) are classified as regional because part of the issue with the recycling program at her school is that the region the school is located in requires that the school pays for recycling pick-up while garbage pick-up is included in the services to the school. As is shown in the table, half of the photographs (49%) were taken within the municipal region, with another 33% taken within the province. Six participants did contribute images that were taken either nationally or internationally, together these accounted for 10% of the total number of images.

Table 2

Location of photograph

Participant	**Local (within municipal region)**	**Regional (within province)**	**National (within country)**	**International**	**Not Applicable**
Carolyn	11	6	3		
Chris	19	1	2		2
Dorothy	10	4			1
Jen	9	12			4
Julie	17	6	2	7	2
Karina	12	7			6
Lora	2				
Megan	3	9	1		
Meghan	3	16		3	2
Rob	5				
Total	**91**	**61**	**8**	**10**	**17**

5. Personal Connections with climate change

There were 15 topics photographed and discussed by the research participants throughout the course of this project. The majority of the topics, as identified in chapter four, were determined by the participants themselves and arose from the group discussions and thinking. This engaged the participants not just in interpreting the topics set by the researcher as was done in the first two topics, but also in creating and choosing the focusing ideas within the research project. Using this approach moves the research beyond theory, and ensures that images address the areas of meaning for participants (Clark-Ibáñez, 2007).

The first two topics were set by the researcher during phase one of the research in order to facilitate participants' comfort with the project, set an initial direction, and establish a baseline perspective. Following these participants generated the topics to photograph themselves. This encouraged them to explore more areas of thinking and acting (Keiny, 1991). This was apparent as participants explored diverse topics within their photographs and discussions.

The Place of People

Unlike the Alberta Climate Change Strategy Document (Government of Alberta, 2008), the photographs contributed to this project often featured people and evidence of people. As shown in Table 1, one third of the photographs contained images of people, and one half of the photographs contained images that revealed the presence of people. People were portrayed in multiple ways within the participants' images which will be discussed throughout the sections that follow.

At the same time, people were evident in the photographs from aspects beyond the subject matter. The majority of the photographs are taken from an apparently human position in space. In other words, the majority of photographs are taken from eye level. Chris drew attention to this view point on the world with several of his images. In two of his images (05, 06) that focus on the outdoor classroom at a local elementary school he talked about how the space itself seemed to determine how it wanted a participant to interact, and hence view the space. He even said that it was "prescribed viewing". At the same time, the view he took required that he physically adopt a position that mimicked a child's height in order to experience that particular view. While Chris felt that this position was predetermined it would be interesting to examine whether other adults, or even children of varying heights attempt to recreate the same view with their physical position in the world.

Although these images drew attention to the role of perspective and even cultural or societal norms in viewing, two of his other images highlighted the role of taking a different perspective, diverging from the standard eye level image. Neither his image of the Astroturf at a playing field (19), nor his photo of the trees from his position on the ground (21) used standard eye level perspective. In both cases he decentres the human position by adopting angles that were not standard. Although Karina commented that laying on the ground and looking up is often a perspective that she takes on the world, only one other image is obviously taken from a perspective that is not eye level. Julie's image (34) of the plant growing through the asphalt is taken from the level of the plant, rather than from the position of a human looking down on the plant. In her discussion, Julie suggested that despite human actions to "*put things down*" the plant had persisted and "*made itself a home*". The perspective of this photo contributed to her comments because she is putting the plant at an equal level to the viewer through her use of angle and perspective. As a consequence, the image contributed to her argument it was okay for the plant to make a home, and that humans should not put it down. As Kress and van Leeuwen (2006) explain, "there is no power difference involved" (p. 140) when the image adopts a point of view that establishes equality.

There was also a tendency for the photographs to be presented as objective documents. Throughout the project the participants often began their descriptions of the photographs with "This is..." followed by a statement regarding the main subject of the photo. For example, Karina (13_Kma's niece Claire 2011) stated "*this is Claire, his [Nikolas'] little sister; it's her birthday this weekend so I'm sure there will be presents because it's got to be even [between the two kids]."* These statements place the photographs in an intended role as documentary images: "photographs recording events, or portraying newsworthy people" (Kress & van Leeuwen, 2006, p. 30). This reflected on Barthes' (1977) reflection on photographs that are viewed as uncoded messages. The documentary nature of these images does present them as direct representations of reality.

The main exceptions to this were several of Meghan's images. Meghan's photos of the leaves in an art installation (02), the 'veins' in the leaf (13), the dinosaur museum (16), the black and white photo of the plant with one colourful leaf (21_photoshopped flower), and the image of the zebra (22_Zebra) were each intended as symbolic images. The indexical and iconic meanings were secondary to the symbolic meaning. An important avenue for further research is to address the tendency towards documentary images versus the taking of symbolic images. Is this a response to trying to create objective images because of the connection between climate change and science, a supposedly objective pursuit? Is it an

artifact of the methodology and the association between photography and reality? Does it relate to the images of climate change that are most commonly seen in the media and publications available and utilized by participants? How do the images and discussion change if participants take one approach over the other? And how do different subcultures address this difference between documentary versus interpretive images?

Table 3 summarizes the photographic topics taken by participants, the themes that emerged within each topic, and the photographs included in each theme.

Table 3

Summary of topics

Topic	**Main Themes**	**Photographs**
Everyday life	Daily activities and scenes	Dorothy 01 Jen 01, 02, 03, 04 Julie 04_Garbage, 05_Garden and Garbage, 07_Spring sunshine in the river valley Karina 02, 04, 05, 06, 07 Rob 01, 03
	Personal lifestyle choices	Dorothy 02 Julie 03_Forest Family Lora 01 Rob 02, 05
	Interactions with nature	Dorothy 01 Jen 03 Julie 06_on the River Karina 01, 03, 08 Lora 02 Rob 01, 03, 04, 05
	Consumption and waste	Julie 01_Big Trucks and McDonalds, 02_Farm and Manure, 04_Garbage, 05_Garden and Garbage Rob 02

Representative or related to climate change	Causes		Julie 08
	Consequences		Dorothy 03, 04, 05 Jen 05, 06, 07 Karina 09,10 Meghan 01, 02
	Positive human actions		Carolyn 01, 02, 03, 04, 05, 06, 07
	Resilience		Megan 01
Childhood then and now	Opportunities for outdoor play still exist		Julie 15_kite flying, 18_bundled kids, 19, 20_trees, 23_changes in rec – family Meghan 03, 04, 06
	Access to different technologies		Jen 08 Julie 17_technology Karina 22_11&10 Meghan 04
	Decreased quality of environment		Meghan 05, 12
	Restricted access to nature because:	Adult interests	Julie 13_Jasper Karina 11_Nikolas B-day 2011
		Reduced physical access	Meghan 14
		Increased safety concerns	Julie 20_trees Karina 23_11 childhood now, 24_11 childhood then Kma and Bro at Crimson Lake 1980ish Meghan 05
	Decreased role of creativity		Jen 08, 09 Julie 09_bouncy castle, 14
	Consumerism		Jen 08 Julie 09_bouncy castle, 16_simple Halloween Karina 11_Nikolas B-day 2011, 13_Kma's Niece Claire 2011

Urbanization of Nature	Impacts on flora and fauna	Carolyn 11 Jen 23_Salamanders, 25_uncas wetland before Julie 34_urbanization of nature Karina 01 Meghan 07
	Loss of culture	Carolyn 08, 12
	Juxtaposition of urban parks with industrial areas	Carolyn 18 Karina 14_1 Goldbar with Esso refinery winter
	Impacts on recreation programs	Carolyn 02_downtown from river, 18, 19_summer camp 07 1191, 20_summer camp 07 1188 Chris 15 Dorothy 10, 11
	Restricted access	Chris 15, 18 Meghan 14
	Replace or modify nature	Chris 17, 19
	Urban Nature	Dorothy 11, 12, 14, 15 Megan 12_sunset over suburbia
The way we live versus the way of the natural world	Controlling nature	Carolyn 09_chicoutimi Dorothy 09 Jen 24_taking its own path Megan 05_a natural cycle Meghan 23
	Disconnection with nature	Chris 20, 21 Dorothy 10,11 Megan 09_luxury in the wilderness
	Nature within living spaces	Dorothy 14, 15 Jen 16_garden Julie 05_Garden and Garbage
	Nature doesn’t give up	Meghan 18

Changes and trends in outdoor recreation	Changes from climate change		Meghan 12, 19
	Pursuit of nature		Megan 13_the nature we chase
	Equipment changes	Motorized equipment	Carolyn 15, 19_summer camp 07 1181, 20_summer camp 07 1188 Dorothy 08 Jen 22_rowboat Julie 22_change trend rec Megan 02, 07_driving to paradise
		New equipment	Carolyn 8, 10, 12, 15, 16 Chris 09, 19
		Equipment Exchange	Chris 22, 23
	Seasonality		Chris 07 Dorothy 08 Julie 24_Climate affects
	Cultural context of outdoor recreation		Chris 06 Julie 23_Changes in rec
Weather trends and changes through our lives and their effects on leisure activities	Water		Carolyn 10 Dorothy 09 Jen 20_gull lake 2011 Karina 16_4 plus 11 during Jan xc ski training Megan 08_I call this my summer home
Seasonal change of one location			Chris 07 Dorothy 06, 07, 08 Julie 33_season changes and how climate effects Meghan 24
Everyday climate change	Behaviours or situations		Carolyn 18 Chris 01, 13, 24 Dorothy 13 Jen 15_drive to work
	Weather or climate		Jen 17_hail, 18_hail2, 19_incoming storm Julie 25_Everday climate change Karina 15_2 FLOOD! Capilano WGD June 19 2011 a

How am I affected by climate change?	Personal events or choices	Dorothy 14, 15 Jen 21_roasting marshmallows Julie 24_Climate affects, 33 season changes and how climate affects
	Societal issues	Meghan 16, 20, 22_Zebra
I feel powerless when...	Societal systems and barriers	Carolyn 15, 17 Chris 01 Dorothy 13 Jen 10_bins, 11_book orders, 12_buried in paper, 13_classroom recycling Julie 31_Powerless, 32_Powerless 2 Karina 17_8 powerless
	Personal implications	Julie 22_change trend rec 26_Hmmmm Meghan 13, 21_photoshopped flower
Positive actions/things	Community/society opportunities or infrastructure	Chris 04, 05, 11, 12, 14 Jen 10_bins Julie 29_Positive – Don't be a tosser, 30_Positive – garbage placement Karina 18_9 & 12, 22_11 & 10 Meghan 08, 09
	Human/nature relationship	Chris 08, 10 Megan 11
Small changes I can do with my life or programs that have an impact		Carolyn 13, 14 Jen 14_crafty, 16_garden Karina 18_9 & 12, 19_9 carbon reduction programs, Karina 20_9 encourage others to cycle Dorothy 13, 14, 15 Megan 10_Nature's virtual postcard

People, places or things – ideas that inspire me	Carolyn 13 Chris 02, 17 Dorothy 06, 07, 10 Jen 15_drive to work, 16_garden Julie 27_Inspire Karina 21_10 inspired by my happy place and nephew, 25 Megan 11, 13_the nature we chase Meghan 10, 11, 15

Topic - Everyday Life

The topic for the first meeting was purposefully left extremely open, and was intended to get participants used to the act of taking photos for the project and discussing them as a group. The photos ranged across a number of different areas:

- examples of daily activities or scenes (Dorothy 01; Jen 01, 02, 03, 04; Julie 04_Garbage, 05_Garden and Garbage, 07_Spring Sunshine in the River Valley; Karina 02, 04, 05, 06, 07; Rob 01, 03),
- comments regarding personal lifestyle choices (Dorothy 02; Julie 03_Forest Family; Lora 01; Rob 02, 05),
- interactions with nature (Dorothy 01; Jen 03; Julie 06_on the River; Karina 01, 03, 08; Lora 02; Rob 01, 03, 04, 05),
- issues of consumption and waste (Julie 01_Big Trucks and McDonalds, 02_Farm and Manure, 04_Garbage, 05_Garden and Garbage; Rob 02).

Throughout the meeting issues such as consumption and consumerism, lifestyle choices, and relationship with nature were raised as important.

Topic - Representative or Related to Climate Change

For the second meeting, all of the participants except for Carolyn and Megan contributed photos that reflected either causes (Julie 08) or possible consequences (Dorothy 03-05; Jen 05-07; Karina 09,10; Meghan 01, 02) of climate change. While none of these photographs were identical to those described in the research literature (e.g. polar bears, people in at risk locations, or glaciers) as common in communication and education publications about climate change, they focused on subjects that have been connected with climate change science in the news and entertainment media such as destruction of natural spaces, and drought and other extreme weather (Kolbert, 2009; Manzo, 2010a).

Carolyn and Megan, as well as the other participants discussed above, each selected different frames for how they presented their perspective on climate change. Carolyn (01-07) focused on positive human actions such as alternative

modes of transportation, reduced use of chemicals, and education. While these images differed from the rest of the group because of their positive focus, they were still largely focused on human behaviours which are commonly the focus of climate change campaigns (Whitmarsh, 2009). Megan (01), on the other hand, contributed a photograph of the tree that has grown in her front yard for her entire life, focusing her description on how the tree survives in spite of the high level of disturbance around it. Carolyn emphasized individual actions that may contribute to climate change; while Megan framed her perception with a belief in the resilience of nature, a message that would likely appeal to those who do not want to change. This is seen in the media as well, which will select different frames based on the ideology of the producing news outlet, as well as the audience they hope to target (Shanahan, 2007). These images are discussed in the next chapter in relation to their attempts to recreate expert icons, and the subsequent doubt that participants expressed regarding the relation to climate change.

Topic - Childhood then and now

Childhood then and now was the first topic decided on by participants. It also appeared in the group of topics used to guide the final meeting. Overall five participants photographed the topic for a total of 22 photos. Childhood is often recognized as a significant time to develop lifelong interest and care in the natural world (Chawla & Cushing, 2007). Increasing evidence indicates that there are key components to this development such as role models and involvement in programs such as scouts (Chawla, 1998b). At the same time, alarms are being raised regarding decreased opportunities to engage in natural settings (Louv, 2005). Increased access to personal technologies are often associated with decreased time outside; as is decreased free time, and safety concerns (Louv, 2005).

As outdoor educators the participants in this project expressed concern regarding these issues. However, the photographs that the participants contributed relating to this topic generally focused on how the opportunities still exist for children to be engaged outside, through programs such as those offered by RVP, or via another adult or experience. For example, Julie (15_kite flying, 18_bundled kids, 19, 20_trees, 23_Changes in rec – family) and Meghan (03, 04, 06) both contributed images of children and/or adults engaged in outdoor activities both past and present. They concluded that opportunities still exist but they often require that a related or other adult help facilitate those opportunities. As Karina said about her nephew "*he probably will not get to play outside as much as I did just because that is his parents' lifestyle choice, but I was definitely able to distract him with a pine cone and a dandelion."* The importance of an individual or group to initiate outdoor experiences corresponds to the research into significant life experiences (Chawla & Cushing, 2007) and emphasized the importance of having opportunities like RVP to facilitate nature experiences and ensure that staff can act as role models in this field.

Other themes that emerged within this topic included:

- increased access to different technologies (Jen 08; Julie 17_technology; Karina 22_11 & 10; Meghan 04);
- decreased quality of environment (Meghan 05, 12);
- restricted access to the environment because of
  - the interests of the supervising adult (Julie 13_Jasper; Karina 11_Nikolas B-day 2011);
  - reduced physical access (Meghan 14),
  - or because of increased safety concerns (Julie 20_trees; Karina 23_11 childhood now, 24_11 childhood then Kma and Bro at Crimson Lake 1980ish; Meghan 05);
- and decreased role of creativity (Jen 08, 09; Julie 09_bouncy castle, 14).

These themes illustrate that the participants did recognize changes between how they remember their own childhood and those that they see today; however, these changes are reflective of issues other than a lack of access to outdoor places. As outdoor educators, many of these concerns are ones that arise within RVP or similar programs. Safety regulations, teacher or other adult interests/concerns, decreased time available, and prevalence of technology can all affect how a program is planned and implemented. At the same time, Karina talked about the role of RVP "*where you get a kid excited about being outside and he wants to cross country ski for the rest of his life or ride his bike for the rest of his life, and then he makes that change*." Therefore, the focus in RVP, and for many of the participants, was on the availability of opportunities.

Consumerism.

One theme that warrants separate consideration is that of consumerism. Consumerism was understood as an increasing consumption of goods. In particular, participants shared their observations that consumerism seems to have increased in relation to two events: Halloween and birthdays. Both Jen (08) and Julie (16_simple Halloween) shared images in order to contrast the homemade costumes of their childhood with the store bought, and generally more elaborate costumes they observe today.

> *Jen - I had this crown that my mum made me when I was in grade two, it was my Halloween costume. Looking at all the kids costumes that came in this year at Halloween, probably 80% of them were store bought and they'll buy a brand new costume every single year and never actually make their costumes.*
>
> *Julie - they're crazy costumes too, inflatable horses and such*

Later in the same meeting:

> Julie - *and every year you get something [new], whereas I would get my brother's hand-me-downs, and then we'd share with our friends, so last year I was a ____ how about we trade this year?*
>
> Jen – *then you keep everything in a tickle trunk so that you can use it when you become a river valley leader*
>
> Karina – *when you need to go to animated camp*
>
> Julie – *consumerism, I guess*
>
> Megan – *my mom used to alter our Halloween costumes and we wore them at least five years because she made them all out of patterns, so we would let them out, until they couldn't be let out anymore, that sort of thing.*

Julie directly referenced consumerism and how things have changed from trading and altering costumes that were once handmade to purchasing new costumes each year. There are a variety of areas of study in relation to childhood and consumerism. For example, there is extensive marketing research done in order to discover what products children would be interested in, as well as how to market all types of products from cars to food to children and youth in order to increase the likelihood that their parents will purchase it (Nairn, 2009).

Birthday parties also emerged as an area of concern. Both Julie (09_bouncy castle) and Karina (11_Nikolas B-day 2011, 13_Kma's Niece Claire 2011) presented photographs of children's birthday parties, focusing directly on their consumption. Julie showed a photograph of an inflatable bouncy castle at a birthday party for a child too young to actually use the inflatable castle; while Karina focused on the excessive amount of presents received by one child, which would need to be equaled by his sister in order to keep things even between siblings.

Overall, the maintenance of outdoor opportunities and an increase in consumption/consumerism were the main topics considered in relation to comparing their own childhoods with the childhood of individuals today. Although some participants indicated that they did not feel that there was a difference in opportunities they recognized the importance, and possible disappearance, of role models to facilitate these experiences. Both Julie and Karina indicated that parents were often a part of the concern because they, for various reasons, like decreased free time themselves or lifestyle choices, choose these different experiences and focuses for their children. The focus on opportunities to be outside was likely reflective of the culture of the participants as Julie foreshadowed when this theme was selected. This was supported by how often participants talked about their own role in facilitating outdoor experiences

for both groups of children through work and relatives and other children they know personally.

Authors like González-Gaudiano and Meira-Cartea (2010) and Selby (2010) have suggested that consumption, or our unwillingness to challenge it, is actually at the root of climate change. We may engage in practices, such as recycling, to reduce our impact, but ultimately addressing climate change will require addressing consumption directly, rather than finding ways to make it (appear) more benign. This appeared to be an opinion that was also held to greater and lesser degrees by the participants in this project: it was raised during every meeting by multiple participants. The following are a few examples from two of the meetings.

> Photo Jen 08 (June 7) – Jen – "*I have a picture of a card in here. I've noticed that there is a trend that a lot of kids now, the Christmas cards and stuff that are coming out. They will go and get a big huge photo shoot and send out these cards, that have professionally done photos, they never even sign the cards or anything like that it's just, there's no, it's personalized to them, but not to who it is going to. I've received quite a few of these ones so... I mean, it's a lovely card but…*"

In this case, the concern is not the consumption involved in giving a card in general, but the lack of connection between the person giving the card and the person receiving the card. The card is personalized for the giver, almost as if who the card goes to is irrelevant.

> Photo Karina 11_Nikolas B-day 2011 (June 7) – Karina – "*this is him [Karina's nephew] at his birthday party where he got copious amounts of presents… it was obnoxious, it was really obnoxious how many people his parents invited. My brother actually felt guilty*."

> Photo Megan 10_Nature's virtual postcard (September 29) - Megan– "*I tried not to buy any souvenirs when I went to Tofino this year, so I made souvenirs and this is one of them… I wrote my brother a birthday card and texted it to him and I wrote my mom a birthday card and texted it to her. Just using the seaweed and drawing in the sand. It's my natural card.*"

This photo brought the participants to a discussion regarding the loss of handwriting. While Megan was able to make her virtual postcard without cutting pieces of seaweed, handwriting, or cursive writing, has been basically removed from the elementary curriculum in Alberta. As a consequence, the participants concluded that children today would have more difficulty creating the same souvenirs as Megan was able to. Additionally, although this was not raised by participants, it highlighted the role of technology. Without cellular phones with cameras Megan would not have been able to send her virtual postcard in the same way.

> Photo Megan 11 (September 29) - Megan – "*They did everything they could recycled everything and they didn't have a lot of your usual wedding disposables. Everything that they used was reusable, recyclable, or donated, or community collaborated*."
>
> Julie – "*People were bringing their own chairs*."
>
> Megan – "*Yeah people brought everything themselves and it was really neat to see a community come together and see a wedding that wasn't a production. It was really nice*."

This led to a discussion regarding weddings in general and how weddings often take on the concerns of others, and the societal pressures to be "productions". Several of the participants expressed that the weddings they have enjoyed the most were smaller and did have a lower environmental impact.

Although consumerism is often considered part of capitalism and therefore an issue that cannot be addressed without shaking the foundations of Western society, others suggest that this is exactly what is required (Kagawa & Selby, 2010; Plumwood, 2001). This project demonstrated that there are at least small groups of people who are likely to respond to these messages positively.

Topic - Urbanization of Nature

The urbanization of nature was the most photographed topic. All eight of the participants engaged at the time this topic was determined contributed photos relating to it, totaling 21 photos. At the same time, there were different interpretations of this topic revealed by the participants' photographs and discussion.

The impacts of urbanization on flora and fauna.

Carolyn (11), Jen (23_salamanders), and Meghan (07), as well as one of Karina's earlier photographs of moose licking salt off of the road (01), all examined the impacts of urbanization, expansion of people, and habitat destruction on wildlife. This is not an issue that is generally addressed by climate change media which tends to focuses on animals in truly wild settings which they may lose. The participants focused on current impacts on wildlife within local settings. Carolyn's image is the closest to those traditionally used in that it pictured a tiger in a zoo; she discussed this in relation to the fact that we have destroyed so much of the habitat that they cannot return to their natural areas. The other three images however, focused directly on current interactions between humans and wildlife. Both Meghan and Karina looked at the habituation of wildlife to people which puts them and humans at risk, while Jen's focused on a local loss of habitat due to annual weather fluctuations: the effect of drought conditions on salamanders, an amphibian dependent on the availability of water.

Drought conditions in the Edmonton area have resulted in salamanders seeking out other moist places such as water wells. An individual who cleans out wells had been finding large numbers of salamanders and taking them to schools to see if the teachers would like to use them in their classes. Jen discussed this with her students, many of whom had personal stories about their own attempts to rescue salamanders.

Julie's photo (34_urbanization of nature) of a plant growing through a slab of asphalt, and Jen's (25_uncas wetland before) which showed a wetland located next to a train track before it was filled in to expand the track, also focused on current interactions, but broadened the focus to include plants and habitat. Each of these images addressed local environments and events. Although it may not be possible to connect these images directly with the causes and impacts of climate change they do reflect part of the human relationship with nature that underlies human-induced climate change. If this relationship is questioned through images taken in local contexts it might offer an opportunity to connect climate change to local and personal contexts, something which is increasingly identified as necessary in order to encourage the level of change necessary (Lorenzoni et al., 2007).

The perceived loss of culture through urbanization.

Carolyn contributed two photos that reflected her perception of a loss of culture through aspects of urbanization. The first (08) is an image of an area in Old Québec, Québec City, Québec. Regarding this image Carolyn talked about the contrast between Old Québec, where all buildings must fit the architectural style of the area, and the newer areas where people can make whatever changes they want.

> *It's neat to walk through all the old homes and down all the side streets to because there's so much charm and so much culture; and so much that's still there that speaks to what and how the city grew from such a small little community into this huge major city*. (Carolyn)

Later, Carolyn shared an image (12) that contrasted two Alberta industries: agriculture and oil and gas. She associated the past, symbolized by a bale of hay in the foreground of the image, with ideas like community, being connected with the land, and being at home; whereas, the refineries in the background are associated with transient workers, a loss of community, and a decreased connection with the environment. Carolyn focused on change that resulted in a perceived loss of culture. In the first image, Carolyn connected urbanization with a loss of culture, culture is not present in the newer areas where people can build and remodel as they want to. In the second image, the loss had occurred because the residents do not call Alberta home. In a sense, because their priorities for home and community lie elsewhere the transient workers did not

participate in the culture in the area. Further, because the local environment is not the context for their culture they did not care as much about protecting it.

These ideas led to a discussion of consumption and consumerism again:

> *We were talking about the whole idea too of it [Europe] still has all the old stuff in it whereas here we gunge things out, we throw out the old stuff for new stuff. I've stayed with friends in England they have a house that's how old and it still has this old massive iron stove. This thing just sits there and still heats the room, it does everything. But here everyone's got their posh new stuff; we just get rid of things so quickly.* (Julie)

Like Carolyn, Julie associated 'new' with a loss. This loss was connected to a loss of culture. It is often challenging to recognize the culture you are embedded in. Culture is "something that people of other nationalities had" (Allen & Labbo, 2001, p. 43). This can make it particularly challenging to recognize elements of your own culture that contribute to unsustainable ways of being. Julie's comments reflected that Western societies do have culture, one aspect of which is consumerism. McCracken (1990) described the rise of a consumer revolution during which "culture and consumption began to fashion their present relationship of deeply complicated mutuality" (p. 3). Consumer culture has been linked to general environmental decline (Bowers, 2001b; van Koppen, 2007). This is an area where collective action is vital. While one person purchasing something second hand or keeping something old in good repair and usable will not have a significant impact, collective action such as providing opportunities to sell and purchase used outdoor gear, as will be discussed shortly, can have greater impact in both providing opportunities for individual action, and creating cultures where it is considered a more positive way to act.

The juxtaposition of urban parks with industrial areas.

Carolyn (18) and Karina (14_1 Goldbar with Esso refinery winter) both photographed parks on the east side of Edmonton, where you can clearly see the urban park setting and the refineries located in the Industrial Heartland. They are both common RVP programming sites. Carolyn said "*they [the refineries] hum and ha all day long and I love it when the kids in our programs panic, ah the whole world is a nuclear explosion, it's not nuclear, it's fine*." In addition to demonstrating one of the impacts of this situation on outdoor programming, causing stress for program participants, Carolyn's comments illustrated how these scenes have become the status quo for many people, no longer raising concern regarding the implications of the scene. In fact, Berger, Brown, Kousky, and Zeckhauser (2011) found that status quo bias resulted in people making decisions to maintain the status quo "even when change may be preferable" (p. 1424).

The impact on recreation programs.

The images (Carolyn 18 and Karina 14_1 Goldbar with Esso refinery winter) also illustrated how recreation programs, and recreation generally within the city, are rarely able to happen in a truly natural environment. There are almost always sights in the distance that remind participants of the urban setting: whether they are industrial complexes such as these two, the downtown skyline (Carolyn 02_downtown from river), a piece of infrastructure that stands out in the landscape (Dorothy 11), or a barrier that prevents access (Chris 15). If the most common exposure to natural settings includes these sights, people are likely to use this image as their baseline perception. Therefore, they may be more tolerant of the modification of truly natural places (Stedman, 2003). Dorothy's comments regarding one of her photos (Dorothy 10) reflected this situation as she referred to people who are reluctant to associate a "naturalized" park (City of Edmonton, 2012b), with an urban location: it did not fit with their mental image of an urban park.

A related situation was the focus of two of Carolyn's photos (19_summer camp 07 1181, 20_summer camp 07 1188). Both of the images were taken at a residential camp where Carolyn was a leader. During the camp, campers prepared for and go out on an unsupported overnight trip with their leaders. They had to take all of the supplies they required and be aware of safety concerns and first aid as they were told they would not be able to get help. They travelled to the location by canoe over several hours. On one particular trip, two of the campers decided that they were going to try to catch fish for their supper. This seemed like a feasible option to them. Their attempt ended however, after a speedboat arrived from the main camp to deliver birthday cake for one of the campers.

> *As much as it was an exciting moment getting birthday cake it was, they were all questioning what's happening, I thought we weren't able to get, I thought people weren't able to get to us. I thought this was our moment as a group, as a cabin, to really enjoy this, to play games, to get to stay up late because we are not at camp. Then there is cake and all of our bosses. Clearly this moment of no you don't have to worry about wearing your shoes right now, where are your sandals, we all had to go change. It was kind of like oh, you just popped our bubble of being in the outdoors. We are to have a campfire at a certain time now.* (Carolyn)

The campers, and even the leaders who knew differently, began with the sense that they were separated, isolated from the amenities of home: it was to be a unique nature experience. The experience was disrupted when the people delivered the birthday cake; essentially urbanizing their experience because they still had access to the amenities they were used to.

Restricted access to nature.

Chris contributed two photos (15, 18) that focused on barriers erected to reduce access to nature. The first is a fence, but the fence is actually open at both ends, and appeared to be placed randomly, not in relation to a field or something where it might serve a purpose, leading him to conclude that its purpose was to obstruct the view. The second photo was of a municipal sign indicating that the park was closed during certain hours each night. "*I hate these. Why should nature be closed?*" (Chris). These signs may affect how nature and parks are perceived: as Chris suggested, they indicate that nature can be open and closed, in a sense having hours of operation. Thus, the perception may be that these areas are, in fact, separate from nature, potentially contributing to the perceived separation between humans and nature. Meghan also contributed an image of a barrier in nature (14), although she associated it with the theme childhood then and now. Meghan's image showed nature being protected from further damage by humans by restricting direct access. Arguably, this also emphasized the perception of humans as separate from nature.

Replacing or modifying nature.

Chris contributed two images which pictured human constructions that take the place of natural elements. The first (17) is of a constructed waterfall located in the centre of one of the river valley parks in Edmonton. What was most interesting about this image was that Chris talked about it as a "*hidden spot of nature… most people will have no idea it's there amongst the manicured stuff*;" however, the spot is entirely manicured. In fact, the waterfall can be turned on and off, which Chris knew and acknowledged. The difference for Chris was that the manicured areas are dominated by grass, with sporadic trees dotting the landscape, compared to the mixture of rocks, water, grass, and more frequent trees. When Chris shared this image both Karina and Meghan asked him if it was in obviously landscaped settings, a store or landscaping on a local post-secondary campus respectively. This illustrated how personal perceptions can affect interpretation of an image, influencing potential responses.

The second photo (19) was of an outdoor playing field with artificial grass. In relation to this photo, Chris talked about the potential conflicts between environmental concerns, such as water usage and conditions during rain, and human concerns, such as the impact on the players' bodies. This illustrated that replacing nature is not a black and white issue; there are many concerns and angles from which to examine a single issue, making decisions more difficult, particularly when you know you do not have all of the information, which is the situation with climate change.

Urban nature.

Both Dorothy (11) and Megan (12_sunset over suburbia) showed photos that depicted an urban shadow or silhouette in an otherwise natural scene.

Dorothy showed the shadow of a bridge on the natural landscape and talked about how the bridge stands out from its natural setting because of the materials used. The shadow was symbolic of Dorothy's perception that the bridge has cast a shadow on nature because it does not fit in. Megan's photo showed a beautiful sunset; it happens that all of the bumps in the distance are actually houses. While Dorothy was less tolerant of the human structure than Megan was, they both reflected on the reality of nature within an urban environment. Thus, although their images were not showing as stark a contrast as Carolyn and Karina both illustrated with their images of the refineries overshadowing the parks, there may have a similar effect on the viewer.

The final photos in the urbanization of nature were all taken by Dorothy. Each focused on the role of nature within the urban environment. In the first (12), Dorothy pictured one of the major automobile bridges in the river valley. She referred to the river valley as a positive, something that we are lucky to have, but that it also has consequences for how we live because it is in the centre of the city. In the first meeting, Karina talked about an article she wrote about RVP. She opened the article stating that "*most of us just spend our time passing over top, and if you go down a little deeper*…" The river valley is something that most people drive over on their way to get some place else. Several of the research participants indicated that they hear similar statements from the people in their programs. Therefore, a viewer's perception of Dorothy's photo would likely depend on how they view the river valley, is it an asset to the city, do they notice that it is there, or is it a hindrance to their daily commute.

The last two photos (14, 15) showed the natural elements that were in the community where Dorothy purchased a condo. She talked about the importance of these natural elements in making her decision on where to live. This was a common factor in considering housing choices, often appearing as one of the top reasons for housing choice (Munro, 2006). Communities with natural elements were generally perceived as having a higher quality of life (Sheets & Manzer, 1991), as well as social (Kim & Kaplan, 2004; Kuo & Sullivan, 2001) and psychological benefits (R. Kaplan, 2001; Taylor, Kuo, & Sullivan, 2001). In Dorothy's case, the natural elements influenced her decision to purchase a home in a higher density community, rather than a larger home in a lower density neighbourhood with fewer natural elements. One potential avenue for images in communication and education about climate change is to show these higher density residences with significant natural elements in order to encourage higher density living.

Topic - The way we live versus the way of the natural world

There were 15 photographs taken by six participants. Not surprisingly, there were some connections between this and the previous topic. Dorothy in particular connected the photos in these two topics. Generally the photographs in

this topic illustrated four themes: controlling nature, disconnection with nature, nature within living spaces, and resilience of nature.

Controlling nature.

Carolyn, Jen, Megan, and Meghan all presented photos which focused on areas where humans have attempted to control nature: directing its path, preventing natural cycles, or even altering the nature of nature. Carolyn (09_chicoutimi) and Jen (24_taking its own path) both focused on cases where humans had attempted to control the flow of water.

> *Sometimes we build so close to things and we don't realize the damage that can come or how we try to change our landscapes with the dams and with all these other things and the ways we move water and we move things to kind of suit our needs. It's just one of those images where it totally backfired*. (Carolyn)

Carolyn's image focused on two buildings left standing after a severe flood, caused by heavy rains upstream of a hydroelectric dam in Québec. Jen's image showed water running across a trail in Edmonton's river valley, despite the presence of a culvert intended to channel the water below the path. In both cases, the water ended up making its own path, despite human efforts to direct it. Similarly, Megan (05_a natural cycle) focused on human control of fire, which has often turned out to be a negative for the landscape and for people, just like the control of water did in Carolyn's image. However, Megan highlighted the beauty of the scene, focusing on regeneration and other benefits of fire. Taken together, these images give the impression that any attempt to control nature has the potential to backfire, and eliminate the possibility of something beautiful. Rather than implying then that no action is required on climate change, the participants are focusing on controlling human behaviours, rather than controlling nature. For example, the participants shared their support for reducing consumerism, but not for changing nature itself, as has been proposed in some climate change plans.

Meghan's image (23) emphasized the preference to leave nature as it is. She discussed genetically modifying nature to make it more profitable or less susceptible to loss; however, the image, which focused on a frying pan of eggs of which several had double yolks, also indicated the role of societal preferences. "*I personally like the double yolks, there's nothing wrong with that, so I don't understand why we are genetically modifying lots of animals and plants when they are perfectly good the way they are*" (Meghan). Although it may be argued that the areas Meghan was discussing are no longer natural as they are part of human agriculture this may contribute to the perceived separation between humans and nature by classifying nature as separate from agriculture. That is not to say that all human modifications have been natural, but that we need to be aware of the implicit meanings when we separate human activities from nature. All of these images focused on attempts to control nature and how they had

backfired or did not make sense from the perspective of these individuals. It may be then, that images of how humans have controlled nature, and how that control has backfired and may have resulted in some of the issues of climate change may be a positive way of picturing the root causes of climate change for these individuals, and hopefully others.

Dorothy (09) also contributed a photograph that related to controlling nature; however, it came from a different perspective. She talked about the changing weather and how this can make planned outdoor events very challenging and stressful. In the case of this image, which focused on the site of an international cross country ski race near Edmonton, it is the variable winter weather that casts doubt on the feasibility of the race each year. Unlike the other images about attempts to control nature regardless of their success, Dorothy's focused on how controlling nature may be seen as a positive in specific cases.

Disconnection with nature.

Three people examined the disconnection between how we live and nature, as well as the benefits of reconnecting. Dorothy's image (10) illustrated how we have artificially separated urban living with natural settings. She stated that "*you have this extreme between urban as supposedly not natural therefore we can't be in the city because we have this great park.*" Dorothy raised important issues regarding the fact that a disconnection with nature is a perception based on viewing humans as separate from the wider concept of nature. Megan's image (09_luxury in the wilderness) further emphasized this perception as she discussed the presence of an outhouse at the start of a hiking trail in the mountains. "*I always find it hilarious that you go to nature to get back to nature and we still have some sort of fairly modern outdoor facility for taking care of your natural business*" (Megan). Another of Dorothy's images (11) also portrayed this separation through a photograph of the shadow of a bridge in a natural area. The bridge serves to separate humans from the natural terrain, and perhaps then some of their natural ability to navigate such terrain. Megan and Dorothy illustrated how humans have denied their material base (Plumwood, 2001), evidence of the artificial separation and hierarchical relationship between humans and nature (Selby, 2010), which has been argued as the root of the issue of climate change (González-Gaudiano & Meira-Cartea, 2010) and other environmental issues (Oelschlaeger, 2007; Plumwood, 2001). This is also apparent in Megan's discussion regarding a photo of a bowl of apples from a tree in her backyard (06_apples). She stated that she never connected the apples on the tree with apples in the grocery store, and therefore with food.

While the above all highlight our separation from nature, Chris (21) demonstrated that there are people who do attempt to coexist; "*it's a perspective that people don't take of the world, of trying to look up at the trees and things and being that calm*." This began to demonstrate a connection with nature that recognized humans as part of nature rather than separate from it (Weintraub,

1995). Although the other participants expressed their tendency to act in similar ways this was likely evidence of a norm within a subculture that would not be as common in society at large. There is also significant evidence regarding the benefits of nature on humans' psychological health as Chris identified with his other photo in this category of a class outside (20). Chris talked about the students in the class being able to pay attention and being less fidgety when the class was outside. There is significant evidence regarding the benefits of time outside, or even views of nature on attention (R. Kaplan, 2001; Taylor et al., 2001).

According to the principles of community-based social marketing (McKenzie-Mohr & Smith, 1999) one possible means of addressing this need to reconnect with nature would be to utilize images of people in a variety of roles who are embedded in nature. For example, if an individual sees an image of someone playing a video game inside with a caption indicating that they should get outside, they are more likely to associate being inside and playing video games with the most common, or normal behaviour. However, if they were to see images of people in settings with trees, water, or other stereotypically natural elements, this would become the perceived norm in that situation. These photos show a possible means of encouraging people to be with nature. This strategy involves the establishment of norms which then lead to particular behaviours or actions, something that Frantz and Mayer (2009) highlighted as important to achieving action on climate change.

Nature within living spaces.

Related to the discussion of the artificial disconnection between humans and nature were photographs that illustrated an attempt to recapture at least pieces of this relationship. Dorothy (14, 15) contributed photographs that focused on the presence and importance of natural elements such as trees within her neighbourhood. Although neither of them directly connected these images to this topic both Jen's (16_garden) and Julie's (05_Garden and Garbage) photographs of their balcony gardens illustrated their personal efforts to reclaim aspects of nature within their living spaces.

Chris addressed the conflict between the disconnection from nature and recapturing nature within a single image (03). The image depicted a set of bike racks which he suggested were a contradiction. The bike racks had a curved shape, which he connected with being more natural. In addition, they facilitated the use of cycling as transportation which is more environmentally friendly. However the material is "*stark, shiny metal*" (Chris) which he argued was unnatural and served to separate the bike racks from nature.

Resilience of nature.

Meghan contributed one photo to the topic of the way we live versus the way of the natural world that focused on nature as a role model. Meghan's photo (18) pictured a plant that appeared to be growing out of rock in a high alpine

environment; focusing on the struggle that many organisms have in order to survive in natural environments.

> *I took it to show that we may feel depressed or discouraged sometimes about the whole climate change but there is still pretty and cute little plants like that that are showing us that we can't give up hope, we must fight because he fought. The whole world is not bleak.* (Meghan)

This image stood out because Meghan indicated that we should take our cues from nature and continue to fight to change the way we live because nature fights to survive. Contrast this with the images of nature commonly used in climate change that picture vulnerability (Manzo, 2010b) and portray sources of fear (O'Neill & Nicholson-Cole, 2009). Part of the reasoning behind inaction in the face of climate change is that the scale of climate change is too large for an individual, or small group to have an effect (González-Gaudiano & Meira-Cartea, 2010) . When individuals do feel that they can benefit the environment, they are more likely to engage in environmentally responsible behaviours (S. Kaplan, 2000). While the common images such as polar bears stranded on ice flows can contribute to feelings of helplessness, Meghan's image, with an accompanying caption, which portrayed the plant's survival as an example of perseverance, may contribute to feelings of hope and encouragement.

Topic - Changes and trends in outdoor recreation

One of the topics was how outdoor recreation has changed, or is changing in the context of climate change. This topic was photographed by seven participants, totaling 20 photos. Like with so many of the topics in this project, actual changes as a result of climate change were not the focus of the participants. Instead the focus was around how recreation changes are indicative of a different relationship with nature.

The one exception was Meghan, who did project forward into the potential future, envisioning how recreation may change in the context of climate change. In her photo (19) Meghan is sandboarding in South Africa. Very similar to snowboarding, a common Canadian winter activity, sandboarding involves sliding down large, sand covered slopes on a board. Meghan suggested that people will still get outside and be involved in recreation opportunities, but those opportunities may change because of the prevailing climate. Meghan's image implied that we can able to adapt to a new climate if necessary, particularly since, in most cases, the climate will not be new, just new for that area. D. Scott (2011) suggested that warm weather activities will expand in Canada while cold weather activities will be reduced with changing climatic conditions, which supports Meghan's perspective.

Depicting a different type of change, Meghan also shared a photo of a family canoeing (12). In this case, she talked about the same activities existing but the context changing.

> *What you can't see in the picture is gazillions of other speed boats and fishing boats on the outside of it but I just took it because one of the topics was about recreation in the past or how it's changed. I still think that canoeing has been there for a while and it will still be there in the future but it could change because the water could get grimier or you can have too many powerboats so that people don't want to canoe.* (Meghan)

Dorothy talked about how this has already happened in some places as she does not see many self-propelled boats on a lake that she goes to.

These changes may make the photo that Megan contributed (13_the nature we chase) even more difficult to access. Megan suggested that there is an ideal nature, the nature that everyone wants to see but few people actually get to. This is the other side of Meghan's photo. Through selective framing Meghan created an idyllic nature scene, while Megan raised concerns regarding their disappearance. Even in Megan's image of this idyllic nature there was a camping vehicle in the background.

Megan also raised this concern in her image of seeing the mountains through a bug-splattered car windshield (07_driving to paradise). "*That's how we see the mountains a lot of the time, as we drive through them in our cars with the bugs splattered across it. It just seems like such an oxymoron*" (Megan). This changes our perception of the mountains and potentially affects our tolerance of other events. At the same time, it is reflective of how changes in equipment affect our nature experiences, just as the car changed how we interact with the world (Høyer & Hall, 2005).

Equipment changes.

Several people focused on how there have been equipment changes that have affected outdoor recreation. This was alluded to in the discussion of powerboats versus canoes in both Dorothy's and Meghan's photos and the impact of the car on nature viewing by Megan. Major areas of discussion in this area focused on motorized versus self-propelled options, the role of prior experience, and additional (or collateral) knowledge on perspective, the negative environmental impact of newer opportunities, and various points regarding the acquisition of new gear.

Dorothy (08) and Jen (22_row boat), like Meghan in the previous section, discussed how they saw motorized boats as displacing self-propelled options like canoes. This was seen as a negative change because it may result in a loss of activity that the participants have enjoyed (canoeing). As well, it may affect the wildlife in the area, which may avoid areas with motorized boats due to the noise which will subsequently affect the human experience. Rob also raised a concern regarding the difference in experience in a vehicle like a car versus something like a bike:

> *Seeing a city is going to be totally different if you do it on a bike than if you drive it, so I recommend, any new city you go to, even get a scooter, just something that's open [to see the city from]*.

Carolyn (19_summer camp 07 1181, 20_summer camp 07 1188) also reflected on how the presence of a motorboat affected the experience of a group of campers. The arrival of the motorboat disrupted their wild experience, reintroducing the obligations of the more structured camp they thought they had left behind.

Contrasting this perspective, particularly the discussion of powerboats, is Megan's image (02) which showed her sitting in a powerboat as a symbol of the arrival of summer. From a semiotic perspective this difference shows the importance of collateral knowledge in how we interpret symbols (Lefebvre, 2007) that may be used to represent climate change. Based on Megan's previous knowledge and experience, the motorboat was connected to positive memories of being outdoors, childhood, and summertime. On the other hand, for participants like Carolyn, Jen, and Dorothy the motorboat was associated with displacing the canoe and disrupting their relationship with nature. As such, they would be more likely than Megan, to respond to an image of a motorboat that was negatively implicated in issues of climate change.

This importance of collateral knowledge is also apparent in Chris' image of a long board (09), a type of skateboard primarily used as a mode of transportation. Chris, who owned a long board himself, is aware of its use for transportation, but commented that it is rarely acknowledged as a means of alternative transportation. To many people, the picture of the long board is likely to be grouped with skateboards more generally and associated with behaviours other than commuting.

Carolyn and Julie introduced another perspective. They each focused on newer forms of recreation which provide outdoor opportunities, but are also associated with a more significant environmental cost. Carolyn (15) highlighted a vehicle designed to take tourists onto a glacier in the Rocky Mountains. She was struck by the size of the vehicle and the fact that although its purpose is to expose people to new places, that action is doing more harm than good. Similarly, Julie (22) focused on a motorcycle tour that she attended in Australia; reflecting that the tour has an economic benefit for the town, but was also a source of her own personal guilt for the superfluous emissions that she contributed while on the tour. Current studies indicate that the majority of current climate change impact in tourism is from travel to and from the location (Hall & Higham, 2005); therefore, it is interesting to recognize that while Julie drew attention to her own implications in participating in the tour that did contribute emissions, she did not question the travel to Australia in itself. In fact, Julie, who expressed significant concern regarding opportunities like local shopping, the use of air conditioners, and growing your own food, had the most international photos, which she never

raised as a concern. This illustrated an inconsistency that requires further investigation. Meghan (01), on the other hand, did recognize her own flight to a tourist destination as significantly contributing to climate change.

Another theme that emerged with regards to equipment was how individuals, or groups, get new equipment and why. For example, Carolyn shared a photo (10) showing the older RVP voyageur canoe trailer parked at one of the canoe launch sites. These trailers were replaced by newer ones which were supposed to be safer; however, without the right knowledge the trailers can be just as difficult to work with as the older ones. This approach of newer is not always better showed up earlier in the discussion of Carolyn's image of Old Quebec (08) and the different industries of Alberta (12), as well as in her photo of the old hot springs in Jasper National Park (16). She talked about the hot springs being replaced because people wanted newer and better but that she thinks the old ones were better. González-Gaudiano and Meira-Cartea (2010) suggested that people view the present as better than the past, and the future will be better than the present. This is apparent in Carolyn's comments, but contrary to how she thinks personally. Carolyn created images that examine how the past has been displaced. Her comments about people wanting newer things reflected on some of the critiques of consumerism. Therefore, drawing connections between images of a discarded past and climate change may help to engage her in the issue at a broader level. Typically however, images of the past in climate change focus on natural features such as glaciers, and their disappearance (Manzo, 2010a). Carolyn shared a photo from a glacier, mentioning the signs which show the glacier's recession over time; however her image (15) focused on the vehicle that takes people on tours of the glacier. She specifically focused on the actions of people, which may be changed, instead of on the disappearing glacier that can seem like an insurmountable challenge.

Chris also introduced an equipment change (19), specifically creating artificial environments in the name of recreation. The image focused on artificial turf which had recently been used to replace the grass at the main outdoor football stadium in Edmonton. In colder climates, indoor fields made of artificial grass are relatively common; however this was outside. Chris highlighted that this was not a clear issue in one direction or the other: there are both environmental and health costs and benefits from the turf. Therefore, sometimes the possibility of new equipment is not as clearly evaluated in terms of climate change as, for example, Julie's motorcycle tour.

Finally, Chris also examined the exchange of equipment by taking two photographs (22, 23) of a used gear sale at a local outdoor store. He talked about the difference in thinking that reused gear is "*useful for their activities*," they do not have to buy new. Karina wondered however, if this was a reflection of the demographics of the individual purchasers, perhaps they do not have the money to purchase new gear. Julie also questioned the motivations of individuals involved in what appeared to be more sustainable behaviours.

> *The reasons for people going to markets and the reasons for people doing that kind of stuff, is it because they are cheap and they just want cheap stuff or is it because they're actually consciously thinking wow I'm doing something good rather than this being thrown out. Because Zac goes to markets because he knows that the meat is healthier for him. Whereas I'm like we're not driving as far. We have different reasons for it, so people's reasoning too is interesting. Are we cheap? … Or is it because you actually believe in that?* (Julie)

These different perspectives would affect how an image was interpreted, and therefore the response that it may trigger in a viewer. This is an area that needs to be investigated further. It again raises the need to target not just local contexts but contexts specific to groups of people in order to achieve the desired responses.

Seasonality.

The reality of Edmonton is that there are very distinct seasons throughout the year. This affects what recreational activities can happen outdoors at different times. As Chris pointed out in his photo of an outdoor skating rink in summer (07), this leads to some structures that are unused during many months of the year. Even relatively natural areas can be affected by seasons as Julie showed in her image of an area that was closed because there was still too much snow in the area and was unsafe (24_Climate affects). It also leads to large amounts of equipment that is unusable at points during the year like canoes (Dorothy 08). This seasonality has another implication: the consumption inherent in outdoor activities as it increases the amount of gear necessary to be active outdoors at all times in the year, which arises again within the next topic.

Cultural context of outdoor recreation.

The final two photographs in the topic changes and trends in outdoor recreation relate to a more obviously cultural context. Chris contributed a photo of an outdoor classroom at an elementary school (06). The photo showed a path leading up to a patch of tall grasses which he interpreted as being a prescribed nature experience: "*we want you to have this experience in this way*." Louv (2005) discussed a loss of free play opportunities for children. This is what Chris was pointing to as well. The pathway removed some of the possibilities for free play in the setting because it guides visitors as to where they should be and how they might interact with the natural elements.

Julie's image of an adult and child going surfing (23_Changes in rec) also pointed to the cultural components directly. "*It's that whole idea of drop your kid off at the little sporting thing, whereas this is the dad taking his kid out surfing. It's still that family involvement*." Julie suggested that children have different experiences of nature depending on who is providing that experience. For example, Karina talked about distracting her nephew with a pine cone. While his parents may not involve him in his natural environment, Karina makes an effort to

do so; thus the experience of nature will differ with Karina than with his parents. Julie also talked about this in relation to her photo (20_trees). She explained how she encouraged the children to climb the tree; whereas their mother was focused on keeping them neat and clean. Overall Julie highlighted a relative decrease in family involvement - registering children in organized sports has become more common, but this image showed that families can still be involved in how children learn and develop in relation to nature.

Topic - Weather trends and changes through our lives and their effects on leisure activities

Six participants contributed six photographs under this theme, all of which relate to water in some way. Jen (20_gull lake 2011) and Megan (08_I call this my summer home) both shared photos of the same site, Gull Lake, Alberta. This is the site of Megan's family's cabin so she has watched the water recede throughout her lifetime. The photo she shared shows a picturesque prairie landscape, it is only when she revealed that the photo was taken from a spot that is already more than a kilometer in from where the water used to be, and the water is still not visible in the photo that you realize what the photo actually represents. On the other hand, Jen, also a regular visitor to the area, showed a photo of what she believed were higher water levels this year compared to recent years. She talked about the lake rising over the walking trails and shortening the beach. This is evidence of why there is often confusion, which the participants expressed frequently, regarding natural cycles versus those caused by human-induced climate change.

Meghan's image (17) focused on melting glaciers. This was similar to the issue of water recession; however, the participants expressed little doubt regarding the connection between glaciers and climate change. Carolyn (15) also talked about glaciers but focused not on the disappearance of the glacier, although this was mentioned, but on the issue of outdoor recreation as a form of consumption. "*I just thought it was interesting that we spend a lot of money to get to see some of this stuff but we're impacting it in a more negative way than we are actually doing good with it*" (Carolyn). Meghan's photo is one of the most similar to those found in communication and education about climate change. Despite Edmonton's proximity to the Rocky Mountains glaciers were not prominent. However, this does not preclude their use for other populations who are familiar with glaciers.

Both Dorothy (09) and Karina (16_4 plus 11 during Jan xc ski training) focused on the variable winter weather that Edmonton has experienced. Karina took a photo of RVP staff cross country ski training in January 2011. The temperature that day was +11°C, normal daily temperatures average around -11°C (Environment Canada, 2007). This variability is also reflected in Dorothy's image (09) of the cross country ski trails at Blackfoot Provincial Recreation Area located east of Edmonton. She talked about the impact of weather has had on an annual,

international cross country ski race. The race has been running for 26 years and has been cancelled a total of four times, three of those in the last decade. Three times the race was cancelled because of lack of snow and once because it was too cold (Canadian Birkebeiner Society, 2010).

The last image focused on the impacts of excess water. Carolyn (10) brought in a photo of one of the main launch sites for the RVP voyageur canoe program. More rain fell between June 18th and 20th than normally falls during the entire month of June (City of Edmonton, 2011). This heavy rainfall created channels in the bank where the canoes are launched from creating a significant safety concern for program staff.

There is significant research examining the potential impacts of climate change on water availability, and water related weather events. Leiserowitz (2006) found that concern regarding worldwide water shortages was greater than concern regarding local water shortages, and received the highest risk perception amongst a list of potential risks. Extreme weather events associated with water have also been the subject of disaster movies focused on climate change like *The Day After Tomorrow* (Emmerich & Gordon, 2004). There does not appear to be significant research investigating how or why people frequently connect water and climate change. Therefore, this may be a potential avenue of future research.

Topic - Seasonal change of one location

There were six photographs from four participants in this topic. Like the temporal nature of climate change, capturing seasonal change requires being able to access a single site during different seasons. This is what Dorothy did with two of her photos (06, 07). However, the participants demonstrated that there are other means of conveying change over time. Chris, Dorothy, and Julie focused on evidence of different seasons. For example, both Chris and Dorothy photographed outdoor recreation that was out of season: for Chris (07) an empty outdoor skating rink, for Dorothy (08) a canoe covered in snow. Julie's photo (33_season changes and how climate effects) showed the evidence of different seasons on the landscape: water channels carved into the landscape from spring run-off. This led to a discussion regarding the impact of the seasons on the recreation activities: "*our activities and recreation is very based on the seasons that we have. We have clothing for each season, we have equipment for each season, and it almost sounds wasteful*" (Julie). This was apparent in both Dorothy's and Chris' photos. Meghan observed (24) that climate change may make the weather variability even more erratic and unpredictable than it already is; which connected back to the previous topic and the images of how weather is already affecting outdoor recreation. This posed an ideological problem for the participants who wanted to be active outdoors but expressed issues with their higher levels of consumption in order to deal with all of the different seasons and weather that Edmonton experiences.

Topic - Everyday climate change

Six participants contributed 11 photographs to this topic. There were two major themes within this topic: behaviours or situations that contribute to climate change and weather changes. The latter theme illustrated one of the misconceptions that people have regarding climate, combining it with weather and seeing weather as evidence of climate change. The former theme focused on how the status quo can be taken as the way things need to be, and therefore justify unsustainable behaviour.

Behaviours or situations.

Carolyn, Chris, Dorothy, and Jen contributed photographs which illustrate the ways in which current ways of life have contributed to creating the issue of human-induced climate change. Carolyn's image (18), which was discussed earlier, showed refineries in the background of a city park. In this case it is her dismissal of the concerns of people in RVP programs that illustrated how this has contributed to climate change. She said that everything is fine, showing that she had accepted the scene as part of the status quo. On the other hand, Chris illustrated his questioning of the status quo with his two images. In relation to the first photo (01), he talked about the amount of consumption involved in transporting cars to a place that is small enough to get around on foot or by bike. Jen's photo (15_drive to work) related to this, as she talked about different reasons for commuting to and from the city for work. Whereas she was unable to find a job in the city but chooses to live in the city because that is where she spent her time when not working, she watches a constant flow of cars drive from rural areas into the city on her morning commute. The group questioned the motives of these commuters.

> Julie - *they commute but are they growing their own stuff, are they fertilizing, are they composting, where is the balance?*
>
> Jen-*what choices are they making for, to compensate for, to balance it?*
>
> Carolyn - *I don't think a lot of those people who live out on those acreages do anything though, I think they're like I have a nice job in the city I have a nice home outside of the city and I have the nice car to go in between the two… it's just a matter of we have the bigger, we have the better, we have the best.*"

This discussion illustrated some of the many factors that can influence different decisions and perceptions of people. This diversity is something that needs to be considered when including climate change within education programs.

The second image Chris showed (13) pictured a paved parking lot with an unused basketball hoop at one end. He said "*it just felt wrong*", connecting the space with other activities and things that we build because that is what is done

even though there is a negative impact on the environment. These photos and comments illustrated some of the ways of looking at climate change in order to achieve the level of change that Kagawa and Selby (2010), among others, have called for. Further, they demonstrate how difficult this can be because once

> People become accustomed to a particular standard of living, their perceptions of needs and expectations change. Their revised expectations are perpetuated in discourses about quality of life, and once absorbed into daily routine become interpreted as 'needs' rather than 'wants' (Lorenzoni et al., 2007).

With this in mind, it is not that the people who are taking their cars on ferries to get them to small walkable communities are choosing to do this because they are consciously contributing to climate change, but because the car has been absorbed as a need, required for their everyday living.

This way of thinking directly related to Chris' third photo in this category (24). In response to the photo, which pictured a small campfire, Chris discussed how campfires have happened throughout human history, although today's fires are rarely utilitarian. Chris viewed campfires as different from events like burning fossil fuels because a campfire is drawing on current sunlight; while fossil fuel use draws on ancient sunlight. This difference means that carbon that was stored millions of years ago, and should be part of the slow cycling of carbon is suddenly released through human intervention into the rapid cycle, accumulating in the atmosphere at rates well above normal. Therefore, Chris felt that a distinction should be drawn between different types of activities that contribute to climate change.

A similar argument may be made the other way however. Julie raised her personal debate regarding where she may want to live in the future: does she choose a small high density place in the city where she can use alternative modes of transportation, or a rural place where she would likely have to commute to work but can grow her own food. Chawla and Cushing (2007), amongst others, argue that personal actions are not enough; therefore, individuals need to be taught how to take broader societal actions such as political engagement. With this in mind, perhaps both the debates of Chris and Julie are misplaced, and the real concern should be how these personal behaviours and debates can lead to political action.

Dorothy (13) addressed another issue in relation to combating climate change: the rebound effect. Her photograph showed a reusable shopping bag, a growing trend in many locations as a green consumer choice. However, Dorothy spoke about the proliferation of reusable bags and the challenge of remembering to take them with you when shopping, leading her to wonder "*if we are not actually using more resources than we were before*." There is more research on this within the field of energy efficiency. Generally, the rebound effect is that

because the new option is more efficient, or less wasteful, people are more likely to use more of it than previously, resulting in either reduced saving levels, or in the worst case, an increase in consumption (American Psychological Association, 2009; Sorrell, 2007). For example, because the reusable bags are supposed to result in less waste people may accumulate more of them than they need, resulting in an actual increase in resource use and waste production than was associated with plastic bags.

Weather or climate.

Jen, Julie, and Karina each shared photos that depicted weather events. Similar to the topic weather trends and changes through our lives and their effects on leisure activities all of the events related to water. All of Jen's images (17_hail, 18_hail2, 19_incoming storm) and Julie's photo (25_Every day climate change) portrayed some of the effects of regular storms – hail which can cause damage to personal property, the image of a storm rolling in, and hiking trail conditions. While Karina's image (15_2 FLOOD! Capilano WGD June 19 2011 a) captured a more extreme event, a flood, all of the events fit relatively within the local climate patterns of the area. And yet, each of them associated the event with climate change, although not specifically human induced climate change. Karina drew attention to this commenting that it was "*kind of an impact that climate change may have if you want to say that that is climate change*." This is a common issue for people in trying to find personal evidence of climate change: "weather events – even extreme ones – are not necessarily diagnostic of changes in the climate…. People often falsely attribute unique events to climate change and also fail to detect changes in climate" (American Psychological Association, 2009, p. 33). This also arose as a topic of discussion in relation to Halloween. Several of the participants shared stories about having to wear Halloween costumes overtop of the snowsuits as kids: "*I remember being a ballerina with my snow pants underneath my dance suit*" (Jen). Whereas today the participants felt like there is rarely snow on the ground during Halloween. At the same time, the participants questioned these memories: perhaps they only remember the ones when they wore snowsuits (Jen). Or maybe the weather changes were part of a natural cycle (Julie).

This illustrated that connecting climate change to daily weather, or even extreme weather events, can be problematic in terms of how people think about and respond to the issue. Jen drew attention to the role of language.

> Jen-*I like the shift in the wording of calling it climate change instead of global warming. Global warming to me was always it's going to get hot and that was the only way I could picture climate change was that it was just getting warmer so everything else the shifts in other weather patterns and stuff like that didn't even occur to me.*
>
> Julie-*Yeah, that's what you focus on.*

> Jen-*It's like how can we have global warming if it's been freezing cold this summer. I didn't get to wear shorts hardly at all this summer so how could it possibly be global warming.*
>
> Carolyn-*And it poured rain more in the month of July than it usually pours all summer.*
>
> Jen-*Exactly whereas climate change makes more sense because it's more encompassing of other things. I was expecting us to get some big storms this year because everywhere else around us was getting these massive weather shifts and we got nothing this summer.*

Therefore, although extreme weather is often the narrative conveyed by news media because it includes particulars "*this* storm, *this* city, *these* people" (Kolbert, 2009, p. 71). It may not be the best topic through which to convey a need to change actions and ways of living.

Topic - How am I affected by climate change?

Within this topic there were two general approaches: personal events and choices or societal issues.

Personal events and choices.

Dorothy's images (14, 15) focused on her decision to live near the centre of the city, close to work, and in a walkable community. Jen (21_roasting marshmallows) examined how concerns over climate change affected how she viewed things like fires, and how different people can carry out the same activity but have very different levels of impact. Julie (24_Climate affects, 33_season changes and how climate affects) focused primarily on how weather can affect the different recreational opportunities that are available, and how this then is related to the types of consumption that happen to conduct outdoor recreation activities.

Societal Issues.

While Dorothy, Jen, and Julie focused on personal events and choices, Meghan focused on societal issues. For example, she (16) talked about the propensity not to notice the importance of something until after it is gone, using a photograph of a display in the Tyrell Museum – a museum in Drumheller, Alberta devoted to the study of dinosaurs – to demonstrate that although we have dinosaur museums, we do not have access to a lot of common information about things that are at risk today because of climate change. Reflecting back on the earlier discussion of Carolyn and Julie's images which were connected to a seeming lack of culture in North America this may demonstrate how natural places and creatures have been hijacked as cultural artifacts. Patin (1999) described how the natural environment was used within North America to compensate for the missing cultural treasures. According to Patin national parks adopted museum techniques to display, exhibit, and present wilderness in the way that cultural

artifacts were displayed by museums in Europe. This effect supports Meghan's interpretation of the Tyrell Museum. The museum draws attention to dinosaurs as something that needs to be exhibited and displayed so that people can remember and access this natural history of the area. However, we do not have a similar exhibition regarding climate change, in fact drawing attention to climate change in a similar way would question the current culture rather than promote it. The concern regarding where people place their concern and efforts also arose in another of Meghan's images (13) which will be discussed under the topic I feel powerless when…

The second photo from Meghan in this section (20) was one that she had shared earlier in the project as representative of climate change. The photo was in black and white to represent people who either "*believe there is a way or there isn't*" (Meghan) to combat climate change. The complexity of socio-environmental problems, like climate change, requires a diversity of points of view, none of which is completely convincing all the time (Colucci-Gray et al., 2006). Further, a view of the topic as black and white ignores that climate change science is still changing and requires that action is taken before the issue is completely understood (Lorenzoni et al., 2006). Therefore, drawing attention to the fact that climate change is in fact a multi-faceted issue, rather than overstating the cause of climate change as carbon dioxide emissions (Selby, 2010) will lead to better understanding of the issue and how action needs to occur.

Meghan's final image in this section (22_Zebra) represented people hiding their ignorance, or unsustainable behaviours, amongst other people's ignorance and behaviours. She used zebras to symbolize this because zebras are able to camouflage with each other because their stripes make it difficult to distinguish individual animals. She related this to how individuals and corporations will justify their policies and actions on the basis that they do not stand out from the crowd; they are only one of several doing the same unsustainable behaviours. There have been successful campaigns in making corporations change practices by singling them out for their social or environmental practices (Porter & Kramer, 2006). Therefore, drawing attention to this issue, and the companies or even governments and individuals who are camouflaging with their peers may be a means of increasing action towards mitigating climate change. This would require very personal images directly related to a relevant context.

Topic - I feel powerless when…

All participants except for Megan contributed photographs relating to this theme, indicating its prominence within the subject of climate change. It also related to two of Meghan's photos in the previous theme: viewing climate change as a black and white issue (20), and my actions are only one of many so what I do does not make a difference (22_Zebra). Like Meghan, the other participants in this project focused primarily on societal systems and barriers that create issues that they do not feel like they can affect. It highlighted the need to teach people

how to take broader action such as political action in order to combat feelings of helplessness.

Societal systems and barriers.

Lowe et al. (2006) stated that "the intangible large-scale effects of climate change which are so often reported to the public become 'real' only when put in more local terms, with the public often only associating climate change with environmental measures such as recycling" (p. 454). However, within the scope of this project, topics like recycling were raised in relation to societal issues that prevented sustainable behaviours. As discussed earlier, Dorothy (13) addressed the topic of reusable bags and how there are so many of them now that although they are supposed to be better than plastic bags they may not be. Related was a series of photos that Jen contributed on the topic of recycling (10_bins, 11_book orders, 12_buried in paper, 13_classroom recycling). Unlike the findings of Lowe et al. (2006), Jen identified recycling as a negative because it is related to excessive consumption in the first place. Her school is sent extra copies of various paper items just in case they are needed, but most of them end up being recycled, with the end result that her school is questioning whether or not they can continue recycling because garbage pickup is free, but they have to pay for recycling pickup. To further emphasize the issue, one of the organizations that sent these paper products switched other materials into electronic formats in order to reduce paper use and waste. Overall, the recycling program is evidence of the mixed messages associated with environmental issues.

Residential waste production in Canada has been increasing due primarily to an increase in the amount of waste per person (Babooram & Wang, 2007). Only a portion of this increase has been offset by recycling (Babooram & Wang, 2007), but there are also costs and impacts to recycling that need to be included, for example the cost of municipal waste versus curbside recycling programs indicate that the economic cost of recycling is higher than those of waste collection and disposal (Bohm, Folz, Kinnaman, & Podolsky, 2010). School recycling programs can be used as examples of environmental responsibility however, Jen's photos support the conclusion that more often they are masking deeper issues like overconsumption (Selby, 2010). Further, they essentially target individual actions: the individual consumes and the individual takes action to reduce the impacts of that consumption. They do not question the societal values that make consumption a status symbol: "when individuals and households use their incomes to increase their social status through certain kinds of purchases" (Kates, 2000).

Consumption is also related to several of the other images in this category. Carolyn (15, 17), Chris (01), Julie (31_Powerless), Karina (17_8 powerless) all focused on what the participants considered to be excessive consumption relating to different aspects of society. The majority of these are addressed as being unnecessary, but Julie pointed out that some things, like air conditioners can be a

necessity in certain climates. Although, it wasn't raised by participants a similar argument exists in Edmonton regarding heating homes in winter. These are examples of technological remoteness which separate humans from the realities of the natural environment (Plumwood, 2001). Thus, the local climate significantly impacts what is required in order for society to live in certain areas of the world.

Finally, Julie also raised the issue of consumption and waste with her photo of a large tire on a beach (32_Powerless 2). She said that "*you're going to have developing countries and they're going to have more garbage, they have more people, and less places to put it*." This comment, in addition to the fact that air conditioners in hot countries were brought up but not furnaces in cold climates, illustrated the ease with which climate change can be attributed as someone else's problem. From the perspective of living in Edmonton, challenging the need for central heating is likely to trigger apathy because it would be perceived as sacrificing something necessary to maintain current quality of life (S. Kaplan, 2000). The thought that living in a climate restrained world may mean that it is no longer feasible to live in certain areas of the world, or that living there may require a drastic change in how we live is an uncomfortable topic at best. Yet, it may be one that has to be examined because, as Julie said, "*what do you expect*?" the living conditions have to be kept safe and that means heat in some climates and cold in others.

As is illustrated by the above discussion, societal systems and barriers is a significant issue when it comes to sustainability in general. Recycling is something that a municipality can regulate through the provision of the program as well as the introduction of bag fees. There are several examples of municipalities that charge per bag for garbage, but the amount of recycling produced is often unregulated. Perhaps regulating both would have a greater impact. Similarly, it is possible that municipalities may regulate the quantity of natural gas or electricity that a single household is allocated. However, the question still remains as to whether regulations such as these, supposing that the government had the will and public support to implement them, would actually get at the fundamental issues. Instead, perhaps there needs to be a change in how concepts such as quality of life are measured. Does quality of life relate to being able to turn the heat up or down a few degrees when at home? Or buying a new product? Or is it, related to much different concepts such as happiness?

Gross national happiness (GNH), which originated in Bhutan, suggests that there are nine domains to GNH: "psychological wellbeing, health, education, time use, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standards" (Centre for Bhutan Studies, 2012, GNH: Concept section, para. 1). C. O'Brien (2005) discussed the implications for urban transportation if GNH was used as a guide rather than the convention that "transportation is about moving people and goods, as quickly as possible" (p. 98). She suggested that reframing transportation in such a way results in the recognition that transportation is about moving people and goods,

but it is also about "*wonder, discovery, adventure, connection, and happiness*" (p. 100, italics original). Is this along the lines of what Jen and Julie are moving towards with their discussions? GNH is a growing area of research and one that may have the potential to challenge the current normative ways of thinking. It, or another way of thinking, will require a significant change in how we think and act individually and collectively. It will require political and societal change, but perhaps it is possible.

Personal implications.

Julie recognized her own implication in the photo of a motorcycle tour that she took in Australia (22_change trend rec). Although she participated in the tour, she also expressed her own sense of powerlessness with regards to the event. This is related to the "inconsistencies and ambiguities in beliefs, values and actions" (Lorenzoni et al., 2007, p. 448) that needs to be addressed, and relates strongly to the apparent battle between consumption and sustainability that the participants frequently expressed.

Another battle that emerged in Julie's images was in a photo of graffiti on a staircase in the river valley (26_Hmmmm). The photo features a comment that has clearly been stenciled and painted onto the stair "You will never change the world;" underneath someone has written with pen "unless you try." Julie commented that she really did not know what to do with the image because one individual had put a lot of effort into the negative message, while the second had responded with a positive message but little apparent effort. Did the second person need to put more effort in to be heard over the negative? Or is the fact that they responded enough? These two messages highlighted the spectrum from hope to despair.

Meghan's photo of a tropical plant (21_photoshopped flower) is related to this issue. She changed the photo to black and white using graphics editing software, and then restored the colour to a single flower. Meghan wrote about the image:

> *I have chosen to represent this picture in black and white, except for the one flower of brilliant colour. Sometimes I feel downhearted and powerless when I learn about how climate change affects our rainforests. However I need to stop and remember that there is some hope to the picture and that with positive action we can make a difference against the fight for climate change, represented by the one colourful and radiant flower.*

The comment in pen in Julie's image is like the coloured flower in Meghan's: it represents that there is hope. At the same time, in both images, the negative message appeared more dominant. Images can convey messages of helplessness, as well as hope, and sometimes both in the same photo. This is an important recognition as Frantz and Mayer (2009) identified "a person's sense of

empowerment or self-efficacy" (p. 207) as key factors in promoting positive behaviour. How might images be reversed to show hope more prominently without leading viewers to the conclusion that no action is needed?

Another important factor in encouraging action on climate change is connecting with people's personal interests and concerns (Lorenzoni et al., 2007). Meghan (13) raised this issue with her comments regarding plants as worthy of protection as well: the focus does not need to be, nor should it be focused exclusively on animals. Similar to this is the recognition that polar bears may not appeal to individuals who are not interested in them (Hulme, 2009). This is picked up in the next chapter regarding using a face to convey issues of climate change.

Topic - Positive actions/things

The majority of the images in this topic reflected community or societal opportunities or infrastructure for taking more sustainable action. This is similar to the previous topic regarding feelings of powerlessness, indicating the importance of societal systems to support both individual and collective action. These range from facilities or campaigns regarding recycling and waste disposal (Chris 11, 14; Jen 10_bins; Julie 29_Positive – Don't be a tosser, 30_Positive – garbage placement), renewable energies (Meghan 08, 09), transportation alternatives (Chris 09; Julie 28_Positive – Bikes; Karina 18_9 & 12, 22_11 & 10), education opportunities (Chris 04, 05), and reduced need for infrastructure (Chris 12). Each was contributed by the participants as evidence that there were positive actions, events, and objects happening in society as a whole in relation to climate change: from fostering care for the local environment by encouraging the use of garbage bins to contributing to mitigating the harmful emissions that are directly responsible for climate change through actions like alternative transportations and hybrid vehicles. One concern that may be raised regarding these images is that some of them are more generally environmental actions and not directly related to climate change. However, if the bigger concern is not carbon dioxide emissions but the human relationship with nature (Selby, 2010) then all of these images are positive because they do affect and reflect that relationship. For example, if the beach shown by Julie (30_Positive – garbage placement) was covered with garbage, rather than having frequent garbage cans, visitors may be more tolerant of other types of pollution and degradation as well, because "what people are concerned about can be affected by their actual experience of environmental conditions" (Blake, 2001, p. 719)

Three images did focus more directly on the human/nature relationship. The first (Chris 08) while not picturing a natural environment focused on children being active outside. The photo is of a driveway where Chris watched two boys riding and jumping their bikes. The fact that it was not a wild setting was not a concern for Chris because they were outside and enjoying themselves, which means they would be more likely to want to go outside again. Chawla (1999) suggested that learning about ecosystems can be enhanced by integrating

"opportunities for unstructured exploration in their everyday environment" (p. 296) with both formal and informal learning opportunities, all within the context of urban ecosystems. With this approach, the children that Chris saw playing would be able to draw on experiences like the one he described in order to develop an integrated understanding of urban ecosystems, which can then be drawn on when learning about other ecosystems. A second image by Chris (10) also illustrated one of these opportunities, this time for adults, specifically the participants in this project. While sitting outside at one of the group's meetings a hawk flew overhead. Within moments the group scattered to see the hawk. Chris took the opportunity to capture a photo as it showed the culture of the group, more than willing to be distracted by nature, and in turn get others excited about those distractions.

Megan's photo (11) also focused on a sub-culture within the area, picturing the reception at a wedding that she went to. She described the wedding as very community-based and very low impact. These last two images illustrated how even within a larger culture there are sub-cultures that will respond to different images and events than each other; illustrating the need to connect to people's contexts, knowledge, and interests.

Topic - Small changes I can do with my life or programs that have an impact

One of the concerns regarding personal action in relation to climate change is that they are "unlikely to make any significant contribution in relation to the scale of the problem" (O'Neill & Nicholson-Cole, 2009, p. 372). Consequently, there are calls to teach people the right actions, such as political involvement, because actions like recycling and energy efficiency will not have a significant impact (Chawla & Cushing, 2007). However, as Carolyn pointed out (13, 14), small actions can have significant impacts, particularly as educators. Carolyn talked about two photos. In the first (13), she talked about being able to facilitate a unique experience for a group of children in nature. They got to do something which was out of their ordinary experience and engaged them in natural settings. This related to the significant life experiences research where "contact with natural areas has emerged as one of the most significant influences" in developing future environmental interest, concern, and action (Chawla, 1998b, p. 381). At the same time, Chawla (1998b) raised concerns that these experiences are external and that more attention needs to be paid to the internal environment which encompasses an individual's own "interests, aptitudes, and temperaments" (p. 369). This is connected to Carolyn's image (14) that focused on a bracelet that the children would make during their week at camp. The centre bead on both bracelets pictured is the green bead which symbolized the environment. Carolyn said "*it was kind of the bead that we always gave out just to make the kids feel happy that they got one so they would work hard for the other ones*." Although this was an external event, it can influence the internal context – interests, aptitudes, and temperaments – by demonstrating the care and ways of thinking that relevant adults have put into their own relationship with the environment.

Similarly, Jen contributed an image of a craft made of recycled materials (14_crafty). The craft may not be significant in terms of facilitating a relationship with the environment except that Jen talked about the fact that it was made by a teacher who did not otherwise show many signs of environmentally responsible behaviour. Therefore, this single craft may be the exposure to another way of thinking that students have in her class. On a larger scale, Karina talked about her direct involvement in carbon reduction through educating the public (19_9 carbon reduction programs), and the RVP staff on energy, carbon reduction, and alternative transportation (20_9 encourage others to cycle). These examples all related to educational opportunities but individual actions were also discussed. They also raised the need to address people where they are. The teacher making the egg carton craft is may not be ready to address some of the more significant issues portrayed in Karina's image and would therefore be more likely to not do any actions if she was confronted by the need to make a significant leap in level or impact (McKenzie-Mohr & Smith, 1999).

Personal actions also occur at different scales of influence. Although Dorothy carrying a reusable bag (13) may not have a significant impact, particularly as she admitted that she often forgot them, her decision to purchase a condo in a higher density area in a walkable community had larger impacts, still at a personal level (14, 15). Similarly, Jen's balcony garden (16_garden), Karina's image of a hybrid car (18_9 & 12) and Megan's attempt not to purchase souvenirs on a trip (10_Nature's virtual postcard) may be small actions, but they can contribute to the internal thinking that will result in larger external actions. This relates to research regarding cognitive dissonance.

The theory of cognitive dissonance suggested that people want to avoid inconsistencies in their beliefs, attitudes, and behaviours (Thøgersen, 2004). According to this theory, an individual who engages in one environmental act or belief, is more likely to engage in others because they want to establish consistency in order to avoid potential emotional disturbance (Festinger, 1957). If these personal behaviours that relate to small changes can be connected to larger actions such as political support they have the potential to result in changes that will make a more significant contribution to mitigating climate change. Therefore, the focus should not be on why these small changes are not enough, but on why they are directly connected to larger changes.

While political positions did not emerge as a part of the participants' discussions they did express some reflections regarding their own cognitive dissonance, primarily these centred on wanting to participate in outdoor recreation activities, while being cognizant that this participation resulted in higher levels of consumption in terms of equipment and travel. This is an issue that is picked up in the next chapter.

Topic - People, places or things – ideas that inspire me

The final topic identified by participants focused on inspiration: there were 16 photographs contributed by eight participants. It was the only topic with a direct connection to the topics identified in the literature regarding images to communicate and educate about climate change. A comparison between the inspiring images from the literature and those from the participants will be covered in the next chapter. Many of the inspiring images contributed by participants focused on natural (Chris 02; Dorothy 06, 07, 10; Jen 15_drive to work; Karina 21_10 inspired by my happy place and nephew; Megan 13_the nature we chase; Meghan 10, 11), or pseudo-natural (Chris 17) scenes or events. With the exception of a few (Dorothy 10; Jen 15_drive to work; Chris 17) all the images focused on natural settings that were located outside of cities and away from significant human infrastructure. The photos that were within cities are still scenic nature photos, in Megan's words they are 'the nature we chase.' Trees were common to almost all of the images which is supported by several other research projects which indicate that trees are associated with a higher perceived quality of life in residential settings (Sheets & Manzer, 1991), and with higher psychological benefits (R. Kaplan, 2001). Therefore, the inclusion of trees within inspirational images may be a positive avenue for many groups.

Carolyn (13), Karina (21_10 inspired by my happy place and nephew, 25), and Megan (11) all included people in at least one inspirational image. The people ranged from children who the participant was able to share an experience with, to people engaged in behaviour that had a smaller negative impact on climate change. Similarly, Julie (27_Inspire) talked about the indigenous people who live in a rural area of Morocco.

> *You can survive off of so little. I thought that was interesting. You know, you go to the nomads and they live in caves. Literally they don't have stuff. They make rugs by hand and then they trade it for stuff. They make their own salt by drying it on rugs outside. They have their four goats and whatever. To me, it's a bit inspirational because you can really survive in this kind of environment.*

Meghan's image (15) focused on "*a symbol of hope that some places around the plants, which are protected may still retain their beauty and life even if the areas around them are facing hardships*" (Meghan). This was also evidenced in Karina's photo (25) of a staff from another organization biking all of their supplies for a display to the site, while Karina drove a large truck. Cycling the gear to location may be difficult, but that is what made it inspirational. These participants focused on people and organisms who were facing challenging conditions and still thriving, drawing inspiration from someone or something else's struggle. The image (16_garden) Jen identified as inspiring showed what she had accomplished in growing a small balcony garden. This was the only image in this category that focused on the self-efficacy of the photographer. This

may have other connotations. Perhaps the participants have difficulty identifying positive and inspiring elements within their lives because it is easier to recognize someone else's effort over your own. It may also have been an artifact of the methodology: it is more challenging to take a self portrait.

Is the personal also local?

As shown in Table 2 of the results, half of the photographs were taken within the municipal setting, with another third of the photographs taken within provincial settings. At the same time, six of the participants shared photographs that were taken within national and/or international settings. This raises questions regarding what constituted the personal versus the local context for climate change.

For example, when conducting certain types of research the neighbourhood is one approach to delineating study populations. However, Coulton, Korbin, Chan, and Su (2001) indicated that individuals, including those of similar demographics and living in close proximity, tend to establish unique boundaries for their personal understanding of their neighbourhood based on a number of factors such as the urban-suburban boundary. Colabianchi et al. (2007) examined how individual interpretations of easy walking and driving distances could be used to determine neighbourhood boundaries for adolescent girls revealing that factors such as urban or rural residence impacted the size of the neighborhood boundaries.

In a review of relevant literature Chaskin (1997) found that both the terms neighbourhood and community "are viable units of action, [but] the operational definitions of these units vary greatly" (p. 522). He suggested that local communities, which are understood as place based, also need to include a concentrated set of connections such as social, functional (eg. production, consumption), cultural, or circumstantial (eg. economic status or lifestyle). For example, many of the RVP staff form a community based on social and circumstantial connections centralized around the places of RVP such as Edmonton's river valley and the RVP office.

This evidence indicates that defining a local context is more complex than simply choosing a single geographically bounded location such as a municipality. Further complicating the issue is the inclusion of recreational activities which can result in greater ranges of travel. For example, while it may be possible to participate in some recreational activities within a municipality, such as cycling, others are more challenging or even impossible within close proximity, such as mountain biking or kayaking.

At the same time, within the personal contexts of the participants there were a significant number of local photographs. Further, all participants contributed a majority of photographs based with Edmonton. This indicated that although the personal context of climate change may include regional, national,

and international images, it is possible to connect with climate change within the local context. However, this is one reason why it is important to recognize the diversity of people within a single location and to consider this diversity when implementing any approach to education about climate change.

Summary

The range of thinking about climate change was extremely diverse, even within a group of people who shared similar interests and experiences. This illustrates the importance of connecting photos used in education and communication about climate change to local interests and experiences. The next chapter examines how the photos created by participants compare to the topics, discussed in the literature review, that are commonly used in education and communication.

6. Participant Photographs and Photographs in Communication

The results of this study indicate that issues relating to climate change can be visually represented through photography within a personal context. There are a number of calls to connect education about climate change, as well as other means of communicating climate change to local and personal contexts in order to increase the relevance for people (Lorenzoni et al., 2007; Lotz-Sisitka, 2010; Lowe et al., 2006). This study emphasizes this call by demonstrating that the topics which participants in this study connected to are different than those commonly used in photographic representations of climate change within the media and education. These differences are the subject of this chapter. This study also raised an important question regarding whether or not we should be focusing on the actions that people take, or on the underlying ideologies which lead to actions.

Recreating Expert Images

As discussed in the previous chapter, one of the two topics that the participants photographed that was determined by the researcher was 'representative or related to climate change.' Within these images, the participants attempted to create their own associations with climate change. Icons, as defined by O'Neill (2008), are "*a tangible entity which will be impacted by climate change, considered worthy of respect, and to which the viewer can relate to and feel empathy for*" (p. 81, italics original). This is congruent with Peirce's conception of icons which requires that the sign has a likeness for the object. Meghan's image of the plant (13), about which she stated "*I was trying to symbolize that plants are also worthy of protection*," presented the plant as an icon of climate change. However, it differs from many of the current icons of climate change in that it was determined by a non-expert.

Expert climate icons tended towards issues such as the acidification of the ocean by carbon dioxide, the impacts on niche ecosystems, and the melting of the West Antarctic Ice Sheet; non-expert icons focused on several themes, some of the most prominent were 'affects me', 'the everyday', and 'emotion and touches you' (O'Neill, 2008). While the polar bear appears to be a non-expert icon, and was mentioned as a source of dramatic imagery by the participants in O'Neill's (2008) study, she argued that it was in fact defined by experts using a top-down approach, and is thus a pseudo non-expert icon.

> Expert-led icons had little personal impact and invoked emotions such as helplessness or boredom, and were considered too scientific or complex. Conversely, non-expert icons tended to impact upon the individual, the local area or nature; and invoked affective and cognitive engagement with climate change (O'Neill, 2008, p. 2).

This was also apparent in the current study, particularly when examining the photographs and discussion regarding the images that participants purposefully

took in order to portray an aspect of climate change. The following discussion illustrated this point.

> Karina – *That's where polar bears are the poster child because there are less and less ice flows for the polar bears to survive on.*
>
> Jen – *I went and searched for images of climate change, because I was curious to find what things other people were taking photographs of. I found it really hard to try to avoid taking stereotypical things*.
>
> Julie – *Which I took.*
>
> Jen – *Which of course I didn't want to, but I ended up doing anyways. If you search in Google for images of climate change half of them are polar bears and half of them are a picture of a globe that's burning. They are all really dramatic things, flash floods, tidal waves.*
>
> Carolyn – *I think sometimes people think too much about the big picture and not about the small picture, because if you are looking at the Earth burning, that's such a huge thing that you're not considering all the small things that you could do.*
>
> Jen – *Which is why it was hard to figure out what's a picture of something locally that's climate change. If you think about trying to educate kids about it, if the only things they see are these big things, they're going to think well it's not affecting me here because I don't see any change around me.*
>
> Carolyn – *I don't have a polar bear in my backyard.*

Jen's images (05, 06, 07) focused on extreme weather: rain storms and severe drought. These are issues that are the subject of significant media attention, as described in the literature review, because they can be told as a narrative with specific details (Kolbert, 2009). At the same time, people generally have trouble recognizing extreme weather as a local risk (American Psychological Association, 2009). As well, they rarely associate it with related consequences such as health risks like heat related deaths (Leiserowitz, 2005). Jen commented that her photo of the rain storm (05) was not capturing extreme weather because "*we didn't have any really dramatic weather over the last week*". This illustrated that even in recognizing potential extreme weather events, there may be confusion regarding what constitutes the extreme weather that is supposed to be connected to climate change. As Julie stated:

> *What I do find interesting people take pictures of oh flooding, oh disaster, oh the world's coming to an end. At the same time, we have always had flooding, we've always had this, but I guess it's the extent that you have to*

look at. But the way people are oh, oh. Do we just report it now or is it actually more?

Consistently throughout the project participants showed reluctance to attribute a particular event or occurrence to climate change. For example, Dorothy talked about the drought that Edmonton experienced "*a few years back and it, again, could be related to climate change but you don't really know*". This is appropriate because it is difficult to assert that a particular event is connected to climate change without in-depth statistical analysis (Rosenzweig et al., 2008).

With the exception of Carolyn, Julie, and Meghan, the participants focused their photos on this topic towards natural signs of climate change. Dorothy highlighted dead trees (04, 05) and existing wildfires (03). Jen's images of extreme weather were discussed above. Karina also focused on dead trees (09, 10). Meghan photographed a sign on the ocean that warned that there were extremely rough waters (01). In some way, the photographs that directly focused on portraying aspects of or relating to climate change, tried to replicate expert icons, based on the presence of similar subjects within news and entertainment media such as extreme weather. Therefore, Jen and Julie were both correct. Although they did not take photographs of polar bears and burning globes, they did stay within the established conventions of photographs of climate change.

Megan's image (01) was a little different because it focused on a lack of evidence of change in nature. This image is discussed further below. All of these signs rely on tentative and tenuous connections to climate change. Is it really possible to attribute the drought Dorothy mentions to climate change? Megan talked about the tree flowering at the same time every year as evidence for how resilient nature can be, but would she really recognize a change in flowering times of just a few days? Or recognize this as significant enough to take note of?

This challenge remained consistent throughout the project as Karina stated in the last meeting "*it's hard to decide if its climate change or if it's just a natural cycle*". At the same time, the participants did not doubt the existence of human-induced climate change; only what its impacts were on the natural environment. The scientific complexity of climate change therefore, posed a challenge to participants that they were unable to overcome. Photographs that focused on attempting to portray aspects of the science, particularly with regards to the natural world, were accompanied by a degree of helplessness, as the participants were unable to decide for themselves whether what they observed was true, or related to climate changed, based on their own scientific understanding of climate change. González-Gaudiano and Meira-Cartea (2010) suggested that the dominance of science in education about climate change gives the impression that science, and consequently scientists are the only ones equipped to respond to climate change effectively and appropriately. As a result, the participants in this project generally showed more conviction when discussing topics that they had connected to climate change but were not scientifically focused.

Julie and Meghan introduced a different focus from the start. Each of them, in distinctly different images, raised concerns regarding social aspects of climate change. Julie (08) drew attention to issues of consumption regarding construction and the way people live. She talked about people wanting to have quick access to natural regions like the Rocky Mountains, while still being able to build houses that are so big they would be subject to restrictions within the National Parks, so they build in a town just outside of the park. Meghan (02), on the other hand, raised concerns regarding how people think about climate change as an either/or proposition. It is either happening or it is not. They either need to make every change or they will make none. Neither of these focused on nature, or the impacts of climate change on nature, focusing instead on social issues. Both participants showed more conviction regarding their statements that the images were related to climate change compared to statements about the other type of photos.

Carolyn also targeted a different issue with her photographs (01-07). "*I find that a lot of people when they think about climate change think of the negative and not the positive things that people do, so my pictures reflected some of the positive things that people do to affect climate change*" (Carolyn). Carolyn implicitly focused on human action, she did not show any people, but signs of what people are doing. At the same time, she focused on individual actions like commuting and decreased use of chemical and physical methods to control nature. She also expressed doubt regarding the impact of some of the actions such as solar power generation in residential settings. Therefore, like Julie and Meghan, Carolyn looked at a human component within the topic; however, she also expressed doubt, this time with regards to the impact of the different actions. This is common as research has found that people view individual action as necessary, but unlikely to make a difference on climate change (O'Neill & Nicholson-Cole, 2009).

The remainder of this chapter examines how the photographs taken by participants compare to the types of images used in communication and education about climate change which were discussed in the literature review. Table 4 summarizes the key differences between the topics utilized in photographs which communicate about climate change and how these topics appeared within the participants' images in this project.

Table 4

Comparison of images used to communicate climate change and participant images

Technique	Current Communication of Climate Change	Participant Communication of Climate change
Image of Time	Present a series of photographs of a natural feature taken over a significant period of time.	This technique was used in a modified form. Primarily it was used by Megan and Jen when talking about water levels at a local lake. Karina also referenced the passage of time. The participants showed one image and referenced how it illustrated a change.
A Place for Climate Change	Often portray landscapes which are at risk due to climate change or juxtapose signs of warm climate with signs of a cold climate.	Participants focused on sense of place including loss of place and creation of new or personal places. In addition they addressed the importance of people in facilitating connections and experiences with places. Extreme weather which is often portrayed in media communication of climate change was not prominent in the results and highlighted confusion regarding climate and weather.
A Face of Climate Change	Typically draw on either animals (e.g. polar bear) or humans who are at risk due to climate change related events.	Meghan presented plants as a face of climate change, which differs from the use of animals including humans described in the literature. Other images that presented faces of climate change drew on concepts of resilience rather than risk and vulnerability.
Adapting to Change	Images of adaptation and mitigation such as alternative energy icons.	Focused on renewable energies but was not the subject of many photographs. Only two people provided photographs that referenced renewable energy.

An Image of Time

This approach was not used extensively by any of the participants. Megan (04, 08_I call this my summer home), Jen (20_gull lake 2011), and Karina (09, 10) referenced how places they knew had changed over time due to changing water levels and the introduction of pine beetle. The participants generally showed one photograph and described how it looked before. This may have been an artifact of the methodology as participants were asked to provide their own images, and they may not have two images of the same location from different time periods. As a consequence, this area was not prominent within participant discussions. The one exception may be the discussion regarding changes in childhood. Although, this differs from the conventional approach which focuses on places that have changed, it is appropriate given the participants' greater focus on societal issues versus consequences in natural areas.

A Sense of Place

Sense of place is the subject of significant research which examines features such as how it is created, what its dependence on the physical environment is, and how social and cultural experiences impact it (Stedman, 2003). Although most authors focus on sense of place with regards to locations individuals have personal, firsthand experience with, Hall and Saarinen (2010) suggested that there is a second type as well; "it can also apply to the understandings and relationships of people to a location that they have never been to and perhaps have experienced only vicariously but of which they still have an image and a personal understanding" (p. 2). The latter form of sense of place is the focus of many of the images used in communication and education about climate change. These images are centered on places which the target audiences have never been to but are currently or will be experiencing significant negative impacts from climate change.

Multiple studies have found that although climate change is considered a significant global issue, it is generally of secondary or lower importance personally, and nationally (American Psychological Association, 2009; Frantz & Mayer, 2009; Leiserowitz, 2006; Lorenzoni & Pidgeon, 2006; Lowe et al., 2006; O'Neill & Nicholson-Cole, 2009). The images commonly used within communication and education efforts can be seen as contributing to raising awareness of the global issues associated with climate change, while failing to engage people with climate change within their personal contexts. Although, images are often used in order to "bridge the gap between what may seem an abstract concept and everyday experience" (Nicholson-Cole, 2005, p. 255), they do not substitute for experientially derived knowledge. In fact, they often contradict personal experience where change at the scale of climate change goes relatively unnoticed within local contexts. Epstein (1994) stated that "experientially derived knowledge is often more compelling and more likely to

influence behavior than is abstract knowledge" (p. 711) based on an extensive review of related research. Therefore, the experience of the local environment as unaffected is likely to decrease the risk perception relating to global climate change and subsequently result in inaction (González-Gaudiano & Meira-Cartea, 2010).

Hirsch (1999) described the power of a photograph to simultaneously affirm the existence of the past and "signal its insurmountable distance" (p. 10). The same is true for photographs of climate change that an individual does not have personal experience with which they can connect. For example, the vulnerable beings like polar bears and residents of faraway places commonly pictured in climate change media (Manzo, 2010a) are perceived as real, hence the perception of climate change as a significant global issue; while simultaneously conveying their distance, and thus the distance of climate change, because they are distant from personal experience.

Personal experience, a vital part of personal photography.

The nature of photography is that personal experience is vital to the content and composition of photographs. Other than Meghan, the participants in this project did not manipulate their photographs in post production with graphics editing software. Meghan did purposefully manipulate one photograph which was discussed in the previous chapter. However, in all cases, including Meghan's manipulated image, the photographer had a personal experience which was reflected in some way by the photographs they chose to share. While the media, as well as cultural codes, will influence the images created (Kress & van Leeuwen, 2006). The participants still had first-hand knowledge of the sites and scenes they photographed. This means that participants may have been unable to create a particular photograph that they feel would represent a particular theme. This was not mentioned by any of the participants as a concern, with the exception of the photographs focused directly on portraying aspects of climate change which were discussed at the beginning of this chapter. The photographs produced were part of a network of personal experiences, that drew on memories and experiences beyond those portrayed by the photograph.

The topic of place illustrated the connection between photographs and memories. Carolyn (8, 10, 12, 13), Dorothy (10, 14, 15), Jen (04/ 25_uncas wetland before, 16_garden), Julie (05_Garden and Garbage, 24_Climate affects, 32_Powerless 2), Karina (09, 10, 21_10 inspired by my happy place), Megan (02, 04, 08_I call this my summer home), and Meghan (10, 11) all contributed photographs of places that they have connected to their thinking about climate change. The connections however varied from the loss of a place, to the creation of new personal natural spaces, particularly within urban environments.

Loss of place.

Jen, Julie, Karina, and Meghan all referenced places that they had lost, or in Meghan's case, feared losing. All of these places were natural areas of varying

sizes; however, the reasons that the natural areas were lost were all different. For example, Jen contributed a photograph to the first meeting (topic: everyday life) of the train crossing near her school (04). In the final meeting, she showed the same photograph because the small wetland area by the crossing had recently been filled in during construction on the train tracks (25_uncas wetland before). Although she did not attribute value to the wetland as a natural place originally, its loss was significant for her: "*it just happened over a week. All of a sudden they had these big back hoes and stuff in there, and it's like, where did our wetland go*?" (Jen). In this case, the area was lost due to expanding transportation corridors. The area is no longer in a natural state, having been taken over for human use. Jen did not consciously attribute value to the place originally, connecting with its value for her only after it had been destroyed. This is common and makes gauging the importance of local places difficult; thereby also contributing to the challenge of protecting local places (Read, 1996).

Karina, on the other hand, lost her place because of a natural process which may be accentuated by climate change. She contributed two photographs of a mountain forest near where she grew up that has been infested with mountain pine beetle (09, 10). The pine beetles kill the trees where they lay their eggs; the dead tree turns red, but remains standing. Pine beetle are a natural occurrence in the area; however, warmer winter temperatures over the past several years have allowed the population to expand beyond its normal levels, resulting in greater levels of destruction (Carroll, Taylor, Regniere, & Safranyik, 2003). Karina acknowledged that the area will change naturally, and that she had not actually lost her "happy place" but that for the moment it is different from the place she had connected to.

Karina's reaction supported the theory that sense of place is understood as having three components: the physical environment, human behaviours, and social and/or psychological processes (Stedman, 2003). Although her place still exists, the physical environment has changed because of the presence of pine beetle, which affected her connection. These three aspects influence the behaviours individuals are willing to engage in to maintain or enhance the place (Stedman, 2002). Therefore, facilitating peoples' ability and awareness to connect events, like increased pine beetle populations, with climate change has the potential to encourage action against climate change as a place protective behaviour.

Julie's lost place (24_Climate affects) was different again in that it was a natural area which at the time was closed to human use because of dangerous conditions relating to a lingering snow pack. The area is a series of caves in the Rocky Mountains which are known for high bat populations. Later in the year, the area was temporarily closed in order to protect the bats from a fungus which had been affecting bat populations in the United States (Government of Alberta, n.d.). This loss encompasses two causes. The first, at the time Julie took the photo, related to safety for humans, while the second is focused on the safety of the

natural environment. This is related to potential concerns regarding the impact of changing climates on tourism (D. Scott, Wall, & McBoyle, 2005). Although it is difficult to attribute a single weather event, such as that which prevented Julie from visiting the caves to climate change, "all demand and supply facets of tourism are regarded as being affected by global climate change" (Hall & Saarinen, 2010, p. 13). Will later snowpack become the new climate for this area, changing its availability for tourism? Will safety become an issue for either people or the bats because of the opportunities and challenges presented by a changing climate?

Meghan contributed two photographs (10, 11) that focused on a special place, again located in the Rocky Mountains. While her place still existed and was therefore not lost, she expressed her fears that she could lose the area because of climate change.

> *That's that alpine environment or high altitude so it's, I believe, if I remember correctly, it's sensitive to changes more so maybe than other environments because it is a highly sensitive ecosystem. I would hate for that to be destroyed due to climate change because it's one of my happy places.* (Meghan)

Stedman (2003) described how the loss of a place is dependent on changes in place meanings: "the physical landscape may change to such a degree that preferred meanings become untenable or are maintained only through active effort" (p. 683). This is apparent in Jen's, Karina's, and Meghan's photographs and discussion. Each of them described a change in the physical landscape, and subsequently, in the meaning that it has for them following the change. This resulted in a sense of loss, or a feared sense of loss.

Protecting lost places.

One of the common discussions relating to sense of place is the willingness of individuals to engage in place protective behaviours. Individuals are more willing to act when the places are essential to their identities and when they believe the area is less than optimal: "this is especially true when important symbolic meanings are threatened by prospective change" (Stedman, 2002, p. 577). This has implications in terms of how individuals respond to climate change. The places most commonly portrayed in education and communication materials are far away and the individual viewer is unlikely to have developed personal symbolic meanings that they attach to the place. Instead, place attachment relies on individuals adopting the symbolic meaning that is told to them about the image. However, this is unlikely to carry the same weight as that derived from personal experience (Weber, Blais, & Betz, 2002). Therefore, it is less likely that the symbolic meaning that individuals attach to these distant places will be perceived as being threatened in the same way that the meaning of a local or personally familiar place may be. Further contributing to this is the baseline effect phenomenon.

The baseline perception is that which an individual develops when they first arrive or experience a place. This forms the basis for their future tolerance of new threats: how much does the threat actually impact their baseline perception (Stedman, 2003). In terms of climate change, if the baseline perception of these distant places is of a place threatened by climate change, the images may unintentionally create a tolerance for threat from climate change to that place. This would be a valuable area of future research.

Another challenge is that if the risk needs to threaten the personal symbolic meanings attributed to the place, many will not be perceived as relating to climate change, even if there is an underlying connection. Blake (2001) argued that actual experience directly impacts people's environmental concern. In Jen's photograph of the wetland destroyed due to railway expansion the connection to climate change is not a direct one. The damage is not caused by the effects of climate change, but like Julie's photograph of a construction zone in the mountains (08), the underlying mentality beneath the need for the expansion may relate to the reasons why there is human-induced climate change, such as high levels of consumption. It is necessary to make the connection between higher consumption and climate change in order to develop climate related concern and action regarding impacts such as these.

When asked to provide photographs that the participants connected to climate change in some way, Julie contributed a photograph of a construction zone in Canmore (08), an Alberta city located just outside of Banff National Park and the Rocky Mountains.

> *The thing with Banff is it's a National Park so there are still restrictions on the building there; whereas Canmore is outside and everyone is like woohoo! If you guys have ever been to Canmore their houses are massive, the condos and all these places you stay are massive and they just keep building and its growing and growing and growing. It's just outside [the national park], everyone wants to be close but this way they can still build what they want, the excessive amount that they want, while being close to the mountains still.* (Julie)

The surrounding discussion focused on the issue of excessive consumption within Western society. This directly reflects what Selby (2010) indicated was the problem with most consumer awareness strategies, the typical approach to addressing climate change:

> They fall short of a root-and-branch critique of consumerism as such and may even inadvertently buttress a consumerist ethic. The recycling bin in most classrooms is a case in point. Often identified as evidence of a school's commitment to sustainability, it conveys the subliminal message that consumerism if approached responsibly can be benign (p. 44).

Selby (2010) argued that in focusing on the production of carbon dioxide as the primary cause of climate change we have ignored the deeper issue, that it is "a crisis arising from a disconnect from the web of life" (p. 38). This turned out to be one of the underlying themes that weaved itself throughout all of the meetings between the research participants. Throughout the research project participants expressed, through both their photographs and their discussions, their personal struggle between participating in activities outdoors and connecting with nature and the consumption associated with doing these activities. Further, they discussed issues such as how intentions influence whether or not a particular action is acceptable. This was discussed in relation to commuting in the previous chapter. Commuting out of the city because of a job was identified as acceptable, as was the potential of commuting into the city if the individuals participated in other activities like growing their own food and composting. Commuting because the person wanted a nice house outside of the city was, on the other hand, perceived as negative behaviour.

Julie's image (24_Climate affects) that reflected on her sense of loss regarding no longer being able to access a popular recreation area also exhibited this battle. The area, it may be argued, is often utilized as a place of consumption. Tourism is a form of consumption in terms of both tangible goods and intangible services; however, most importantly "the tourist industry sells 'experiences'" (Britton, 1991, p. 454). The closure of this particular site is a lost possible experience.

Again, this raises the issue of consumption versus a connection with nature. Carolyn talked at one point about making a daytrip to Canmore, approximately a four and a half hour drive from Edmonton.

> *I think the lifestyle does come with a few challenges though, you have the lifestyle and you want to do it. Like the other day we drove to Canmore for the day to hike and climb. We definitely did. But, I mean, that's the lifestyle that we want to lead too, we want to go out, we want to have fun, we want to go to Canmore but at the same time we probably could have gone for the whole weekend, I mean, we carpooled, that's a bonus right. We probably could have climbed in the city, or we probably could have gone to the climbing gym, we didn't have to go.* (Carolyn)

Carolyn recognized that driving to the mountains was unnecessary consumption from many points of view but the discussion continued to highlight the role that the natural environment plays in outdoor recreation, and the subsequent enjoyment of the experience and connection to the place. Related was Megan's conscious choice to capture her experience of a place, Tofino, British Columbia, by not purchasing any tangible goods as souvenirs; instead capturing her experience in a photograph of a word and date written with seaweed (10_Nature's virtual postcard).

The desire to be in nature in order to facilitate connecting with nature adds a challenging component to looking at place protective behaviours in the face of climate change. In order to connect with natural spaces, to form symbolic meanings, it is necessary to experience the space; however, the activity needed in order to get to most natural spaces in turn contributes to human-induced climate change. Julie captured this dilemma in a self portrait (01_Big Trucks and McDonalds), her reflection in the side view mirror of the truck she was riding in, in order to get out of the city to go horseback riding. Therefore, in terms of climate change it is not enough to have a sense of place that can lead to place protective behaviours. The issue is more complex, also involving what we are protecting the place from, and how we use the place ourselves. This is true regardless of whether we have developed a connection with place personally, or vicariously.

Place as a location of positive action/thinking.

Not all of the interpretations of place were associated with loss. Several were connected with positive actions and thinking. Julie (05_Garden and Garbage) and Jen (16_garden) both contributed photographs of their balcony gardens. Both participants commented about being able to create natural places on their balconies, providing some separation between them and the built, or uncared for, environment around them. Similarly, Dorothy (14, 15) talked about "*the naturalization of urban living*" in reference to her choice of neighbourhoods to live in. The neighbourhood she chose has significant natural elements such as large street trees and small community parks; the community is also walkable to both work and amenities. These examples differ from the previous discussion because they are places of created nature. Both Julie and Jen have built their balcony gardens, while Dorothy picked an area where the urban planning model incorporated natural elements. At the same time however, they act in a similar way to the natural places discussed earlier, providing a connection to nature within the participants lives. Further, although this may not always be the case, these created places each have a positive contribution to mitigating climate change. Community and individual gardening have been linked with connecting people with nature, and developing knowledge about ecological systems, and about health and wellness generally (Litt et al., 2011), as well as with high neighbourhood satisfaction (R. Kaplan, 2001). Dorothy is able to cut down on her use of motorized transportation options. In addition, all three are living in higher density housing options.

One of the areas of discussion relating to this idea was an increase in the availability of resources on gardening in small spaces. Jen and Carolyn both talked about resources they had seen recently that focused on topics like container gardening: they discussed the different options that existed and how they might be able to utilize them to develop spaces. Particularly in relation to food production this has positive implications, in terms of behaviour, and in terms of the underlying thinking.

You really can grow your own food.

There is a disconnection between people and the source of their food, although it is likely more prevalent than just with food (Sumner, 2003). Vileisis (2008) traces the history of this lost knowledge and how it arose from events such as reducing costs of production and delivery, war time rationing, and the movement of women from the home into the workforce. Now, children, and many adults, are often unaware of where their food comes from connecting it back only as far as the grocery store (Vileisis, 2008); therefore, Megan's reflection regarding her backyard apples is not a solitary story. Megan (06_apples) brought in a photo of a bowl of apples that she had collected from a tree in her mom's backyard.

> *So these apples are from my mom's backyard. I just thought it was kind of funny because you see apples in the grocery stores and they all look alike and the apples on the tree in our backyard that has been producing apples my whole life I never, growing up and I didn't consider them food they were just oh look our tree grows apples. You didn't make that connection that food grows on trees and of course nowadays with the movement towards organic quote unquote and the kind of natural local foods I thought how neat is that that many of us have grown up with some sort of local organic food in our very backyard and we've never really taken notice of it before.* (Megan)

There are a variety of movements relating to local food production and consumption. Farm to school movements cite improving health benefits as a major motivation for connecting schools with local farm operations (Public Health Association of BC, 2011); at the same time local food is being considered as a social movement, a diet, and an economic strategy (DeLind, 2011). Brien (2009) suggests that awareness of climate change is central to the development of cultural activities such as the slow food movement, "and is, as a result, stimulating what could be seen as an evolutionary change in popular foodways" (para. 1). Foodways are defined as including the cultural customs, beliefs, and practices involved in all aspects of food from production to consumption (Brien, 2009). Many of these food movements focus on increasing awareness regarding the sources of food, which Megan highlighted as something she had not considered in relation to the apples from the backyard. One of the benefits of gardening, particularly gardening for food in relation to climate change, is increasing awareness regarding the connection between food and nature, and in turn, humans and nature (Freeman, Dickinson, Porter, & van Heezik, 2012). Photographic images which connect growing food and opportunities like vegetable gardens and community gardens with food consumption may contribute to making this connection, as taking the photograph did for Megan.

Clayton (2007) stated that "belonging, or 'fitting in' to the local community, can be an important determinant of gardening practices" (p. 216). However, Julie discusses how her balcony stands out:

> *The number of people just looking up at our balcony because everything else is bare and then you have ours with our little hangy things over the edge with our little mini gardens everywhere and we have a whole set up*.

Therefore, utilizing images of areas such as balcony gardens, which focus on sustainable and locally appropriate plants in local communities, may encourage others to create similar areas. One approach to doing this would be to use community-based social marketing approaches to develop small space gardening as a norm (McKenzie-Mohr & Smith, 1999). Although it is beyond the scope of this paper, it is important to note that there are important considerations in terms of how gardening is done regarding aspects such as species planted, water use, and application of toxic chemicals that must be considered in relation to encouraging gardening in the context of human-induced climate change (Clayton, 2007).

Both Jen and Julie expressed their satisfaction in having access to green spaces within otherwise urban and often unattractive areas: Jen looked over a parking lot, while Julie could regularly see significant amounts of litter from her balcony. There is extensive research indicating the positive benefits of experiencing and viewing nature. Viewing natural elements through a window has a strong effect on personal well-being reports for example (R. Kaplan, 2001). While being close to nature was an important factor in moving to suburban areas in Edmonton (Munro, 2006). In relation to increasing residential satisfaction (R. Kaplan, 2001), balcony gardens, and neighbourhood nature, such as that described by Dorothy, may encourage others to live in higher density residences such as those chosen by these three participants, because the presence of natural elements will increase perceptions regarding satisfaction and quality of life (Sheets & Manzer, 1991).

These neighbourhood and apartment spots of nature were taken as positive images relating to climate change. At the same time, other examples of high density living were cited as undesirable. Karina said "*I was going to bring in the picture of Hong Kong and the dirty street and the disgusting air conditioning and all of the commercialism and all of the flashy lights, and I thought 'I don't want to look at that"*'. While Julie did contribute a photograph of a similar scene (31_Powerless) discussing how it made her feel powerless.

> *You can see all the air conditioners. At the same time, with how many people who live there, what do we expect. I think this is in Malaysia, I'm pretty sure, what do you expect though, people just live in the heat*? (Julie)

Comparing these sets of photographs – the positive implications of small space gardening and local natural places with the negative perceptions of the built environments involving air conditioners and evidence of consumption – illustrated a contrast between the participants in this project and messages from the environmental movement generally. Weston (2007) argued that the

environmental movement has focused on the negative: "opposed to this, worried sick over that, ill-disposed by reflex to almost any human impact on nature. The Voice of Doom" (p. 10). This is also reflected in the label of doomsayers attributed to early environmental photographers (Cosgrove, 1994). Jen, Julie, Dorothy, and by the non-inclusion of her photograph Karina, all focused primarily on positive images, images of what can be done, what they have done, and the positive effects, rather than focusing on the negative behaviours that contribute to causing climate change. This is important because the negative messages are often associated with loss, something that we are psychologically averse to and therefore acts as a considerable barrier to change (Frantz & Mayer, 2009; S. Kaplan, 2000).

This is, in many ways, similar to the use of images of alternative energy technologies as icons of climate change (Manzo, 2010a). The major difference however is the scale of the icon. Putting up solar panels or wind turbines, even at a personal level, is a complex and costly undertaking. The restrictions of infrastructure and bylaws further complicate the use of renewable energies, making photographs like Carolyn's image of a net zero house in Edmonton's river valley (06_riverdale net zero house) a rare and often unattainable image to replicate personally. Gardens and neighbourhood choices are a realistic option available to make small steps towards mitigating climate change. Further, unlike installing renewable energy technologies, gardening and community greenspaces can contribute to connecting with nature, thereby addressing the root causes of climate change rather than just the symptoms.

The people can make the place.

The final group of positive sense of place images contributed by the participants focused on facilitating nature experiences for children. Chawla and Cushing (2007) reported on the significant life experiences identified by environmental activists and educators. Childhood nature experiences and influential role models and family members are both identified as two of the most common formative experiences. Activities like participation in outdoor groups and environmental groups also figured prominently. Karina suggested that the role of river valley programs is to introduce participants to local natural areas and the possible activities that can be done outside so that they make the choice in the future to go outside and connect with nature, this is embedded within the RVP mission.

Similarly, Carolyn (10, 13) talked about working at a residential camp with children in the Rocky Mountains, where she was able to encourage children to be active outdoors and interact with nature. As outdoor educators the staff of River Valley Programs are well placed to encourage similar activities and behaviours within the city of Edmonton. This opportunity was raised by multiple participants who contributed photographs of equipment and/or people in the RVP programs and will be picked up again in the next section. Carolyn summarized her

feelings regarding the opportunity, stating "*it's what I do for work; it's just happy and fun and it's how I encourage kids to play outside. I decided it is really cool, I'm not going to lie. It's just pretty neat*."

Karina raised a related opportunity: exposing the staff of RVP to new activities and ways of thinking and acting. While this does not necessarily involve a physical place, it is often the experience of working with river valley that encourages individual staff to take on new actions or ways of thinking. For example, Karina brought in a photograph of all the staff bikes at an event during the summer 2011 (20_9 encourage others to cycle). She encouraged staff to cycle to a particular event and had eight of them follow through; this was the majority of the staff participating in the event. This highlights the need for education opportunities for staff and adults generally who can also be exposed to new activities and ways of thinking. Bélanger (2003) recommended that adult education is grounded within local communities, which can be defined based on a multitude of factors as discussed in the previous chapter. The place of the river valley forms a basis for programming for RVP, thus it, in connection with the people involved, form a community where adult education can occur amongst the staff. Community is a key access point for adult environmental education (Sumner, 2003). Most significantly however, Bélanger (2003) argued that "under certain conditions, life contexts may lead individual and collective actors to reflect on their relations to their environment and may induce them to act to transform it" (p. 82). Contexts such as that created by River Valley Programs can introduce individuals to new experiences and new skills which can subsequently affect their interaction with the natural environment. This will be brought up again when considering the people within the photographs in the next section regarding the faces of climate change.

Other views of place.

Not all images of specific locations were connected with a specific and personal meaning for the photographer. Several images of this type were contributed as evidence of other concepts and ideas. Two of Carolyn's images for the topic that directly connected to climate change focused on positive behaviours, changes, and actions. The first image (01_dandelions), for example, focused on her neighbour's lawn. Despite societal pressure, her neighbor has chosen to leave the dandelions in the lawn alone. She is not engaging in any control measures despite dandelions being viewed by most people as weeds and undesirable in Edmonton. Therefore, the lawn serves as an image of a place being left on its own to revert to a more natural state.

Carolyn's other image (07_Rutherford) focused on a place that symbolized intangible action that she connected to climate change. The image is of a building at the University of Alberta which symbolized the development of awareness and knowledge. These images illustrated how places can be taken to symbolize meanings beyond those inspired by the scene itself. As well, they

illustrated that by utilizing local landmarks, individuals can be connected to images and their intended symbolic meaning without significant additional discussion.

Chris also contributed an image that did not fit with the other representations of place (07). His image was representative of the role that place plays in outdoor activities. The photograph is of an outdoor, community skating rink during the summer. During many months of the year the rink

> *Looks abandoned, but we know that in four months time there's going to be hockey games on there, there's going to be community skating programs, Thursday night public skate times or whatever; it's going to be the focus of the community playing and such*. (Chris)

The photo illustrated the impacts of climate on a single place and its role within a community. At the same time, it connects to several discussions the group had that focused on consumption, relating, in this case, to the quantity of gear that a person living in Edmonton has to have in order to be active throughout the year. Not only are there four seasons – spring, summer, fall, and winter – but there is extensive variability within each of those seasons. This was discussed under the theme seasonal change of one location in the previous chapter.

The climate, along with a desire to be active out-of-doors requires a higher level of consumption, something which the participants questioned at many points throughout the project. Julie stated that the level of consumption "*almost sounds wasteful,"* illustrating how inconsistencies can persist. The participants agreed that being outside in nature is worthy of some level of consumption, unlike people who the participants perceive as consuming for the sake of having better things. Lorenzoni et al. (2007) indicated that it is necessary to examine how individuals recognize inconsistencies between their beliefs, values and actions. For the participants in this study, it was done based on their placing higher value on having nature experiences than on the implications of the consumption to have these experiences.

Extreme Weather.

Extreme weather is another area relating to place that was identified by Manzo (2010a) as being used in photographs about climate change. Extreme weather was often raised as a common event. Jen (17_hail, 18_hail2, 19_incoming storm), Julie (06_On the River, 25_Every day climate change), Karina (15_2 FLOOD! Capilano WGD June 19 2011 a, 16_4 plus 11 during Jan xc ski training) and Meghan (01) all took photos of extreme weather or evidence of extreme weather. Most of these however, were discussed with a reluctance to associate the events with climate change because the participants were very aware that natural changes occur. For example, regarding her photograph of the high water levels under a bridge (15_2 FLOOD! Capilano WGD June 19 2011 a) Karina indicated that the flood might be attributed to climate change, but that it

was up to the individual to say it, she was only going to indicate a possible connection. Sobel (2009) argued that extreme weather is a common way to see climate change because the events are subject to media attention. This is exemplified by Jen's description of a political cartoon from a local newspaper that pictured the provinces of Manitoba, Saskatchewan, and Alberta. "*Alberta was in flames, Manitoba was all water and the helicopter was bringing the water over from one province to the other and saying maybe there is something to this climate change.*" The participants in this study however, questioned the lens of extreme weather based on their knowledge that there have been natural cycles throughout history. This reluctance was due, at least in part, to the association of extreme weather icons with those developed through scientific expertise which was discussed at the opening of this chapter. The exception to this hesitation was Karina's photograph of cross country skiing in January (17_4 plus 11 during Jan xc ski training). The photo and discussion related to the extremely warm temperatures during January in 2011. This weather was not viewed as being part of a regular pattern and thus stood out to Karina as evidence of climate change. This difference in how extreme weather was perceived illustrated how previous knowledge and experience can affect how potential evidence of climate change is understood and interpreted. Cold winters are part of the identity of residents in places like Edmonton. Consequently, a threat to this cultural identity, like a warm winter, may be easier to attribute to a particular cause like climate change. While weather like rain and flooding are events that happen which are not part of how individuals from Edmonton identify themselves.

Place figured prominently in several of the photographs contributed by participants; however, it was treated differently than how it is normally picked up within education and communication opportunities. The photographs which focused on a sense of place and associated loss of that place emphasized the importance of connecting meanings with specific locations; as well as illustrating how those meanings may not be connected by an individual to climate change depending on how they are framed. Other photographs of place focused on positive changes and actions that can in turn lead to having a greater sense of connection between humans and the natural world. There were also some photographs that highlighted the importance of staff in organizations like River Valley Programs, not just in facilitating outdoor experiences for children but also for each other and other adults. Finally, there were places that acted as symbols for other aspects of culture such as education. Common amongst all of these different perspectives was the symbolic meaning that is attributed to place, both personally and as part of a culture: "different human cultures recognize different features in the landscape and imbue them with different cultural characteristics" (Read, 1996, p. 4). This stresses the need for utilizing images which reflect these connections rather than relying on a vicarious connection, as is commonly done in education and communication about climate change. In the next section, it will become apparent that place is not the only topic that is subject to personal and cultural interpretation.

The "face" of climate change

Putting a face on climate change is another means of trying to connect people with the issues of human-induced climate change. A common association is the polar bear, but as Manzo (2010b) found there are other vulnerable beings who are also used in communicating about climate change. The vulnerable being is one whose future, and sometimes present, is seriously threatened by the risks of climate change. Viewers, in being able to connect to the subject of the image, are hopefully then able to connect personally to the issues. Images of an identifiable being are intended, not to convey scientific information about climate change, but to trigger an emotional response from the viewer: "when it comes to eliciting compassion, the identified individual victim, with a face and a name, has no peer" (Slovic, 2007, p. 86)

Within communication and education, these vulnerable beings are most often animals at risk from changing or disappearing habitat, or people at risk due to extreme weather or changing climates (Manzo, 2010b). Neither of these types of faces were pictured by the participants in this project, although this may be due to lack of access. The most similar to the standard approach was Meghan's inclusion of plants (13). This photograph focused on a large leaf that had red veins. Her intention was to symbolize a connection between animals, which are commonly thought of as worthy of our protection, and plants which are often ignored:

> *A lot of us think that we are going to try to save the polar bears and the panda bears because they are really cute, because they're animals, because they have blood. So this picture I was trying to symbolize that plants are also worthy of protection because it looks like it has veins in the leaf.* (Meghan)

In this case, Meghan gave a face to plants as a vulnerable being. Hall, James, and Baird (2011) indicated that plants have been largely overlooked when identifying flagship species for conservation, with most efforts focusing on charismatic megafauna like polar bears. According to Lorimer (2007), one of the aspects of nonhuman charisma is ecological charisma which relies on how often humans encounter the species and how easily they can identify the species. Given these characteristics it makes sense that the participants in this project identified with plants as symbols of taking action towards mitigating climate change. Compared to something like a polar bear, which while easily identifiable, is not a common personal experience; plants have the potential to be relevant to individuals based on personal experience. It should be noted that the plant Meghan photographed was an exotic plant housed at a local conservatory, so it still was not a local species, but it is a local experience. This raises questions as to whether local facilities such as zoos and conservatories may be able to increase the relevance of photographic images if they house the subject of the photograph within their

collections. At the same time, it may also raise concerns regarding the potential co-opting of natural features and elements as cultural artifacts (Patin, 1999).

Resilience instead of vulnerability.

Plants were also utilized as the face of resilience. These images fell into two categories: plants as symbols of hope and plants as symbols of consistency: Julie (34_urbanization of nature), Megan (01, 03), Meghan (15, 18). Megan in particular focused on consistency, even in the face of change. In relation to a photograph of a tree in front of the house she grew up in (01) she said:

> *This tree has survived the many changing pieces of the environment, and I thought sometimes we don't notice how harsh we are to certain aspects of the environment because it really does withstand a lot of the harm that we do to it.*

The second photograph (Megan 03) focused on a flower that she associates with the beginning of summer because it has always bloomed near the start of this season. Megan identified these plants with resiliency and consistency. Accordingly, an image which focused on these or similar plants would likely be unsuccessful for her as an icon of climate change.

Julie and Meghan both focused on plants that had grown in harsh conditions, however, the conditions were different: in Julie's photograph (34_urbanization of nature) the conditions are created by humans, whereas Meghan's images (15, 18) depicted plants surviving in natural environments.

> *It's a little plant being very stubborn and growing. There was actually a whole bunch of them so I don't know if this is a poorly made slab [of asphalt] or what the case is. It's growing out of the asphalt, it made itself a home. But we put things down, you know that's the thing, people try to weed the grass out of the cracks in their walk ups and stuff.* (Julie)

With regards to her second photo (18) Meghan said:

> *This is a picture of a high altitude plant surviving in one of the harshest environments on earth. I took this picture as a reminder to myself and others that while sometimes the outlook on the environment may be bleak, you can still make it through the cracks and shine, just like this plant.*

In these cases, plants were identified as icons of the resilience of nature. The plants were representative of the ongoing survival and adaptation of nature, often in spite of the actions of humans.

On the other hand, discussion of plants and climate change in the research literature focuses on the negative impacts of changing climates on local flora. For example, changing climates will have significant impacts on the plant species that are able to exist in a particular area, potentially resulting in extinction of some

species (C. Thomas et al., 2004). The risk of invasive species as climates become more suitable also figures prominently in the research literature (Hellmann, Byers, Bierwagen, & Dukes, 2008). Another area of ongoing examination is the influence of warmer temperatures on flowering times of plants (Primack, Miller-Rushing, Primack, & Mukunda, 2007). These changes however, are likely to be subtle, only noticeable to an individual with additional contextual knowledge based on things like scientific training, or personal experience through gardening or agriculture. Therefore, they are likely to escape the notice of most people. For example, Megan talked about the plant as flowering at the same time every year but whether or not she would have noticed a shift of just a few days is unclear, whereas scientifically this can be seen as evidence of a changing climate. Hence, many of the indicators of changing climates at a local scale go unnoticed (Doyle, 2007).

Julie's photo of the plant growing through the asphalt was discussed in terms of the urbanization of nature, one of the topics chosen by participants for the final meeting. She talked about people trying to hold back nature through weeding and other activities, but used the plant as evidence that nature tries to persist and often does, but in a changed context, urban rather than natural. Similarly, Meghan reflected, regarding her photo of a deer outside of a building in Waterton National Park (07), that

> *It's not just us that are changing our attitudes towards animals and the environment it's also them. The deer is becoming more desensitized to human activity and comes right into the town; it's kind of starting to get in the way. While it's kind of cute to look out of your window and see the deer, it's also bad because we are altering the environment and the ecosystem and how it flows*. (Meghan)

On the other hand, Meghan's image of the plant growing through the rock in a high alpine environment (18) showed that nature creates and struggles with harsh conditions without the presence of people. Meghan cited the photograph as evidence of hope. From another perspective however, the image may be taken to demonstrate that humans do not create conditions that are any more challenging than nature already does; or that if the plant can survive and even thrive in such places than the actions of humans are relatively negligible in terms of what nature can handle thereby making action on climate change to protect nature unnecessary. This illustrated how the interpretation of visual images can be affected by an individual's personal background, as well as the culture they are part of.

Culture has been shown as a strong determinant regarding landscape preferences. For example, Buijs, Elands, and Langers (2009) found that immigrants from Islamic countries preferred images of nature that focused on anthropocentric values and intensive management; while Dutch citizens were more supportive of images of wilderness which portray nature independent of

humans. This raises challenging questions regarding the delivery of outdoor education – is there an inherent cultural bias to outdoor education, or types of outdoor education and how might these be overcome – as well as questions regarding the protection of nature – not all people will support the protection of the same landscape. If, as the participants of this project indicate, addressing climate change requires deeper engagement and recognition of the interconnectedness of humans within the system of nature, the question then follows who's image or understanding of nature do we need to connect to. Within a multicultural society such as Canada this has significant political implications. But it also illustrates how the complexity and multiplicities of ideologies makes recycling a seemingly safer, albeit potentially less effective, pursuit.

People in nature.

Several of the photographs that included people in nature were focused on childhood experiences now compared to when the participants were children, which was the topic, chosen by the participants, of the third meeting, and one of the group of topics identified for the final meetings. Five of the participants contributed 18 photographs that focused on children engaged in activities out-of-doors. The participants identified several changes between their own childhood and those of children today such as increased consumption, decreased creativity, increased availability of technology, and decreased time spent outside. However, when focused on opportunities to be outside, the participants generally agreed that the opportunities still existed but other factors such as parental interests, safety concerns, and decreased free time did limit the time children spend outdoors.

Many of the other photos in this grouping were focused on the potential positives. In other words, while the people in communications about climate change are often pictured as vulnerable and at risk because of the impacts of climate change, the people pictured in the participants' photos represent connecting with the natural world and the potential for change. For example, Julie said,

> *That's what I got it is still the family and growing up and the atmosphere that you are brought up in, because my cousins did a lot of the same things as me in a lot of the pictures you'll see, but it might be in a different capacity.*

One possible reason for this is that the vulnerable people in the public images are most often from regions such as Africa, and other areas drawn on to represent the global poor and therefore vulnerable, an association that Manzo (2010b) highlights as representative of the West's colonial roots. Further, it is commonly argued that it is the world's poor, living in non-industrialized locations, who are most at risk from climate change (Tutu, 2010). As the majority of images came from the local area, the participants did not have access to similar populations. On

the other hand, this may be indicative of the differences in how vulnerability is understood.

Understanding vulnerability.

K. O'Brien, Eriksen, Nygaard, and Schjolden (2007) described two different interpretations of vulnerability as it relates to climate change: outcome vulnerability and contextual vulnerability. These two interpretations arise out of two different ways of framing issues of climate change: scientific framing and human-security framing respectively. Within outcome vulnerability "vulnerability is interpreted as the negative outcome of climate change on any particular exposure unit – an outcome that can be quantified and measured, and reduced through technical and sectoral adaptation measures, as well as by reducing greenhouse gas emissions" (K. O'Brien et al., 2007, p. 76). Images, such as those described by Manzo (2010a), which depict beings who are at risk because of the actual and potential biophysical changes in their environments, are communicating outcome vulnerability. The negative outcome, the loss of the vulnerable being, is something that is being quantified; for example, if we do not mitigate climate change there may be no more polar bears. From one perspective, Meghan's photograph (13) of plants as worthy of our concern too related to this type of vulnerability because she proposed that there are plants that could disappear if we do not mitigate climate change. However, while Meghan was commenting on the potential outcome vulnerability of some plants, she was more focused on the contextual vulnerability.

Contextual "vulnerability is considered to be influenced not only by changing biophysical conditions, but by dynamic social, economic, political, institutional and technological structures and processes" (K. O'Brien et al., 2007, p. 76). Meghan's ultimate concern is not that certain plants may disappear, but that society has, for the most part, overlooked plants as being vulnerable and worthy of concern. Contextual vulnerability emerges throughout the research project. The participants were not focused on outcome vulnerability because they are either unwilling or unable to determine whether the changes they are seeing, and their associated risks, are purely biophysical. For example, while the changing water levels in the North Saskatchewan were an area of discussion, the idea that water availability changes over time on the basis of natural cycles was well known to the participants. On RVP voyageur canoe trips through Edmonton's river valley, one of the points of interest is a marker behind one of the bridges that shows the water levels at different points in history. The highest mark is almost at the bridge deck, while the lowest mark indicated is above where the water level commonly sits today. Further, they were aware of other influences on the water levels, including two dams located in the headwaters of the river which create higher than average winter flows and lower than average summer flows (Aquality Environmental Consulting Ltd., 2005). The dams provide hydroelectric power generation and "augment winter flows for downstream

residents, agriculture and industry"(Aquality Environmental Consulting Ltd., 2005). Thus, the contextual factors which affect vulnerability from reduced water flows are important in considering whether or not it really does create situations of vulnerability. While images depicting outcome vulnerability can be determined and thus created without reference to local circumstances, contextual vulnerability is necessarily intertwined with the local. As well, outcome vulnerability may continue to present the cause of climate change as unsustainable carbon dioxide production. On the other hand, contextual vulnerability opens the door to uncover other, deeper, and more culturally dependent causes, outcomes, and responses.

Renewable Energies

Renewable energies emerged only a few times within the project. Carolyn (06_riverdale net zero house) and Meghan (08, 09) were the only two people to take photographs of renewable energy technologies. Carolyn's photo was of a house located in the river valley of Edmonton that has solar panels on the roof. The house is located along one of the trails that RVP runs cycling programs on, and can be pointed out to program participants. In relation to the photograph, Carolyn said "*that's our lovely solar paneled house that apparently according to some people puts power back in [to the power grid], I've never heard of anything like that*." Carolyn identified the house as something that people have done to have a positive contribution to climate change but was skeptical of the details regarding that contribution. Again this raises the concern that photographs of things like renewable technologies may not have the intended meaning for viewers. If renewable energy technologies are not seen as having significant impacts as a source of climate change mitigation, then the fact that national governments have placed significant emphasis and resources on developing these technologies may be taken as a sign that governments do not view climate change as a significant threat. This is related to the finding by González-Gaudiano and Meira-Cartea (2010) that "people tend to perceive the slowness in the development of policy responses to climate change as a sign that the seriousness of the threat is not so great, that urgent actions are not required, and that there is still a large margin of time to act" (p. 24). Dorothy also reflected on the cost of renewable technologies and how limited their use is because they have a limited output. She shared the experience of her family who built a house off-grid outside of Edmonton but are now considering moving the house onto the power grid because they are unable to live there in the winter because the power generation is too low. Images of renewable energy technologies may have the opposite effect, instead of encouraging additional action to mitigate climate change they may lead to the belief that action is not currently required.

Fear Appeals and Inspiration

Fear appeals, messages where the content communicates a threat (Leshner et al., 2011), are commonly used in campaigns where behavior change is required. For example, anti-smoking campaigns utilize images of the negative health

consequences of smoking in order to create fear in viewers regarding smoking. In a survey of the fear appeal literature, Witte and Allen (2000) found that fear appeals can be successful at motivating people "as long as individuals believe they are able to protect themselves" (p. 607). However, within climate change imagery "the very images that made participants have the greatest sense of climate change being important were also disempowering at a personal level" (O'Neill & Nicholson-Cole, 2009, p. 373). This emphasizes the need to expand targeted actions to include actions that can influence society as a whole such as voting.

Ongoing use of fear appeals can increase feelings that the issue is not personally relevant if similar disastrous events do not occur within a short time period (O'Neill & Nicholson-Cole, 2009, p. 362). Weston (2007) argued that the environmental movement generally has long relied on fear appeals in order to motivate change; he suggested that we need to suggest a vision rather than argue with fear: "fear and anger push us – yes. But visions *pull* us, and far more powerfully in the end" (p. 9). He cited the vision of the civil rights movement in the United States as an example of the pull of a vision. Karina exemplified this need by talking about not wanting to look at the negative images. The reoccurring theme of hope within the participants' photographs offered at least pieces of a vision: moving, once more, away from a tradition of outcome vulnerability as the focus of environmental messaging and replacing it with visions of resilience, perseverance, personal change, and opportunities. Images which relate to climate change within a personal context have the potential to be more effective at encouraging both belief in human-induced climate change and personal action to mitigate it because they connect to situations which individuals can affect personally. Further, personal engagement with climate change can extend to social engagement. For example, an individual may not choose to vote for a government or representative who prioritises action on climate change within their region if they do not see a personal connection to climate change. In this case, a representative who privileges foreign relief or support over more local changes such as subsidizing renewable energies may be seen as more appropriate. Further, if climate change was not considered a relevant concern than representatives who prioritise issues such as unemployment may be more desirable.

Summary

Throughout this chapter some of the differences between photographic images used within education and communication about climate change and those created by the participants in this project were discussed. Attempts to take photos that directly reflected climate change were met with doubt and efforts to recreate expert icons. The importance of connecting meaning with place, and the role of personal experience in establishing meaning indicate that photos of a place that can only be experienced vicariously may not have the desired impact. The face of climate change may need to reflect hope, change, and action; rather than despair

and loss. As well, renewable energies and extreme weather may need to be framed differently if they are to inspire people to action. Finally, inspiration featured much more prominently than fear, with participants expressing their avoidance of images that were negative or made them feel fear or powerlessness. These all illustrate that taking photos of climate change within a personal context is possible, but it requires that we rethink the focus, moving away from superficial causes such as carbon dioxide emissions, towards deeper causes relating to fundamental relationships with nature.

7. Conclusion

There is clear scientific evidence that human-induced climate change is one of the most significant threats to humans and the wider environment (Intergovernmental Panel on Climate Change, 2007; Oreskes, 2004). The complex nature of climate change requires that we draw on a range of disciplines in order to develop effective long-lasting solutions (United Nations Framework Convention on Climate Change, 2012). Additionally, it is increasingly apparent that there is no one-size-fits-all response to either communicating or addressing climate change. Local and personal contexts play vital roles in the current and potential impacts of climate change as different places will experience different impacts and have different responses that are the most appropriate (Hess, Malilay, & Parkinson, 2008). For example, although wind turbines are prevalent in areas of southern Alberta, they have not been utilized extensively around Edmonton due to different local conditions. Personal contexts can and do impact how individuals view and respond to messages about climate change. At the same time, the global implications of climate change are such that actions of people living in locations like Edmonton do impact people living in other areas such as the Maldives. Further, potential future issues, such as climate refugees, have the potential to impact people living in Edmonton. This study illustrated how personal backgrounds, experiences, and interests can affect how individuals think about and relate to climate change through photographic imagery. Specifically, this research was framed by two research questions:

1. In what ways do outdoor educators visualize climate change through photography within their personal contexts?
2. How do these images relate to those used in the fields of education and communication about climate change?

The theoretical component of the research is located within a complex framework derived from existing climate change research, particularly within two areas: education and visual communication about climate change. Further grounding the study was a conceptual framework of ecological thinking which recognizes humans as embedded within the system, and as reflectors on the system (Keiny, 2002).

The study utilized autodriven photo-elicitation to enable outdoor educators to express how they relate to climate change visually through photography within their personal contexts. This approach engaged the participants in determining the topics to be photographed and in interpreting their photographs with the larger research group. Participants addressed a wide range of topics within their photographs which were discussed in detail in chapter five.

Participants expressed their understanding of climate change throughout the project. The participants were all aware of the link between climate change and greenhouse gases with increased average temperatures and increased

occurrences of extreme weather. Further, the participants discussed their awareness of natural climate change and the challenges in separating anthropogenic climate change from natural climate change. At the same time, they recognized the role of actions like transportation choices and energy sources in contributing to and benefiting anthropogenic climate change.

Prominent amongst the participants' interpretations of the various topics were aspects of the human – nature relationship such as access to nature, modification and/or replacement of nature, control of nature, disconnection with nature, impacts of nature on human activities, and nature as a role model. Given the participants' roles as outdoor educators in facilitating natural experiences, as well as their own interests in outdoor activities this prominence seems appropriate. It also raises the question as to whether or not individuals who are not as connected to the natural environment through their work and personal interests would view the different aspects of the human-nature relationship as important as this particular group did. This should be an avenue of future research.

Other interpretations that emerged in relation to the different topics included doubt regarding the direct relationship between particular events and climate change, which is explored more fully in chapter six, and social aspects such as experiencing feelings of powerlessness when situations seem beyond the participants' control. This is closely connected to what T. Clark (2010) observed:

> What is insignificant or trivial for an individual, say driving a car, regarded by some even as a right, becomes a matter of social concern when thousands and millions of people do it and at even larger scales it becomes a threat to the integrity of the environment itself. (p. 135)

A personal action often appears benign when it is considered as a personal action. T. Clark (2010) pointed out that individual actions can be extremely negative, or conversely extremely positive when considered as societal actions. This relates to ecological thinking because it reflects the role of the individual within the system. If individuals, as many of the participants in this project did, begin to recognize their own role within the broader system, personal actions will become connected to broader societal actions as well. When discussing personal actions and societal responses, participants tended to focus more on positive topics such as small changes, and elements of inspiration rather than on the negative aspects. This was foreshadowed by the climate change literature which indicated that fear appeals have met with limited success in relation to motivating people towards change (O'Neill & Nicholson-Cole, 2009), another aspect that was explored within chapter six when comparing the participants' photographs with those commonly used in education and communication about climate change.

In response to the second research question the participant images and interpretations were compared to the photographic topics identified within the

research literature, review table 4 for a summary. This comparison revealed important differences in interpretation. The closest the participants came to generating commonly seen images relating to climate change was when they were asked specifically to take photographs relating to climate change. However, their interpretation of these images indicated that they were attempting to recreate, what O'Neill (2008) termed, expert icons (p. 79). Further, the participants all showed doubt in their ability to directly connect specific images, and therefore events or things, with climate change. This indicated that it may be more effective to address climate change through other avenues, such as the relationship between humans and nature, because individuals in this study were more willing to say there was an issue with this relationship and relate that to climate change, than they were to relate a particular occurrence with climate change directly. This supports the claims that addressing climate change requires that we examine the "normative values that organize life in society" (González-Gaudiano & Meira-Cartea, 2010, p. 16), and the relationship between humans and nature (Selby, 2010). Again, an important question for future research is to examine if outdoor educators generally differ from other populations in their awareness of this relationship and willingness to question the status quo. If so, what factors influence their openness?

Although climate change photography often depicts particular locations that are at risk as a result of climate change, the participants' images and reflections emphasize the importance of personal experience in establishing a connection to place. This is important because Stedman (2002) identified that it is generally an aspect of the connection to place that is threatened rather than the place itself. It is not enough however, to utilize images of local places because in order to trigger a reaction to climate change the viewer also needs to associate the threat with climate change. Aspects such as personal travel to different locations and exposure to local settings can affect the salience of local places. Baseline perception may also contribute to the range of potential responses. If the baseline perception is of a place threatened by climate change, climate change may unintentionally become an assimilated part of the baseline perception rather than a threat to the area (Stedman, 2003). Related to this, the participants in this study all expressed connections to places that were primarily natural; however, there are differences in preferences for types and levels of nature based on aspects like culture (Buijs et al., 2009). How would these differences affect responses to climate change when identified as a threat to different types of places?

Another important difference in the discussion regarding place was that the participants identified places that were symbolic of positive actions and thinking such as residential choices and local food production. This was again indicative of the participants' tendencies towards positive rather than negative messages which need to be examined further.

Similarly, when attributing faces to climate change the participants focused on positive portrayals. Images revealed symbols of resilience rather than

vulnerability. Although this may have been a reflection of the participants inability to access "faces" that they felt were at risk of climate change, based on the overall tendencies of the participants it appears that it is more likely a result of their focus on topics of inspiration and positive actions. In the future it would be useful to examine whether or not this tendency is common across other populations, and how it may be utilized to draw individuals towards a vision of a future where people are responding appropriately to climate change. Sharing a common vision which people can move towards both individually and collectively can form a powerful form of social engagement thereby increasing the interplay between individuals and the system. This could lead to increased social action such as voting.

Although extreme weather and renewable energies are commonly featured in communication and education about climate change the participants in this project did not focus on these two topics. The photos that did relate indicated confusion regarding issues such as weather compared to climate, and the actual contribution of renewable energies. This indicated that like the fear-based appeals which have been shown to be relatively ineffective at motivating significant individual action these two topics may also result in doubt and apathy rather than action.

The final topic discussed in the literature related to fear appeals versus inspiration. As has been indicated throughout, the participants in this study showed a bias towards inspirational and positive imagery. This revealed that for this group they are more likely to respond to a positive vision of the future, rather than reacting against a potential future nightmare scenario. This is what Weston (2007) is advocating for. If other groups are also shown to have similar biases, the tradition of education and communication about climate change will need to make a significant change in order to achieve their goals.

Limitations of the Study

One of the limitations that is often cited for case study research is an inability to generalize the findings to a wider population or more general context (G. Thomas, 2011). However, others have indicated that context bound knowledge, such as that generated through case studies, is, for the most part, more revealing of actual situations (G. Thomas, 2011). Stake (1978) suggested that case study can lead to, what he termed naturalistic generalization: "recognizing the similarities of objects and issues in and out of context and by sensing the natural covariations of happenings" (p. 6). He further stated that "case studies will often be the preferred method of research because they may be epistemologically in harmony with the reader's experience and thus to that person a natural basis for generalization" (p. 5). Similarly, G. Thomas (2011) argued that case studies offer specifics that are in many cases more interesting and nuanced than knowledge that could be generalized across any context. Any knowledge generated from this project is context bound. Greenwood and Levin (2007) stated:

> Transferring knowledge from one context to another relies on understanding the contextual factors in the situation in which the inquiry took place, judging the new context where the knowledge is supposed to be applied, and making a critical assessment of whether the two contexts have sufficient processes and structures in common to make it worthwhile to link them. (p. 66)

This is in keeping with ecological thinking which recognizes the individual and the group as part of the system: those who have engaged in generating knowledge have done so from within a context of their current system. While the findings of this project are bound within the context of the case, they serve as evidence of the need for specific rather than generalized messages and images within education and communication about climate change. Further, it provides potential lines of exploration to examine how specific messages are received and how specific groups may construct their image of climate change in order to create more specialized and context bound messages.

Climate change exists.

The study is based on an assumption, by the researcher and the RVP supervisory team, that individuals who are employed as outdoor educators with RVP are open to the existence of climate change. The acceptance of climate change in some form was evident throughout the project. However, participants did, under specific circumstances which are discussed in context in chapters five and six, express doubt as to what can be attributed to climate change.

Climate change or general ecological concerns.

One of the critiques of personal behaviour change is that the changes are often more generally environmental rather than strictly related to climate change (Lowe et al., 2006). The same may be argued for the current study. Participants addressed a wide range of concerns, many of which appear only superficially related to climate change, if at all, such as how recreation opportunities have changed. This critique holds true if climate change is viewed as an issue relating to excess greenhouse gas production. Thus, it may be viewed as a limitation of the project. However, there is growing recognition regarding the need to expand the view of climate change as relating to social elements such as issues of privilege and consumption. This research illustrates the possibilities of exploring these deeper and more personally and socially challenging issues in relation to climate change rather than restricting the discussion to concepts which can be scientifically tied to climate change. This is in line with Frantz and Mayer (2009) who suggest that one of the ways to move forward from what they suggest has been largely ineffective education and communication efforts is to focus on helping people "develop a perceptive, connected relationship with the natural world" (p. 218).

Access.

Photography relies on direct experience in some form; therefore, the use of photography as the fundamental element of the method limits participants to what they can personally experience. Given the focus of the project on revealing personal understandings and connections to climate change this is not considered a limitation of the project.

The conventions of photography.

As was noted earlier, the majority of the photographs submitted by participants conformed to some of the perceived conventions of photography. The images were largely taken from an eye level perspective and they fulfilled primarily a documentary approach, with a few notable exceptions. This may be perceived as one of the limitations of photography as a research methodology. The medium will have constricted the visualizations of climate change that participants were able to create and share. Future projects adopting a similar methodology may choose to include other visual mediums, for example painting, in order to challenge the customs of photography. Or there may be opportunities to use set activities in order to break down some of the conventions that may have limited this project. At the same time, the format of the participants' photographs within this project was largely similar to images found within education and communication about climate change and therefore provided a basis for comparison.

Research Participants and Group Dynamics

Research projects are often affected by power dynamics between the researcher(s) and participants. Autodriven photo-elicitation provides one means of addressing these dynamics because it relocates authority within the participants rather than the researcher as discussed above. In addition to this feature of the methodology, my relationship with RVP as a former staff member, as well as the unique structure of RVP also contributed to creating a truly collaborative project. I provided some groundwork for the project through the focus on climate change and photography. The participants however took ownership of the project in terms of creating and determining the topics they photographed and in sharing their own interpretations with the wider group. The collaborative nature of RVP that was already in place prior to this project contributed to the collaborative nature of the research project greatly. As a result, this project features a unique relationship between participants and researcher that enabled greater freedom to express personal reflections and interpretations than may have been otherwise achieved.

Ecological Thinking Revisited

Ecological thinking formed the conceptual framework for this project. This has provided an invaluable position because it recognizes individuals both as individual agents and as parts of the system. Recall that one of the key features was the recognition that humans "become *aware* of their relationship within the

system and better able to conceptualize it into a model, which could enable them to take responsibility for changing or preserving their urban ecosystem" (Keiny et al., 1999, p. 326). This was prominently featured as the participants in this project increasingly became aware of their own implication within climate change both in terms of their connections and awareness of the more-than-human world and the consequences of wanting to explore those connections in terms of contributing to climate change. Thus, autodriven photo-elicitation became an invaluable means of encouraging the participants to recognize and develop ways of thinking which may lead to ecological thinking. As well, the project moves towards identifying "the existing connections between everyday individual and communitarian practices and the causes and consequences of climate change" (González-Gaudiano & Meira-Cartea, 2010).

According to ecological thinking reality "is the sum total of all of the different conceptions of reality, carried by the participants in a particular context" (Keiny et al., 1999, p. 324). Therefore, the social nature of this project allowed for the participants to move towards a conception of reality that was shared within their context. This reality recognizes the dangers of climate change and the role of social issues like consumption in contributing to it. As a result, ecological thinking provides a pathway to move between individualism and the collective and social implications of causing and responding to climate change. The individual is a separate unit that has perceptions and understandings and takes actions, but that individual is also part of the system which changes in response to the individual and causes subsequent changes within the individual.

Future Research

Based on the results, analysis, and discussion of this research project, as summarized briefly above the following questions have emerged for future research. Answering these questions will continue to drive the fields of education and media communication about climate change towards the goal of contributing to mitigating and responding to climate change. The questions which were identified above are summarized in the following list.

- An important avenue for further research is to address the tendency towards documentary images versus the taking of symbolic images. Is this a response to trying to create objective images because of the connection between climate change and science, a supposedly objective pursuit? Does it relate to the images of climate change that are most commonly seen in the media and publications available and utilized by participants? How do the images and discussion change if participants take one approach over the other? And how do different subcultures address this difference between documentary versus interpretive images?
- Can photographs of neighbourhoods be used to encourage specific housing choices?

- How do individuals who are not as connected to the natural environment through their work and personal interests view the different aspects of the human-nature relationship? What are the differences between outdoor educators and other individuals?
- How and why do people draw connections between climate change and water? What potential does this association hold for encouraging action on climate change?
- In what ways do outdoor educators differ from other populations in their awareness of this relationship and willingness to question the status quo? If they do differ, what factors influence their openness?
- What types of threats to place to individuals and groups associate with climate change?
- What is the role of baseline perception in responding to the threats of climate change to otherwise unfamiliar places?
- How would differences in aspects such as culture affect responses to climate change when identified as a threat to different types of places?
- How do individuals respond to positive versus negative portrayals of place?
- Do individuals from a wide range of backgrounds, experiences, and interests display tendencies towards creating positive or negative images in relation to climate change?
- How can images of positive action and inspiration be utilized to draw individuals and groups towards responding to climate change appropriately?
- How do individuals from different contexts respond to images of extreme weather and/or renewable energies in relation to the perception of risks and willingness to take action regarding climate change?
- In what ways do individuals from different contexts show biases towards either fear appeals or inspirational messages about climate change within the contexts of education and communication?
- In what ways can positive or inspirational messages be used in order to create a positive vision of the future that requires and inspires participation in order to achieve.

Contribution to knowledge.

This study contributed to the existing body of research in multiple ways. First, it recognized that within any geographic population there are inevitably sub-groups which have common experiences, backgrounds, and/or interests that may influence how they perceive issues such as climate change. This study focused on one specific group: outdoor educators. Outdoor educators may be more familiar and more connected with the local environment than some other populations. Although, this particular group of outdoor educators did not focus on connections between small changes they may have observed and climate change, they did

position themselves as key players in connecting people with out-of-doors activities and relationships with nature.

Second, it supports the conclusions of others that it is necessary to connect issues of climate change to people's personal contexts in order to garner support and action to mitigate, and adapt to, climate change. The avenue to do this may be through connections to the thinking that frames individual and group responses to climate change, but more importantly to the natural world in general. As discussed in chapters five and six, participants did not express confidence in drawing conclusions that connected a particular natural event with climate change. Rather than demonstrate that outdoor educators do not recognize climate change, this project showed that they connected climate change with deeper societal issues such as consumption and a lack of connection between humans and nature. Both of these are issues that have been identified as the true causes of climate change, as well as other environmental issues (Kagawa & Selby, 2010; Plumwood, 2001; van Koppen, 2007).

Third, it applied a relatively unused method, autodriven photo-elicitation, to explore individual's thinking about and interpretations of the causes, concerns, symptoms, and responses to climate change. The method showed potential with regards to engaging participants in research, as indicated by the time commitment of the participants and their photographic contributions (10 people contributed close to 200 photographs over five meetings). It also provided a different avenue for participants and researchers to explore their thinking which has the potential to open new lines of thought. Bélanger (2003) stated that "to yield their full value, educational strategies must recognize and integrate the relationship of each subject with the environment into the learning-teaching transactions" (p. 81). Autodriven photo-elicitation facilitates this process. In addition, it also provided a framework for participants to explore their position as both individuals within the system and as reflectors on the system and themselves.

Photography as a Pedagogical Resource Revisited

Within the literature review was a section on photography as a pedagogical resource. It discussed a selection of the relatively small amount of research that has examined learner generated photographs in education. Most of these studies focused on the potential of photography to contribute to learning in language arts (Byrnes & Wasik, 2009; Cappello & Hollingsworth, 2008; Marquez-Zenkov & Harmon, 2007). The other study examined the use of photography to help pre-service teachers recognize the role of culture in their personal lives (Allen & Labbo, 2001). The current study drew on autodriven photo-elicitation to elucidate participants' thinking about climate change. This was similar to how photography was used within the language arts studies. It provided a valuable avenue for exploring people's thinking about climate change in order to identify differences and similarities between individuals and subcultures. Further these images can then be used to establish new directions for

climate change education, or to direct current approaches towards avenues of increased success.

At the same time, drawing on Allen and Labbo (2001), autodriven photo-elicitation demonstrated its potential within this project to help participants recognize aspects within their personal contexts that relate to climate change. An example of this was Julie's (01) image in which she implicated herself and her interest in outdoor opportunities in contributing to climate change.

This project was carried out with a specific group of adults; however, its potential is apparent in terms of working with other groups of adults, children, and youth. For example, one future avenue would be to use this methodology with a group such as Girl Guides to facilitate others in uncovering their own relationship and views of climate change.

Several of the participants in this study indicated that their enthusiasm for the project stemmed in large part from their own interest in taking photographs. As opposed to projects that prioritize forms of expression like writing, these participants found the use of photography less intimidating. They expressed that they felt more confident with the creation of photographs than they did in writing. Given that climate change is already an issue that is associated with experts, and expert opinion, but it is generally non-experts who are involved in the targeted behaviours, lifestyle choices, and political influence, providing a comfortable medium through which to explore climate change will be invaluable in engaging these non-experts.

Further, within educational settings, the inclusion of photography proposes to take climate change out of the exclusive realm of the science classroom and introduce other ways of thinking about and addressing the issues. Recall that the UNFCC (2012) stated that climate change "has consequences for all spheres of existence on our planet…[and] that solutions [will] come from all disciplines and fields of research and development" (Background on the UNFCC: The international response to climate change section, para. 5). Including photography as a means of expression and stimulus for thought and discussion can enable the integration of different disciplines leading to innovative approaches that may be able to include multiple aspects of the issues. This study provides the groundwork for using autodriven photo-elicitation within discussions about climate change. It can be taken up within both pedagogical and research contexts to enable learners and participants to think and discuss climate change within a framework that encourages confidence and collective discussion and action regarding the many issues of climate change.

Concluding Remarks

Climate change is multi-faceted. There needs to be extensive research and action into all of the different facets and into their integration and interdependence. This research has made a significant contribution to addressing

this need. It illustrated how a particular group pictures climate change within their context. It further demonstrated that these pictures differ in significant ways from those that are commonly used in education and communication about climate change. Thus, in addition to contributing to the field of research, this study also illustrated the necessity of further research in this area which examines how culture and subculture impacts perceptions of climate change.

Although much of the focus of responding to climate change is placed on reducing carbon dioxide emissions, there is increasing recognition that there are deeper societal causes that are at the root of issues like climate change. This study indicated that it is possible to explore inconsistencies and thinking related to climate change through an approach like autodriven photo-elicitation. Lorenzoni et al. (2007) stated that "to increase information accessibility and uptake, its provision (in terms of content, format and source) should be tailored to reflect… diversity by building upon, and working alongside, existing beliefs and cultural discourses" (p. 454). However, this study indicated a potentially more significant conclusion. Throughout the study the participants raised concerns regarding the deeper issues mentioned above, consumption and separation between nature and humans. This study showed that there is openness, at least within specific populations, to challenging these normative values.

Rather than focusing on what actions are best, the participants have demonstrated that it is possible to address the thinking that underlies the issues of climate change, and that it can be addressed through a means such as photography. They also reflected on their interests, needs, and desires as individuals within the context of the wider system. This is the most significant finding of the current study because it illustrated that the deeper level of change that is required can be brought to the discussion table. That is the first, and perhaps the most important step, if we are to address the multi-faceted issue of climate change.

References

Adams, S. (2001). Views of the uncertainties of climate change: A comparison of high school students and specialists. *Canadian Journal of Environmental Education, 6*, 58-76.

Aikenhead, G. (1985). Collective decision making in the social context of science. *Science Education, 69*(4), 453-475. doi: 10.1002/sce.3730690403

Albers, P. (2006). Imagining the possibilities in multimodal curriculum design. *English Education, 38*, 75-101.

Alberta's Industrial Heartland Association. (n.d.). Alberta's Industrial Heartland. Retrieved December 29, 2010, from http://www.industrialheartland.com/index.php?option=com_frontpage&Itemid=1

Alerby, E. (2000). A way of visualising children's and young people's thoughts about the environment. *Environmental Education Research, 6*(3), 205-222. doi: 10.1080/13504620050076713

Allen, J., & Labbo, L. (2001). Giving it a second thought: Making culturally engaged teaching culturally engaging. *Language Arts, 79*(1), 40-52.

American Psychological Association. (2009). Psychology and global climate change: Addressing a multi-faceted phenomenon and set of challenges. Washington, DC: American Psychological Association.

Aquality Environmental Consulting Ltd. (2005). State of the North Saskatchewan watershed report 2005: A foundation for collaborative watershed management. Edmonton, Alberta.

Augustine, D. (2008). Paradise lost? Teaching about climate change in the Great Lakes region. Retrieved December 21, 2010, from http://cbewiki.cbe.wisc.edu/paradiselost/index.php?id=2

Babooram, A., & Wang, J. (2007). Recycling in Canada. *EnviroStats, Summer*. Retrieved from http://www.statcan.gc.ca/pub/16-002-x/2007001/article/10174-eng.htm

Bal, M. (2003). Visual essentialism and the object of visual culture. *Journal of Visual Culture, 2*(1), 5-32. doi: 10.1177/14704190300200101

Bal, M., & Bryson, N. (1991). Semiotics and art history. *The Art Bulletin, 73*(2), 174-208.

Bangay, C., & Blum, N. (2010). Education responses to climate change and quality: Two parts of the same agenda? *International Journal of Educational Development, 30*, 359-368. doi: 10.1016/j.ijedudev.2009.11.011

Barthes, R. (1977). The photographic message (S. Heath, Trans.) *Image-music-text* (pp. 15-31). New York: Hill and Wang.

Becker, H. S. (1974). Photography and sociology. *Studies in the Anthropology of Visual Communication, 1*, 3-26.

Beilin, R. (2005). Photo-elicitation and the agricultural landscape: 'Seeing' and 'telling' about farming, community and place. *Visual Studies, 20*(1), 56-68. doi: 10.1080/14725860500064904

Bélanger, P. (2003). Learning environments and environmental education. *New Directions for Adult and Continuing Education, 99*, 79-88.

Bell, R., & Lederman, N. (2003). Understandings of the nature of science and decision making on science and technology based issues. *Science Education, 87*(3), 352-377. doi: 10.1002/sce.10063

Berger, A., Brown, C., Kousky, C., & Zeckhauser, R. (2011). The challenge of degraded environments: How common biases impair effective policy. *Risk Analysis, 31*(9), 1423-1433. doi: 10.1111/j.1539-6924.2010.01477.x

Blake, D. E. (2001). Contextual effects on environmental attitudes and behavior. *Environment and Behavior, 33*(5), 708-725. doi: 10.1177/00139160121973205

Bohm, R. A., Folz, D. H., Kinnaman, T. C., & Podolsky, M. J. (2010). The costs of municipal waste and recycling programs. *Resources, Conservation and Recycling, 54*(11), 864-871. doi: 10.1016/j.resconrec.2010.01.005

Bowers, C. A. (2001a). Addressing the double binds in educating for an ecologically sustainable future. *International Journal of Leadership in Education, 4*(1), 87-96.

Bowers, C. A. (2001b). Challenges in educating for ecologically sustainable communities. *Educational Philosophy & Theory, 33*(2), 257-265.

Boykoff, M. (2007). Flogging a dead norm? Newspaper coverage of anthropogenic climate change in the United States and United Kingdom from 2003 to 2006. *Area, 39*(4), 470-481. doi: 10.1111/j.1475-4762.2007.00769.x

Boykoff, M., & Boykoff, J. M. (2004). Balance as bias: Global warming and the US prestige press. *Global Environmental Change, 14*(2), 125-136. doi: 10.1016/j.gloenvcha.2003.10.001

Braasch, G. (2009). Climate change in the United States. In G. Schmidt & J. Wolfe (Eds.), *Climate change: Picturing the science* (pp. 35-44). New York: W. W. Norton & Company, Inc.

Braasch, G. (n.d.). World view of global warming: The photographic documentation of climate change. Retrieved December 3, 2010, from http://www.worldviewofglobalwarming.org/

Braund, M., & Reiss, M. (2006). Validity and worth in the science curriculum: Learning school science outside the laboratory. *The Curriculum Journal, 17*(3), 213-228.

Brien, D. (2009). Climate change and the contemporary evolution of foodways. *M/C Journal, 12*(4). Retrieved from http://journal.media-culture.org.au/index.php/mcjournal/article/view/177

British Council Canada. (n.d.). Teaching resources: Cape Farewell youth expedition 2008. Retrieved November 29, 2010, from http://www.britishcouncil.org/canada-climate-change-science-cape-farewell-teaching-resources.htm

Britton, S. (1991). Tourism, capital, and place: Towards a critical geography of tourism. *Environment and Planning D: Society and Space, 9*(4), 451-478.

Brönnimann, S. (2002). Picturing climate change. *Climate Research, 22*, 87-95.

Brown, C. S. (2007). An introduction to the problem of boundaries in ecological theory and practice. In C. S. Brown & T. Toadvine (Eds.), *Nature's edge: Boundary explorations in ecological theory and practice* (pp. ix-xvi). Albany, NY: State University of New York Press.

Brumfiel, G. (2006). Academy affirms hockey-stick graph. *Nature, 441*(7097), 1032-1033. doi: 10.1038/4411032a

Buijs, A. E., Elands, B. H. M., & Langers, F. (2009). No wilderness for immigrants: Cultural differences in images of nature and landscape preferences. *Landscape and Urban Planning, 91*(3), 113-123. doi: 10.1016/j.landurbplan.2008.12.003

Byrnes, J., & Wasik, B. (2009). Picture this: Using photography as a learning tool in early childhood classrooms. *Childhood Education, 84*(4), 243-248.

Cammaer, G. (2009). Edward Burtynsky's *Manufactured Landscapes*: The ethics and aesthetics of creating moving still images and stilling moving images of ecological disasters. *Environmental Communication: A Journal of Nature and Culture, 3*(1), 121-130. doi: 10.1080/17524030802700599

Campbell, C. (2008). Residual landscapes and the everyday: An interview with Edward Burtynsky. *Space and Culture, 11*, 39-50. doi: 10.1177/1206331207310703

Canadian Birkebeiner Society. (2010). What if the Canadian Birkie is cancelled? Retrieved April 6, 2012, from http://www.canadianbirkie.com/uploads/files/Birkie%20cancellation%20policy%20jan%202011.pdf

Cappello, M., & Hollingsworth, S. (2008). Literacy inquiry and pedagogy through a photographic lens. *Language Arts, 85*(6), 442-449.

Carroll, A. L., Taylor, S. W., Regniere, J., & Safranyik, L. (2003). Effect of climate change on range expansion by the mountain pine beetle in British Columbia. *The bark beetles, fuels, and fire bibliography*. (Paper 195). http://digitalcommons.usu.edu/barkbeetles/195

Center for Biology Education of the University of Wisconsin System. (2009). Paradise lost? Retrieved November 30, 2010, from http://cbe.wisc.edu/K12/paradiselost.html

Center for Climate Change Communication. (2012). Center for climate change communication. Retrieved June 23, 2012, from http://www.climatechangecommunication.org/

Centre for Bhutan Studies. (2012). GNH index. Retrieved June 24, 2012, from http://www.grossnationalhappiness.com/articles/

Chaskin, R. J. (1997). Perspectives on neighborhood and community: A review of the literature. *Social Service Review, 71*(4), 521-547.

Chawla, L. (1998a). Research methods to investigate significant life experiences: Review and recommendations. *Environmental Education Research, 4*(4), 383-397.

Chawla, L. (1998b). Signficant life experiences revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research, 4*(4), 369-382. doi: 10.1080/1350462980040402

Chawla, L., (with Salvadori, I.). (1999). Children for cities and cities for children: Learning to know and care about urban ecosystems. In A. Berkowitz, C.

Nilon & K. Hollweg (Eds.), *Understanding urban ecosystems: A new frontier for science and education* (pp. 294-314). New York: Springer-Verlag New York, Inc.

Chawla, L., & Cushing, D. (2007). Education for strategic environmental behavior. *Environmental Education Research, 13*(4), 437-452.

City of Edmonton. (2010). About CO_2RE. Retrieved November 3, 2010, from http://www.edmonton.ca/environmental/programs/About_CO2RE.aspx

City of Edmonton. (2011, June 20). City of Edmonton dealing with heavy rainfall volume. Retrieved March 31, 2012, from http://www.edmonton.ca/city_government/news/city-of-edmonton-dealing-with-heavy-rainfall-volume.aspx

City of Edmonton. (2012a). The way we green: The City of Edmonton's environmental strategic plan. Edmonton: City of Edmonton.

City of Edmonton. (2012b). Whitemud park. Retrieved March 30, 2012, from http://www.edmonton.ca/attractions_recreation/parks_rivervalley/whitemud-park.aspx

Clark-Ibáñez, M. (2007). Inner-city children in sharper focus: Sociology of childhood and photo elicitation interviews. In G. Stanczak (Ed.), *Visual research methods: Image, society, and representation* (pp. 167-196). Thousand Oaks, CA: Sage Publications, Inc.

Clark, C. (1999). The autodriven interview: A photographic viewfinder into children's experience. *Visual Sociology, 14*(1), 39-50. doi: 10.1080/14725869908583801

Clark, T. (2010). Some climate change ironies: Deconstruction, environmental politics, and the closure of ecocriticism. *Oxford literary review, 32*(1), 131-149.

Clayton, S. (2007). Domesticated nature: Motivations for gardening and perceptions of environmental impact. *Journal of Environmental Psychology, 27*(3), 215-224. doi: 10.1016/j.jenvp.2007.06.001

Cloke, P., & Jones, O. (2001). Dwelling, place, and landscape: An orchard in Somerset. *Environment and Planning A, 33*(4), 649 - 666. doi: 10.1068/a3383

Colabianchi, N., Dowda, M., Pfeiffer, K. A., Porter, D. E., Almeida, M. J. C., & Pate, R. R. (2007). Towards an understanding of salient neighborhood boundaries: Adolescent reports of an easy walking distance and

convenient driving distance. *International Journal of Behavioral Nutrition and Physical Activity, 4*(66). Retrieved from http://www.ijbnpa.org/content/4/1/66 doi:10.1186/1479-5868-4-66

Collier, J., & Collier, M. (1986). *Visual anthropology: Photography as a research method*. Albuquerque, NM: University of New Mexico Press.

Collins, S. (2004). Ecology and ethics in participatory collaborative action research: An argument for the authentic participation of students in eduational research. *Educational Action Research, 12*(3), 347-362. doi: 10.1080/09650790400200255

Colucci-Gray, L., Camino, E., Barbiero, G., & Gray, D. (2006). From scientific literacy to sustainability literacy: An ecological framework for education. *Science Education, 90*, 227-252. doi: 10.1002/sce.20109

Cosgrove, D. (1985). Prospect, perspective and the evolution of the landscape idea. *Transactions of the Institute of British Geographers, 10*(1), 45-62.

Cosgrove, D. (1994). Contested global visions: One-world, whole-Earth, and the Apollo space photographs. *Annals of the Association of American Geographers, 84*(2), 270-294.

Coulton, C., Korbin, J., Chan, T., & Su, M. (2001). Mapping residents' perceptions of neighborhood boundaries: A methodological note. *American Journal of Community Psychology, 29*(2), 371-383. doi: 10.1023/a:1010303419034

Daniels, S., & Endfield, G. H. (2009). Narratives of climate change: Introduction. *Journal of Historical Geography, 35*(2), 215-222. doi: 10.1016/j.jhg.2008.09.005

Davis, B., & Sumara, D. (1997). Cognition, complexity, and teacher education. *Harvard Educational Review, 67*, 105-125.

Dei, G. S. (2010). The environment, climate change, ecological sustainability, and antiracist education. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 89-105). New York: Routledge.

DeLind, L. (2011). Are local food and the local food movement taking us where we want to go? Or are we hitching our wagons to the wrong stars? *Agriculture and Human Values, 28*(2), 273–283. doi: 10.1007/s10460-010-9263-0

Dillon, J., & Scott, W. (2002). Perspectives on environmental education - related research in science education. *International Journal of Science Education, 24*(11), 1111-1117.

Doyle, J. (2007). Picturing the clima(c)tic: Greenpeace and the representational politics of climate change communication. *Science as Culture, 16*(2), 129-150. doi: 10.1080/09505430701368938

Eco, U. (1976). *A theory of semiotics*. Bloomington, IN: Indiana University Press.

Emmerich, R. (Director/Producer), & Gordon, M. (Producer). (2004). The day after tomorrow [Motion picture]. United States: 20th Century Fox.

Environment Canada. (2007). *Climate normals 1971 to 2000, Edmonton, AB*. Ottawa, ON: Government of Canada, Retrieved from http://climate.weatheroffice.gc.ca/climate_normals/results_e.html?stnID=1867&lang=e&dCode=1&province=ALTA&provBut=&month1=0&month2=12.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*(8), 709-724. doi: 10.1037/0003-066X.49.8.709

Eshach, H. (2007). Bridging in-school and out-of-school learning: Formal, non-formal, and informal education. *Journal of Science Education and Technology, 16*(2), 171-190. doi: 10.1007/s10956-006-9027-1

Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row Peterson.

Fischhoff, B. (2007). Non-persuasive communication about matters of greatest urgency: Climate change. *Environmental Science & Technology, 41*(21), 7204-7208. doi: 10.1021/es0726411

Ford, P. M. (1986). Outdoor education: Definition and philosophy. (ED267941). Retrieved from ERIC Clearinghouse on Rural Education and Small Schools.

Frantz, C., & Mayer, F. S. (2009). The emergency of climate change: Why are we failing to take action? *Analyses of Social Issues and Public Policy, 9*(1), 205-222. doi: 10.1111/j.1530-2415.2009.01180.x

Freeman, C., Dickinson, K. J. M., Porter, S., & van Heezik, Y. (2012). "My garden is an expression of me": Exploring householders' relationships with their gardens. *Journal of Environmental Psychology, 32*(2), 135-143. doi: 10.1016/j.jenvp.2012.01.005

Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures, 25*(7), 739-755. doi: 10.1016/0016-3287(93)90022-l

Funtowicz, S. O., & Ravetz, J. R. (2003). Post-normal science. *Online Encyclopedia of Ecological Economics*: International Society for Ecological Economics.

Gayford, C. (2002). Controversial environmental issues: A case study for the professional development of science teachers. *International Journal of Science Education, 24*(11), 1191-1200. doi: 10.1080/09500690210134866

Giblett, R. (2009). Terrifying prospects and resources of hope: Minescapes, timescapes and the aesthetics of the future. *Continuum, 23*(6), 781-789. doi: 10.1080/1030431090298528

Giesbrecht, S. (2008). The 100-mile curriculum: Place as an educative construct. *Education Canada, 28*, 26-29.

Glasser, H. (2007). Minding the gap: The role of social learning in linking our stated desire for a more sustainable world to our everyday actions and policies. In A. Wals (Ed.), *Social learning towards a sustainable world* (pp. 35-61). Wageningen, The Netherlands: Wageningen Academic Publishers.

Goldstein, B. (2007). All photos lie: Images as data. In G. Stanczak (Ed.), *Visual research methods: Image, society, and representation* (pp. 61-81). Thousand Oaks, CA: Sage Publications, Inc.

González-Gaudiano, E., & Meira-Cartea, P. (2010). Climate change education and communication: A critical perspective on obstacles and resistances. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 13-34). New York: Routledge.

Gough, A. (2002). Mutualism: A different agenda for environmental and science education. *International Journal of Science Education, 24*(11), 1201-1215. doi: 10.1080/09500690210136611

Gough, N. (2002). Thinking/acting locally/globally: Western science and environmental education in a global knowledge economy. *International Journal of Science Education, 24*(11), 1217-1237. doi: 10.1080/09500690210136620

Government of Alberta. (2008). *Alberta's 2008 climate change strategy: Responsibility/leadership/action*. Edmonton: Government of Alberta Retrieved from http://environment.gov.ab.ca/info/library/7894.pdf.

Government of Alberta. (2011). *Carbon capture and storage*. Edmonton: Government of Alberta Retrieved from http://www.energy.alberta.ca/CCS/pdfs/FactSheet_CCS.pdf.

Government of Alberta. (n.d.). Cadomin cave temporarily closes. Retrieved March 15, 2012, from http://tpr.alberta.ca/newsroom/cadomin-cave.aspx

Greenpeace International. (2007). 600 strip naked on glacier in global warming protest. Retrieved December 10, 2010, from http://www.greenpeace.org/international/en/news/features/naked-glacier-tunick-08182007/

Greenwood, D., & Levin, M. (2007). *Introduction to action research: Social research for social change* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.

Hall, C., & Higham, J. (2005). Introduction: Tourism, recreation and climate change. In C. Hall & J. Higham (Eds.), *Tourism, recreation and climate change* (pp. 3-28). North York, ON: Channel View Publications.

Hall, C., James, M., & Baird, T. (2011). Forests and trees as charismatic mega-flora: Implications for heritage tourism and conservation. *Journal of Heritage Tourism, 6*(4), 309-323. doi: 10.1080/1743873x.2011.620116

Hall, C., & Saarinen, J. (2010). Tourism and change in polar regions: Introduction - definitions, locations, places and dimensions. In C. Hall & J. Saarinen (Eds.), *Tourism and change in polar regions: Climate, environment and experience* (pp. 1-41). New York: Routledge.

Harrison, C. (2003). Visual social semiotics: Understanding how still images make meaning. *Technical Communication, 50*(1), 46-60.

Harper, D. (2000). Reimagining visual methods: Galileo to Neuromancer. In N. Denzin & Y. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 717-732). Thousand Oaks, CA: Sage Publication, Inc.

Harper, D. (2002). Talking about pictures: A case for photo-elicitation. *Visual Studies, 17*(1), 13-26. doi: 10.1080/1472586022013734 5

Harries-Jones, P. (1995). *A recursive vision: Ecological understanding and Gregory Bateson*. Toronto, ON: University of Toronto Press.

Hart, P. (2002). Environment in the science curriculum: The politics of change in the pan-Canadian science curriculum development process. *International Journal of Science Education, 24*(11), 1239-1254.

Heisley, D. D., & Levy, S. J. (1991). Autodriving: A photoelicitation technique. *Journal of Consumer Research, 18*(3), 257-272.

Hellmann, J. J., Byers, J. E., Bierwagen, B. G., & Dukes, J. S. (2008). Five potential consequences of climate change for invasive species. *Conservation Biology, 22*(3), 534-543. doi: 10.1111/j.1523-1739.2008.00951.x

Herzog, L. (2004, October 14). A legacy of vision, *The Edmonton Real Estate Weekly*. Retrieved from http://www.rewedmonton.ca/content_view_rew?CONTENT_ID=823

Hess, J. J., Malilay, J. N., & Parkinson, A. J. (2008). Climate change: The importance of place. *American Journal of Preventive Medicine, 35*(5), 468-478. doi: 10.1016/j.amepre.2008.08.024

Hirsch, M. (1999). Projected memory: Holocaust photographs in personal and public fantasy. In M. Bal, J. V. Crewe & L. Spitzer (Eds.), *Acts of memory: Cultural recall in the present* (pp. 3-23). Hanover, NH: Dartmouth College.

Høyer, K., & Hall, C. (2005). Sustainable mobility and sustainable tourism. In C. Hall & J. Higham (Eds.), *Tourism, recreation and climate change* (pp. 260-272). North York, ON: Channel View Publications.

Hulick, D. (1992). Photography: Modernism's stepchild. *Journal of Aesthetic Education, 26*, 75-81.

Hulme, M. (2009). *Why we disagree about climate change: Understanding controversy, inaction and opportunity*. Cambridge: Cambridge University Press.

Hutchinson, F. (1997). Our children's futures: Are there lessons for environmental educators? *Environmental Education Research, 3*(2), 189-201.

ICLEI Local Governments for Sustainability. (2006). Local action for biodiversity (LAB): Summary document. Bonn, Germany.

Innis, R. (1985). Introduction. In R. Innis (Ed.), *Semiotics: An introductory anthology* (pp. vii-xvi). Bloomington, IN: Indiana University Press.

Intergovernmental Panel on Climate Change. (2007). Climate change 2007: Synthesis report. Geneva, Switzerland: Intergovernmental Panel on Climate Change.

Kagawa, F. (2010). Learning in emergencies: Defense of humanity for a livable world. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 106-124). New York: Routledge.

Kagawa, F., & Selby, D. (Eds.). (2010). *Education and climate change: Living and learning in interesting times*. New York: Routledge.

Kaplan, R. (2001). The nature of the view from home: Psychological benefits. *Environment and Behavior, 33*(4), 507-542. doi: 10.1177/00139160121973115

Kaplan, S. (2000). Human nature and environmentally responsible behavior. *Journal of Social Issues, 56*(3), 491-508.

Kates, R. W. (2000). Population and consumption: What we know, what we need to know. *Environment: Science and Policy for Sustainable Development, 42*(3), 10-19. doi: 10.1080/00139150009604872

Keiny, S. (1991). System thinking as a prerequisite for environmental problem solving. In S. Keiny & U. Zoller (Eds.), *Conceptual issues in environmental education* (pp. 171-184). New York: Peter Lang Publishing Inc.

Keiny, S. (2002). *Ecological thinking: A new approach to educational change*. Lanham, MD: University Press of America.

Keiny, S., Shachak, M., & Avriel-Avni, N. (1999). "Ecological thinking" as a tool for understanding urban ecosystems: A model from Israel. In A. Berkowitz, C. Nilon & K. Hollweg (Eds.), *Understanding urban ecosystems: A new frontier for science and education* (pp. 315-327). New York: Springer-Verlag New York, Inc.

Kim, J., & Kaplan, R. (2004). Physical and psychological factors in sense of community. *Environment and Behavior, 36*(3), 313-340. doi: 10.1177/0013916503260236

Kirk, J. (1968). *Trends in outdoor education*. Paper presented at the International Congress for Health, Physical Education, and Recreation, Dublin, Ireland.

Kolb, B. (2008). Involving, sharing, analysing—potential of the participatory photo interview. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research, 9*(3). Retrieved from http://www.qualitative-research.net/index.php/fqs/article/view/1155/2574

Kolbert, E. (2009). Reporting on climate change. In G. Schmidt & J. Wolfe (Eds.), *Climate change: Picturing the science* (pp. 70-71). New York: W. W. Norton & Company, Inc.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research, 8*(3), 239-260. doi: 10.1080/1350462022014540 1

Kolstø, S. D. (2001). Scientific literacy for citizenship: Tools for dealing with the science dimensions of controversial socioscientific issues. *Science Education, 85*(3), 291-310.

Kress, G., & van Leeuwen, T. (2006). *Reading images: The grammar of visual design*. New York: Routledge.

Krohne, D. (1998). *General ecology*. Belmont, CA: Wasworth Publishing.

Kuo, F. E., & Sullivan, W. C. (2001). Environment and crime in the inner city. *Environment and Behavior, 33*(3), 343-367. doi: 10.1177/0013916501333002

Lawless, K. A., & Brown, S. W. (1997). Multimedia learning environments: Issues of learner control and navigation. *Instructional Science, 25*(2), 117-131. doi: 10.1023/a:1002919531780

Lefebvre, M. (2007). The art of pointing. On Peirce, indexicality, and photographic images. In J. Elkins (Ed.), *Photography theory* (pp. 220-244). New York: Routledge.

Leiserowitz, A. A. (2005). American risk perceptions: Is climate change dangerous? *Risk Analysis, 25*(6), 1433-1442. doi: 10.1111/j.1540-6261.2005.00690.x

Leiserowitz, A. A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change, 77*, 45-72. doi: 10.1007/s10584-006-9059-9

Lemmen, D. S., Warren, F. J., & Lacroix, J. (2008). From impacts to adaptation: Canada in a changing climate 2007. In D. S. Lemmen, F. J. Warren, J. Lacroix & E. Bush (Eds.), (pp. 1-20). Ottawa, ON: Government of Canada.

Leshner, G., Bolls, P., & Wise, K. (2011). Motivated processing of fear appeal and disgust images in televised anti-tobacco ads. *Journal of Media Psychology, 23*(2), 77-89. doi: 10.1027/1864-1105/a000037

Lewontin, R. (1991). *Biology as ideology: The doctrine of DNA*. Toronto, ON: House of Anansi Press Ltd.

Lind, C. (2008). Knowledge development with adolescents in a PAR process. *Educational Action Research, 16*(2), 221-233.

Litt, J. S., Soobader, M. J., Turbin, M. S., Hale, J. W., Buchenau, M., & Marshall, J. A. (2011). The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. *American Journal Of Public Health, 101*(8), 1466-1473. doi: 10.2105/AJPH.2010.300111

Liverman, D. M. (2009). Conventions of climate change: Constructions of danger and the dispossession of the atmosphere. *Journal of Historical Geography, 35*(2), 279-296. doi: 10.1016/j.jhg.2008.08.008

Lorenzoni, I., Jones, M., & Turnpenny, J. (2006). Climate change, human genetics and post-normality in the UK. *Futures, 39*, 65-82. doi: 10.1016/j.futures.2006.03.005

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change, 17*, 445-459. doi: 10.1016/j.gloenvcha.2007.01.004

Lorenzoni, I., & Pidgeon, N. (2006). Public views on climate change: European and USA perspectives. *Climatic Change, 77*, 73-95. doi: 10.1007/s10584-006-9072-z

Lorimer, J. (2007). Nonhuman charisma. *Environment and Planning D: Society and Space*, *25*(5), 911-932.

Lotz-Sisitka, H. (2010). Climate injustice: How should education respond? In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 71-88). New York: Routledge.

Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books.

Lowe, T., Brown, K., Dessai, S., de França Doria, M., Haynes, K., & Vincent, K. (2006). Does tomorrow ever come? Disaster narrative and public perceptions of climate change. *Public Understanding of Science, 15*(4), 435-457. doi: 10.1177/0963662506063796

Lykes, M. B. (1997). Activist participatory research among the Maya of Guatemala: Constructing meanings from situated knowledge. *Journal of Social Issues, 53*(4), 725-746.

Manzo, K. (2010a). Beyond polar bears? Re-envisioning climate change. *Meteorological Applications, 17*, 196-208. doi: 10.1002/met.193

Manzo, K. (2010b). Imaging vulnerability: The iconography of climate change. *Area, 42*(1), 96-107. doi: 10.1111/j.1475-4762.2009.00887.x.

Maran, T. (2007). Towards an integrated methodology of ecosemiotics: The concept of nature-text. *Sign Systems Studies, 35*(1/2), 269-294.

Marquez-Zenkov, K., & Harmon, J. (2007). Seeing english in the city: Using photography to understand students' literacy relationships. *English Journal, 96*(6), 24-30.

Marshall, M. (1996). Sampling for qualitative research. *Family Practice, 13*(6), 522-525.

McCaffrey, M. S., & Buhr, S. M. (2008). Clarifying climate confusion: Addressing systemic holes, cognitive gaps, and misconceptions through climate literacy. *Physical Geography, 29*(6), 512-528. doi: 10.2747/0272-3646.29.6.512

McCracken, G. D. (1990). *Culture and consumption: New approaches to the symbolic character of consumer goods and activities*. Bloomington, IN: Indiana University Press.

McKenzie-Mohr, D., & Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing*. Gabriola Island, BC: New Society Publishers.

Morgan, C. (2006). What does social semiotics have to offer mathematics education research? *Educational Studies in Mathematics, 61*(1), 219-245. doi: 10.1007/s10649-006-5477-x

Munro, T. (2006). *Where to live and what to learn when you get there: The influence of greenspace on housing decisions and the potential for environmental education programs.* (Master's thesis). Royal Roads University, Victoria, BC, Canada. ProQuest Dissertations & Theses: Full Text database. (AAT MR30187)

Nairn, A. (2009). Consumer kids - the influence of the commercial world on our children. *Education Review, 22*(1), 54-60.

Neblette, C. (1940). Photography as a extra-curriculum activity. *The School Review, 48*(10), 764-770.

Nicholson-Cole, S. (2005). Representing climate change futures: A critique on the use of images for visual communication. *Computers, Environment and Urban Systems, 29*, 255-273. doi: 10.1016/j.compenvurbsys.2004.05.002

O'Brien, C. (2005). *Planning for sustainable happiness: Harmonizing our internal and external landscapes.* Paper presented at the Second International Conference on Gross National Happiness, Halifax, Canada.

O'Brien, K., Eriksen, S., Nygaard, L. P., & Schjolden, A. N. E. (2007). Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy, 7*(1), 73-88. doi: 10.1080/14693062.2007.9685639

O'Neill, S. (2008). *An iconic approach to representing climate change.* (Unpublished doctoral dissertation). University of East Anglia, Norwich, UK. Retrieved from http://www.cru.uea.ac.uk/cru/pubs/thesis/2008-oneill/thesis.pdf

O'Neill, S., & Nicholson-Cole, S. (2009). "Fear won't do it": Promoting positive engagement with climate change through visual and iconic representations. *Science Communication, 30*(3), 355-379. doi: 10.1177/1075547008329201

Ockwell, D., Whitmarsh, L., & O'Neill, S. (2009). Reorientating climate change communication for effective mitigation: Forcing people to be green or fostering grass-roots engagement? *Science Communication, 30*, 305-327.

Oelschlaeger, M. (2007). Boundaries and Darwin: Bridging the great divide. In C. S. Brown & T. Toadvine (Eds.), *Nature's edge: Boundary explorations in ecological theory and practice* (pp. 3-17). Albany, NY: State University of New York Press.

Oreskes, N. (2004). Beyond the ivory tower: The scientific consensus on climate change. *Science, 306*(5702), 1686.

Papert, S. (1993). *The children's machine: Rethinking school in the age of the computer*. New York: Basic Books.

Patin, T. (1999). Exhibitions and empire: National parks and the performance of manifest destiny. *Journal of American Culture, 22*(1), 41-60. doi: 10.1111/j.1542-734X.1999.00041.x

Pauli, L. (2003). Seeing the big picture. In L. Pauli (Ed.), *Manufactured Landscapes: The photographs of Edward Burtynsky* (pp. 10-33). Ottawa, ON: National Gallery of Canada in association with Yale University Press.

Peirce, C. S. (1932). Elements of logic Vol. II C. Hartshorne & P. Weiss (Eds.), *Collected Papers of Charles Sanders Peirce.* Retrieved from http://pm.nlx.com/xtf/view?docId=peirce/peirce.02.xml;chunk.id=div.peirce.cp2.11;toc.depth=1;toc.id=div.peirce.cp2.11;brand=default;query=What concern have we with the universe#What concern have we with the universe

Peirce, C. S. (1991). *Peirce on signs: Writings on semiotic by Charles Sanders Peirce* (J. Hoopes, Ed.). Chapel Hill, NC: The University of North Carolina Press.

Plumwood, V. (2001). *Environmental culture: The ecological crisis of reason*. New York: Routledge.

Porter, M. E., & Kramer, M. R. (2006). Strategy & society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review, 84*(12), 78-92.

Primack, R. B., Miller-Rushing, A. J., Primack, D., & Mukunda, S. (2007). Using photographs to show the effects of climate change on flowering times. *Arnoldia, 65*(1), 3-9.

Pruneau, D., Gravel, H., Bourque, W., & Langis, J. (2003). Experimentation with a socio-constructivist process for climate change education. *Environmental Education Research, 9*(4), 429-446. doi: 10.1080/1350462032000126096

Public Health Association of BC. (2011). What is farm to school? Retrieved March 17, 2012, from http://www.phabc.org/modules.php?name=Farmtoschool&pa=showpage&pid=40

Read, P. (1996). *Returning to nothing: The meaning of lost places*. Cambridge: Cambridge University Press.

Resnick, M. (2003). Thinking like a tree (and other forms of ecological thinking). *International Journal of Computers for Mathematical Learning, 8*, 43-62.

Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research, 7*(3), 207-320. doi: 10.1080/1350462012006523 0

River Valley Programs. (2011). *River Valley Programs mission statement*. City of Edmonton. Edmonton.

Rogers, A. G. (2000). When methods matter: Qualitative research issues in psychology. *Harvard Educational Review, 70*(1), 75-85.

Rose, G. (2007). *Visual methodologies: An introduction to the interpretation of visual materials* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Rosenblum, N. (1997). *A world history of photography* (3rd ed.). New York: Abbeville Press.

Rosenzweig, C., Karoly, D., Vicarelli, M., Neofotis, P., Wu, Q., Casassa, G., . . . Imeson, A. (2008). Attributing physical and biological impacts to anthropogenic climate change. *Nature, 453*(7193), 353-358. doi: 10.1038/nature06937

Rossman, G. B., & Rallis, S. F. (2003). *Learning in the field: An introduction to qualitative research*. Thousand Oaks, CA: Sage Publications.

Schmidt, G., & Wolfe, J. (2009). *Climate change: Picturing the science*. New York: W.W. Norton & Company, Inc.

Schwartz, D. (1989). Visual ethnography: Using photography in qualitative research. *Qualitative Sociology, 12*(2), 119-154. doi: 10.1007/bf00988995

Scott, D. (2011). *Climate change and a healthy, sustainable environment: An opportunity for recreation and parks leadership?* Paper presented at the 2011 National Recreation Summit, Lake Louise, Alberta. http://lin.ca/resource-details/19982

Scott, D., Wall, G., & McBoyle, G. (2005). Climate change and tourism and recreation in North America: Exploring regional risks and opportunities. In C. Hall & J. Higham (Eds.), *Tourism, recreation and climate change* (pp. 115-129). North York, ON: Channel View Publications.

Scott, W. (2002). Editorial: Minds, gaps, models, and behaviours. *Environmental Education Research, 8*(3), 237-238.

Selby, D. (2000). A darker shade of green: The importance of ecological thinking in global education and school reform. *Theory into Practice, 39*, 88-96.

Selby, D. (2010). 'Go, go, go, said the bird': Sustainability-related education in interesting times. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. 35-54). New York: Routledge.

Shanahan, M. (2007). Talking about a revolution: Climate change and the media. COP_{13} Briefing and opinion papers. London: IIED.

Shapiro, B. (2010). Research resources to study the environmental messages of school learning environments. In D. Berlin & A. White (Eds.), *Promising practices to meet global challenges in science and mathematics education* (pp. 51-59). Columbus: Ohio State University.

Sheets, V. L., & Manzer, C. D. (1991). Affect, cognition, and urban vegetation: Some effects of adding trees along city streets. *Environment and Behavior, 23*(3), 285-304. doi: 10.1177/0013916591233002

Shepardson, D., Niyogi, D., Choi, S., & Charusombat, U. (2009). Seventh grade students`conceptions of global warming and climate change. *Environmental Education Research, 15*(5), 549-570. doi: 10.1080/13504620903114592

Siegel, M. (1995). More than words: The generative power of transmediation for learning. *Canadian Journal of Education, 20*(4), 455-475.

Siegel, M. (2006). Rereading the signs: Multimodal transformations in the field of literacy education. *Language Arts, 84*(1), 65-77.

Silverman, D., & Marvasti, A. (2008). *Doing qualitative research: A comprehensive guide*. Thousand Oaks, CA: Sage Publications.

Slovic, P. (2007). "If I look at the mass I will never act": Psychic numbing and genocide. *Judgement and Decision Making, 2*(2), 79-95.

Sobel, A. (2009). Going to extremes. In G. Schmidt & J. Wolfe (Eds.), *Climate change: Picturing the science* (pp. 95-111). New York: W. W. Norton & Company.

Sorrell, S. (2007). The rebound effect: An assessment of the evidence for economy-wide energy savings from improved energy efficiency. Retrieved March 31, 2012, from http://www.blakealcott.org/pdf/Rebound_Report_UKERC.pdf

Srivatsan, R. (1991). Photography and society: Icon building in action. *Economic and Political Weekly, 26*(11/12), 771-788.

Stables, A. (2001a). Language and meaning in environmental education: An overview. *Environmental Education Research, 7*(2), 121-128. doi: 10.1080/13504620120043135

Stables, A. (2001b). Who drew the sky? Conflicting assumptions in environmental education. *Educational Philosophy and Theory, 33*(2), 245-256. doi: 10.1080/00131850120040591

Stake, R. E. (1978). The case study method in social inquiry. *Educational Researcher, 7*(2), 5-8.

Stake, R. E. (2000). Qualitative case studies. In N. Denzin & Y. Lincoln (Eds.), *Strategies of qualitative inquiry* (3rd ed., pp. 75-118). Thousand Oaks, CA: Sage.

Stanczak, G. (2007). Introduction: Images, methodologies, and generating social knowledge. In G. Stanczak (Ed.), *Visual research methods: Image, society, and representation* (pp. 1-21). Thousand Oaks, CA: Sage Publications, Inc.

Stedman, R. C. (2002). Toward a social psychology of place: Predicting behavior from place-based cognitions, attitude, and identity. *Environment and Behavior, 34*(5), 561-581. doi: 10.1177/0013916502034005001

Stedman, R. C. (2003). Is it really just a social construction?: The contribution of the physical environment to sense of place. *Society & Natural Resources, 16*(8), 671-685. doi: 10.1080/08941920309189

Sumara, D., & Davis, B. (1997). Enactivist theory and community learning: Toward a complexified understanding of action research. *Educational Action Research, 5*(3), 403-422.

Sumner, J. (2003). Environmental adult education and community sustainability. *New Directions for Adult and Continuing Education, 99*, 39-45.

Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2001). Coping with ADD: The surprising connection to green play settings. *Environment and Behavior, 33*(1), 54-77. doi: 10.1177/00139160121972864

The Office of Natural Areas. (2007). Natural connections: Strategic plan 2007. Edmonton: City of Edmonton.

Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behavior. *Journal of Environmental Psychology, 24*(1), 93-103. doi: 10.1016/s0272-4944(03)00039-2

Thomas, C., Cameron, A., Green, R. E., Bakkenes, M., Beaumont, L. J., Collingham, Y. C., . . . Williams, S. E. (2004). Extinction risk from climate change. *Nature, 427*(6970), 145-148. doi: 10.1038/nature02121

Thomas, G. (2011). The case: Generalisation, theory and phronesis in case study. *Oxford Review of Education, 37*(1), 21-35. doi: 10.1080/03054985.2010.521622

Tutu, D. (2010). Foreword. In F. Kagawa & D. Selby (Eds.), *Education and climate change: Living and learning in interesting times* (pp. xv-xvi). New York: Routledge.

Ulrich, W. (1993). Some difficulties with ecological thinking, considered from a critical systems perspective: A plea for critical holism. *Systems Practice, 6*(6), 583-611.

United Nations. (1992). United Nations framework convention on climate change. Bonn.

United Nations Framework Convention on Climate Change. (2012). Background on the UNFCCC: The international response to climate change. Retrieved May 25, 2012, from http://unfccc.int/essential_background/items/6031.php

Vadeboncoeur, J. (2006). Engaging young people: Learning in informal contexts. *Review of Research in Education, 30,* 239-278.

van Koppen, C. S. A. (2007). Social learning for sustainability in a consumerist society. In A. Wals (Ed.), *Social learning towards a sustainable world* (pp. 369-382). Wageningen, The Netherlands: Wageningen Academic Publishers.

van Leeuwen, T. (2004). *Introducing social semiotics*. Florence, KY: Taylor & Francis.

Verissimo, D., MacMillan, D. C., & Smith, R. J. (2011). Toward a systematic approach for identifying conservation flagships. *Conservation Letters, 4*(1), 1-8. doi: 10.1111/j.1755-263X.2010.00151.x

Vileisis, A. (2008). *Kitchen literacy: How we lost knowledge of where food comes from and why we need to get it back*. Washington, DC: Island Press.

Walpole, M. J., & Leader-Williams, N. (2002). Tourism and flagship species in conservation. *Biodiversity and Conservation, 11*, 543–547. doi: 10.1023/A:1014864708777

Wals, A., & van der Leij, T. (2007). Introduction. In A. Wals (Ed.), *Social learning towards a sustainable world* (pp. 17-32). Wageningen, The Netherlands: Wageningen Academic Publishers.

Wang, C., & Burris, M. A. (1997). Photovoice: Concept, methodology, and use for participatory needs assessment. *Health Education & Behavior, 24*(3), 369-387. doi: 10.1177/109019819702400309

Weber, E. U., Blais, A.-R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making, 15*(4), 263-290. doi: 10.1002/bdm.414

Weber, E. U., Shafir, S., & Blais, A.-R. (2004). Predicting risk sensitivity in humans and lower animals: Risk as variance or coefficient of variation. *Psychological Review, 111*(2), 430–445. doi: 10.1037/0033-295X.111.2.430

Weintraub, B. (1995). Defining a fulfilling and relevant environmental education. *Urban Education, 30*(3), 337-366.

Weston, A. (1996). Deschooling environmental education. *Canadian Journal of Environmental Education, 1*, 35-46.

Weston, A. (2007). *How to re-imagine the world: A pocket guide for practical visionaries*. Gabriola Island, BC: New Society Publishers.

Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology, 29*(1), 13-23. doi: 10.1016/j.jenvp.2008.05.003

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27*(5), 591-615. doi: 10.1177/109019810002700506

World Wildlife Fund Canada. (2011, 25 October). Polar bears inspire Coca-Cola to turn red cans white for WWF. Retrieved November 21, 2011, from http://wwf.ca/?10041/POLAR-BEARS-INSPIRE-COCA-COLA--TO-TURN-RED-CANS-WHITE-FOR-WWF

Yencken, D. (2000). Attitudes to nature in the East and West. In D. Yencken, J. Fien & H. Sykes (Eds.), *Environment, education and society in the Asia-Pacific: Local traditions and global discourses* (pp. 4-27). London: Routledge.

Yin, R., K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage Inc.

Appendix A – Introduction to Research: Sample

Potential participants were invited to find out more about the project through email, Facebook, and verbal presentations at staff training. The following is a sample of the message that was sent out. It was subject to minor adaptation in order to best suit the medium.

Email message:

Hello,

Some of you know who I am, for those who do not, I am a former full-time and currently very part-time OP staff who is working on my PhD in education. I'm just starting on the research phase of my program and I need you. My research, which is currently titled Climate change in our sites: Outdoor educators picture response-ability, will be happening from May to August with the possibility of an art show in the fall. I'm hoping to get together a group of current and former RVP staff to take photographs and have group chats around topics of climate change. If you would like more details or are interested in participating the best thing to do is get in touch with me via email at tmunro@ualberta.ca. You are invited to participate regardless of your opinion or knowledge about climate change, outdoor education, or photography, everyone has a valuable perspective for this project.

Hope to hear from you,

Tai

Appendix B – Information Letter

Study Title: Climate change within our sites: Picturing response-ability with Outdoor Educators

Researcher: Tai Munro, PhD candidate

I would like to invite you to participate in the research study *Climate Change within our sites: Picturing Response-ability with Outdoor Educators.* The purpose of the study is to work with outdoor educators to explore some of the issues of climate change through photography. This study is being conducted as part of my PhD program in the Department of Secondary Education at the University of Alberta. If you have concerns regarding this project or my credentials as a PhD student you can contact my supervisor Dr. Susan Barker at 780-492-0743 or susan.barker@ualberta.ca.

The focus of this project is to use photography to examine the issues of climate change in both our personal and professional lives. You will be asked to take photographs throughout the project and bring them to share and discuss with the research group. You will also be asked to keep a journal and/or contribute to an online blog which records some of your experiences and insights during the project. You will also be asked to provide two written artists statements regarding your images. In addition, the group meetings (focus groups) with all participants will be audio recorded and transcribed. You will have the opportunity to review the transcripts prior to their use in the research. I will be taking observational notes throughout the process. You may select which, if any of your photos or writings will be shared publicly. Contributions that you select not to share will remain confidential.

All data including photographs, recordings, transcripts, and journal entries will be kept in digital format for a period of five years following the conclusion of this project. They will be kept in a password protected file on the researcher's computer. Paper files and CDs /DVDs will be returned to participants once digital copies are made. At the conclusion of the five years all data will be disposed of in a way that ensures privacy and confidentiality. This excludes information that has been made publically available through internet or other sources.

This research project is intended to be a collaborative project, you and all other participants, including myself and any supervisors who are involved, will be equal participants in this project. This is done with the recognition that each person has their own insights and skills to contribute to the project. There will be no penalty, nor privileges, based on your participation in the project. You have the right not to participate in any aspects of the research and/or to withdraw any aspects of your contribution to the research up until the end of August with no penalty to you. You may choose to receive credit for any or all of your contributions or to remain anonymous.

Timeline:

- *May – June* – meet approximately once per week for a maximum of 8, 1.5 hour focus groups in a location in Edmonton's River Valley or at the Circle Square River Valley Programs Office.
- *July – August* – meet once every two to three weeks for a maximum of 4, 1.5 hour focus groups in Edmonton's River Valley or at the Circle Square River Valley Programs Office.
- *Fall* – plan, organize and implement an art show of photographs taken during the project. You may choose to participate in the focus groups and photography taking and not participate in the art show.

Possible risks associated with participation revolve around the disclosure of personal or sensitive information. This may make some participants uncomfortable. You do not have to answer any questions that make you uncomfortable. Should any of your photographs or writing include identifiable representations of people, it is important that we are respectful of all individuals portrayed. You will be asked to have any individuals identifiable in any of your photographs or writing to sign a consent form in order for the photos/writing to be used as data in the research. Potential benefits of this study include: 1) Individual participants may advance their understanding, gain career experiences, and develop personal skills; 2) River Valley Programs and the City of Edmonton will gain a unique and local perspective regarding climate change and professional development; 3) Education about climate change generally will benefit from exploring a unique process. I will use the research data and findings for the purposes of my doctoral thesis, for publication in research articles, books, academic presentations, and teaching.

I can be contacted at tmunro@ualberta.ca or 780-428-8543.

My supervisor, Dr. Susan Barker, can be contacted at susan.barker@ualberta.ca or 780-492-0743.

If you would like a copy of the final research report please contact me.

Yours sincerely,

Tai Munro

"The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEASJ REB c/o (780) 492-2614."

Appendix C – Consent Form

Please read and initial next to each item to indicate that you understand and agree to the statements below. I _____ have read and understand the information letter for the study entitled **Climate change within our sites: Picturing response-ability with Outdoor Educators**

_____	I understand that there will be no penalties for not participating in the study, nor will I receive any privileges for my participation
_____	I understand that elements of this research project will be used in the researcher's doctoral thesis and may be published in the future in articles and books and may be used for academic presentations and for teaching. Decisions regarding revenue from these products will be discussed during the research period.
_____	I will use my own camera during the research project. I understand that I am responsible for producing the images in a format that can be shared with the research group.
	Or
_____	I would like to use a City of Edmonton camera during the research project. I understand that I am responsible for the camera while it is in my possession and that I may be asked to return the camera when it is needed for programming.
_____	I understand that data that will be collected from me include: photographs taken by me, photographs of me, my contributions to focus groups, my artist statements, my written contributions to blogging websites and/or journal entries, observations about me by the researcher.
_____	I understand that I will have the right to select which of my contributions (photographs, writings) will be shared publicly. I have the right to anonymity and confidentiality should I so choose.
_____	I understand that meetings (focus groups) will be recorded with a digital sound recorder and photographed. The recordings will be transcribed and I will have the opportunity to review the transcripts and conclusions before they are published.
_____	I understand that I may withdraw from the study until the end of August 2011 by notifying the researcher in writing. My information will be removed where possible upon request.
_____	I agree to maintain the privacy and confidentiality of anything discussed by the research group if requested.

I would like to be identified in the research project by: (please check one of the following)

- ☐ My full name: _____ (Please print your full name)
- ☐ My first name: _____ (Please print your first name)
- ☐ A pseudonym that I have chosen: _____ (Please print the pseudonym)
- ☐ A pseudonym that the researcher chooses

I consent to participate in the research study *Climate Change within our sites: Picturing Response-ability with Outdoor Educators* as outlined above.

_____ (printed name)

_____ (signature)

Two copies of this form have been provided. Please sign both forms and return one to the researcher and keep one for your own records.

"The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEASJ REB c/o (780) 492-2614."

Appendix D – Sample Transcripts

Excerpt: May 30, 2011 – RVP research meeting

Attendance: Jen, Dorothy, Carolyn, Megan, Meghan, Julie, Karina, Chris, Tai

Dorothy – These are the trees that I forgot to double check that they are in fact birch, but when I was there in real life I'm pretty sure they were birch trees

Karina – they look like birch, sure

Dorothy – I included them because there are a whole bunch of dead birch trees in the river valley because of the drought a few years back and it, again, could be related to climate change but you don't really know because it is so hard to make direct links that way. That is one of the big problems scientists are having these days, is actually making that direct link

Karina – is it the tree's natural cycle or is it climate change

Dorothy – exactly. However it is very suspicious that. I know why the trees died, because there was drought here, but whether the drought was because of the climate change, who knows. The next one is about a tree as well. They are all from my walk to and from work. Another one of trees, only this one, I've been noticing a lot of trees that have dead tops and I'm not sure why that is and maybe it is normal for those trees.

Jen – maybe my dad's neighbour got at them

Dorothy – And no, it has nothing to do with Jen's dad's neighbour. I'm wondering if it is linked to acid rain because I remember, in Junior High, learning about the signs of acid rain and one of them was these trees that had dead tops. If that's the case there could be a problem in Edmonton. In my mind now, thinking about it, it seems like these trees are near roads but that could be my mind adding in that detail and I think they are mostly poplar trees so it may be

Jen – I don't remember hearing about acid rain as much now as I heard about it when I was little

Julie – yeah, that's true

Dorothy – that was kind of the topic of the day and now it is climate change.

Meghan – didn't they put scrubbers on all the... the changed the industry so that it isn't as much of a problem now

Jen – that could be

Dorothy – I also think that it was more of a problem in Eastern Canada that it was here, and now it may be becoming a problem here.

Karina – we need a tree expert to tell us about the tree blight

Dorothy – I forgot to ask when I was talking with the city arborist a few weeks ago. This one is also right by groat road. I also don't know how far the effects are, when the fumes of the cars mix with the air whether you get the precipitation right there or

Later in the meeting

Karina – we were just talking about, because my picture is of my happy place that has been slightly altered because of pine beetle, so Jen had brought up about Gull Lake and about how far you have to walk now, you were saying that you used to walk.

Megan – well, it's gone down half a kilometre in my life time but, if you ever come to my cabin, it used to come up to the tree line and now it's probably a two kilometre walk from my cabin to the lake. It's gone down that much. It's been steadily declining in the last 50 because of the oil industry or they'll never admit that but, Gull Lake has been used as a...

Chris – Strathcona Wilderness Centre has a lake, or had a lake. The depression, it was a farmer's field and it turned into a massive lake and then with a ducks unlimited project, creating a beaver dam, it stopped the flow into it, and in the next couple years it will be back to a farmer's field. Within a generations year it's gone a full cycle of nothing to something and back to nothing.

Dorothy – and there's a wetland nearby that I'm guessing

Chris – that has been created, but this other one that had been created naturally

Dorothy – is it Beaverhill Lake where they have the snowgoose festival and that. I don't know what level it's at now but there is a painting in the museum and when

we talk about it we have to say, it's all a grassy field right now and they are having some interesting studies on succession right now as the different plants and the different mice move in. But apparently they've also found ancient bison in the centre of the lake so it's gone back and forth between being a grassy field and being a lake.

Karina – on an island, there's an ancient bison did you say

Dorothy – in the middle of the lake, at the bottom of the lake, there are fossils of ancient bison. Sorry I forgot to mention the key point that they found the bones of a bison

Karina – Oh, I thought there was just a bison hanging out

Julie – going for a swim hey

Megan – the question that this has brought out for me is that the world has changed so much in the course of its lifetime; I know that we affect the environment, but how much do we affect the environment. Because there, if you look at it. Let's bring us all back to this technology that maybe would have happened when Pangea was occurring. So all the land was in one spot what do you think would happen if the world started splitting and dividing right now? With the amount of media, with the amount of social networking that we have right now, people would freak out but this happened. So what's to say that the changes that are happening are not as much us as we think or maybe they're happening faster because of us, it just brought up what exactly are we looking at and how much do we actually have control over.

Julie – well, that's what I was saying to about the weather, about how people are oh my gosh landslides, ahh this; but it happens that's just nature.

Jen – it's just that people are in those areas now, so you notice it more

Julie – yeah, it's flooding, well you're on a flood plain. Your house is going to flood.

Megan – It's called High River for a reason people

Appendix E - Consent for Photography and representation in writing

Study Title: Climate change within our sites: Picturing response-ability with Outdoor Educators

Researcher: Tai Munro, PhD candidate

Name of person to be represented: _____
(please print)

I am the person or the parent/legal guardian of the person named above.
I understand that a researcher from the University of Alberta or a participant in a research project through the University of Alberta is proposing to make use of photographs taken of me/my child and make captions identifying me/my child and/or write about me/my child for the purpose of the research.

I understand that: (choose either A, B or C):

A.
The researcher will use these images/writings only as data for analysis (they will not be made public in any way).

OR

B.
These images/writings may be used in the researcher's thesis / dissertation / research reports / scholarly publications (including books) and in presentations at academic conferences.
Photographs/writings will not reveal me/my child's identity.
In captions and in discussions about the images/writings, only pseudonyms will be used.

OR

C.
These images/writings that identify me/my child may be used in the researcher's thesis / dissertation / research reports / scholarly publications (including books) and in presentations at academic conferences.

My signature below indicates that I consent* to the above-described collection, use and disclosure of photographs, captions and other writing.

Name of person consenting: _____
(please print)

_____ _____
Signature of participant Signature of parent/guardian if participant is a minor

Date: _____

*I understand that I may withdraw this consent at any time up until August 31, 2011by contacting the researcher at tmunro@ualberta.ca or 780-428-8543. You can also contact my supervisor at 780-492-0743 or susan.barker@ualberta.ca.

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension, Augustana and Campus Saint Jean Research Ethics Board (EEASJ REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEASJ REB c/o (780) 492-2614.