Living With Loss in the Anthropocene

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Abstract

Heatedly contested at various points in its development, climate change discourse is at once a political and social issue, an environmental and ecological issue, and a physical and mental health issue. Less attention has been paid to the latter. During her work with the terminally ill, Kübler-Ross (2005) outlined 5 stages of grief: anger, denial, bargaining, depression, and acceptance. That outline is now seen as analogous to the feelings that we may have towards issues of climate change, e.g., the real and perceived loss of ecosystem services, as well as uncertainty in regard to the future of humanity. With that in mind, I created The *Anthropocene Adventurer* magazine. Conceptualized as a visual and emotional response to climate change, The *Anthropocene Adventurer* magazine was developed to stimulate climate change communication. The *Anthropocene Adventurer* magazine grapples with the question, "What does one do when climate change hits home?"

Keywords: anthropocene, climate change, human loss and grief, synesthesia, solastalgia, visual communication

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In loving memory of Elaina Marie Henderson

May 14, 1957–October 6, 2017

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Introduction

Hello, my name is Jaynetha. It is pronounced yháh nā thuh, but you can call me Jay. I bet you weren't expecting a personal hello in this section but here you have it. You have, after all taken the time to be here. We might as well be properly introduced.

When I embarked on my *Anthropocene Adventurer* journey it wasn't because I was on mission to gain enlightenment or on a quest for climate change knowledge. My motive was not so altruistic. I was running, hiding actually, from death and from that perspective I am a coward. As someone who has been an academic for the last 6 years it was a no brainer to hide away in a book, so to speak. That book took the form of End Stage Liver Cancer [ESLD] and climate change articles. In that optimism for a positive outcome diminishes over time for either, their conclusions were eerily similar. Mine is not a solitary journey. Which is why I said hello. I invite you to journey with me. We are all on the same eventual path anyway. That is not to say that everybody has cancer, as a form of death cancer only kills 1 in 6 (World health Organization, 2018). There's a 5 out of 6 chance you will die of something else. Everyone has climate change. That is the journey I am referring to. Welcome.

When you know death come soon, you look around things more close.

—Johnson, Payne, Taylor & Payne, 2017, 02:06:57

Living with Loss in the Anthropocene

Mary Kalantzis, in the video *Design and Multimodality* stated, "We are born into synesthesia" (Educationatillinois, 2016, 05:50). According to Synesthesia (2018), "Synesthesia [syn·es·the·sia] is a condition that happens when a sense, such as sight, triggers another sense, like smell, at the same time [. . .] The word synesthesia comes from the Greek syn for 'together' and the root aisthe for 'to feel'" (para. 1). The point that she is making is that we engage and build meaning-making from multiple resources of meaning-making, e.g., oral meaning, written meaning, visual meaning, spatial meaning, tactile meaning, gestural meaning, and audio meaning (Educationatillinois, 2016, 05:10-05:50; see also Cope & Kalantzis, 2009, pp. 178-179). According to Cope and Kalantzis (2009), "the process of shifting between modes and re-representing the same thing from one mode to another is known as synaesthesia, and representational parallels make it possible" (p. 179). Hence, our experiences in the world and of the world are derived from these distinct, yet interactive ways of knowing. This degree project is moored to synesthesia, although it is not the only tether. This degree project is also tethered to solastalgia [so·last·algia], "which refers to the pain or distress caused by the loss of, or inability to derive, solace connected to the negatively perceived state of one's home environment" (Albrecht et al., 2007, p. 96). This degree project, as is much of life, inextricably bound to pain and learning.

Because I have no immediate connection to climate change, i.e., I do not live in a coastal area subjected to storms and flooding, I do not live in an area subjected to drought, I do not live in an area prone to increased vector diseases, my livelihood is not affected by climate change, et

cetera, my understanding of climate change has been hitherto based on abstraction. Now that I have climate grief, a condition that I got when avoiding the impending and eventual death of my wife, climate change, like death itself, has become very real to me. Climate change and death are no longer abstract concepts. She died in my arms and I felt myself go with her. Only climate change remains. It sounds dramatic, I know. But then, "What can you expect?" Climate change and human death are dramatic. To my knowledge no one has ever written a book on the joy of dying or made the movie *The Joy of Climate Change*.

This degree project highlights how I have superimposed environmental distress, over what can be called human distress, to make sense of my wife's slow decline and eventual death. The conjoining of these two types of grief, climate grief and grief when a loved one passes, has had the synergistic effect of making each stronger in the company of the other. Grief is what has driven this degree project and has allowed me to make sense, and in no small way, of death and dying and climate change. The questions, "Why did my wife have to die?" and "Why do we have climate change?" seem to have the same answer. Mortality is preordained. At least that's what I tell myself. It helps me sleep at night. My point is that my feelings for her triggered an emotional response to climate change where previously there was none. Synesthesia happened to me. The exact moment is captured in the Justification of the Problem section below.

Specifically, this degree project is directed at my personal loss; the death of my wife, my mother, my sister, and best friend at various stages of my schooling and to our collective loss, yours and mine, of the global environment due to anthropogenic climate change. In tying the two together I have reworked the way I view and participate in the world. The educational, and ultimately, transformative journey I have undertaken has manifested in the creation of The *Anthropocene Adventurer* magazine, a visual, textual, and digital artifact that has served both as

a reservoir for my loss and a conduit through which to share that loss, albeit rather subtly (the magazine is reproduced in Appendix A).

Initially, the *Anthropocene Adventurer* was conceptualized as having multiple forms; a blog, a website, a magazine, and a campus climate change club—all called the Anthropocene Adventurer. Early on, maintaining a blog and a website was deemed, by me, to be redundant and the blog was taken down. Despite intensive recruitment efforts, i.e., the physical handing out of club announcement flyers, leaving said flyers on the posting boards located throughout campus, and posting the same to the digital space provided by campus television screens, the Anthropocene Adventurer club could not garner enough interest to launch. Not yet, anyway.

The purpose of the *Anthropocene Adventurer*, in its varied forms, is to express personal authority within climate change discourse by enhancing one's climate-change identity through the use of sharable narratives. By sharing our climate change experiences, as well as our values, skill, and knowledge, members contribute to the social construction of reality. In the manner of Berger and Luckmann (1966/1991), climate change has become very much a part of "the reality of everyday life" (p. 33). Climate change poses the quantitative problem of lessening energy consumption's impact on our common home while maintaining an accustomed to standard of living. To put into perspective the magnitude of global energy consumption and the resultant climate energy imbalance, Hansen (2012) stated, "the climate energy imbalance is equivalent to exploding 400,000 Hiroshima atomic bombs per day 365 days per year" (as cited in Braasch, 2013, p. 36).

This degree project posits that by using climate change narrative (visual, textual, digital, oral) as a tool, engagement with the qualitative experience of climate change, coupled with the coping skills we develop in response to human grief and loss, may prevent us from becoming a

society negatively transformed by climate change. This degree project promotes a much needed climate change conversation: one that is cast beyond dinner table conversation and onto the global stage. Likewise, it is a conversation that needs to be cast from the global stage and into our homes and our lives. More often than not, it is as simple as having that conversation with ourselves. For example, ask yourself "What does climate change look like?" and "How does climate change make you feel?"

Given that the power of language is inextricably tied to the power of change, the foundation of The *Anthropocene Adventurer* magazine rests on the premise that response to climate change is a response to our personal biographies. The rallying cry, "The Personal is Political," is as relevant now as it has ever been. In that regard, a goal of The *Anthropocene Adventurer* magazine is to lessen the divide between scientific consensus and social consensus. I believe that this may be possible, when we are able to feel for what we may not see. Climate change is often invisible. The purpose of this degree project then, in the large picture, is to make climate change visible by aligning Kübler-Ross's Stage Theory to stages of climate grief in an attempt to elicit an emotional response to global climate change.

Statement of the Problem

According to Kiehl (2016), throughout history humankind's worldview has been shaped by an attachment to or detachment from nature (p. 88). Drawing heavily on Heidegger's concept of *dasien* or "being in the world" Kiehl rejects Cartesian duality and embraces Spinosian *pantheism*, or "being with" (p. 86). In so doing, Kiehl "illuminates the inextricable interconnectedness between our being and the world's being" (p. 86). Describing interconnectedness with the world as a "coparticipatory process," Kiehl proclaimed that by "not reflecting" on our roles in this coparticipatory process "our presence in the world will continue to

create crises of imbalance" p. 86). These crises of imbalances can be defined by the impact that human societies have had on the environment, "where the impact is the aggregate of changes in population, affluence (an indicator for consumption) and technology" (Steffen et al., 2011, p. 743). Climate change scholars (e.g., Nordhaus, 2015; Steffen et al., 2011; Steffen, Crutzen, & Mcneill, 2007; Zalasiewicz et al., 2008) have speculated that this imbalance between the human enterprise and nature began at the beginning of the industrial revolution (circa 1800 – 1850) and has changed the natural behavior and natural variability of observed earth systems; namely, the geosphere, atmosphere, hydrosphere, and biosphere systems as measured in geological time.

Background and History

According to Singh (2006), "The vast expanse of geologic time has been separated into eras, periods, and epochs" (p. 28) and "often each era ends with a major extinction, which eliminates the dominant life forms and paves way for newcomers" (p. 30). It is important to note that eras, periods, and epochs are separated by boundaries, "defined either via Global Stratigraphic Section and Point ("golden spike") locations or by adopting a numerical date, "which, in the past have been set apart by millions of years and characterized by glacial and interglacial periods brought on by GCC [Global Climate Change]" (Zalasiewicz et al., 2008, p. 4).

It is important to note geological time for two reasons: (1) the International Commission on Stratigraphy (ICS) is being asked by some members of the scientific climate change community (e.g., Crutzen, 2002; Steffen, Crutzen, & Mcneill, 2007; Zalasiewicz et al., 2008, 2017) to formalize the adoption of a new chronostratigraphic unit, the Anthropocene , to denote human causation of abrupt changes to earth systems dynamics, and (2) anthropogenic changes to the earth environment are said to "rival global geophysical process" and "suggests that we need

to fundamentally alter our relationship with the planet we inhabit" (Steffen et al., 2011, p. 739). This altered relationship may be possible today because,

> with the advent of anthropogenic GCC [Global Climate Change] and the concurring acts of ecological-social destruction, the vast conceptual veil perpetuating society's ultimate illusion that the fate of the human species is somehow separate from the fate of the Earth is finally tearing. (Godfrey &Torres, 2016, p. 1)

Justification of the Problem

"Someone must have died," my wife said to me as we pulled into the Veterans Administration's Radiation Therapy Treatment (RTT) facility's parking lot. Puzzled, I asked, "Why did you say that?" It was then I noticed a woman standing on the sidewalk, immobilized and crying, uncontrollably. It was as though she had nowhere to turn, nowhere to go. It was Romanesque, circa Pompeii 79 A.D. Tragic. Very, very tragic.

At this stage in the Anthropocene Adventurer project my wife was dying of End Stage Liver Disease (ESLD). Cancer, to put it more succinctly. However, "cancer is more commonly characterized by an acute decline, whereas advanced chronic illnesses like ESLD have more of a fluctuating deterioration characterized by periods of instability that are interspersed with acute episodes of decline" (Brown, Hammill, Qualls, Curtis, & Muir, 2016, p. 413). There is no cure. We go to the RTT as a matter of course. At this stage it is a matter of pain management. As I was waiting for my wife's radiation session to end my mind wandered back and forth between scenes composed of global climate change, the woman on the sidewalk, and my wife. Global climate change and ESLD have something in common—both bring us face to face with our inherent impermanence, I thought.

In *On Death and Dying*, Kübler-Ross (1969) called the last stage of dealing with grief *acceptance*. In climate change discourse that last stage could be called "mitigation and adaptation" (Moser, 2014, p.346). Mitigation and adaptation, like acceptance "should not be mistaken for a happy stage" (Kübler-Ross, 1969, p.100). Nor, I might add, should one consider that there are limitless options.

I was born in 1959. Back then the idea of the Anthropocene, the proposed scientific terminology and concept for the geological era of "human-driven changes to the global environment," was in its infancy (Steffen et al., 2011, p. 739, see also Crutzen, 2002, 2006). The Great Acceleration, "the speeding up of just about everything after the Second World War," for example; population and economic growth, energy consumption, and transportation had just begun (Steffen et al., 2011, p. 743). Previous geological eras, the Precambrian, Paleozoic, Mesozoic, and Cenozoic Era had been characterized by either birth and evolution or mass extinction (Xu, 2006). Crutzen (2002) stated "because of . . . anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behavior for many millennia to come" (p.23). So although the new proposed era is likely to retain some of the characteristics of previous eras it is uncertain whether any new era will last very long, bringing into question the "future trajectory of geological history" (Zalasiewicz et al., 2017, p. 214). According to Ackerman (2013),

> This may be the last generation that will have a real chance at protecting the earth's climate. Projections from the latest IPCC reports, the Stern review, and other sources suggest that it is still possible – if we start at once. (p. 229)

Moodling with Methodology

Lasslett (1999) stated "personal narratives provide a unique perspective on the intersection of the individual, the collectivity, the cultural, and the social" (p. 392). This form, autoenthrography, allows me, as the author, and you as the reader/viewer to enter into a contract. We both have responsibilities. For my part I will not try to pull the wool over your eyes. For your part you are expected to keep an open mind. Consider this document the mental hug that binds us. This degree project also draws from the fields of Psychology and Feminists Studies to frame and ground The *Anthropocene Adventurer* magazine as a social activist project. Because this degree project is at once textual, visual, and digital, a multimodal design serves to give it substance.

Preliminary Conclusions

When I wrote earlier in these pages that to my knowledge no one has ever written a book on the joy of dying or made the movie *The Joy of Climate Change* that was not wholly correct. Scranton (2015) wrote the book, *Learning to Die in the Anthropocene: Reflections on the End of a Civilization,* a tale that finds climate change death, although not joyous, liberating. According to Scranton (2015),

> Learning to die as an individual means letting go of our predispositions and fear. Learning to die as a civilization means letting go of this particular way of life and its ideas of identity, freedom, success, and progress. These two ways of learning to die come together in the role of the humanist thinker: the one who is willing to stop and ask troublesome questions, the one who is willing to interrupt, the one who resonates on other channels and with slower, deeper rhythms. (p. 24)

Although we cannot stop human death from occurring or reverse the tide of climate change, the sooner we come to the collective conclusion that human health is inextricably tied to

ecosystem health the greater our chances of slowing the progression of climate change. We do so not only for direct benefits to ourselves, but also for the benefit of our children and their children's children. The world is not ours to have, it is ours to give. This is not a new concept. However, it may be one that we've forgotten.

The Research Question and Methods

There as many ways to answer the research question, "What do we do when climate change hits home?" as there are people to ask it. The *Anthropocene Adventurer's* answer is to hyper-personalize climate change and make it real at a micro-level. In my case I have used processes of grief and loss, as well as climate change and cancer research, to make meaning of death by cancer and to put a figurative face on climate change. Before I forget to put it elsewhere in this document, climate change has a cancer face.

Engagement with climate change and cancer research function(ed) as a therapeutic as I grapple(d) with what will become the next chapter in my life. On the premise that our personal lives are made up of vignettes, little plays that unfold on a day to day basis, I offer a brief autoethnographic account of my very personal (evocative) and firsthand experience with cancer, and my less personal (analytical) and secondhand experience with climate change. I have to admit, it was easy to be dismissive of either, until the world went dark at 6:53 pm 2017, October 6 (Pacific Standard Time) and became a very scary place. That was the day my beloved wife, Elaina, died. Before I go on I must clarify that the *Anthropocene Adventurer* magazine, in the context of the paper *Living With Loss in the Anthropocene*, a project rationale submitted in partial fulfillment of the requirements for the degree of *Master of Arts in Interdisciplinary Studies,* is targeted to a mature audience. The *Anthropocene Adventurer* K-12 Teaching and Learning document discussed at the end of this paper can be constructed to meet the varied

cognitive and ability levels of students. Additionally, it should be made clear that any and all references to Elaina are made with her prior consent.

My wife's name was Elaina. When I say it like this, in the past tense, there is a profound sense of longing. It is hard to speak of what was, as though it will be no more.

Elaina had three tattoos. One was of three small mushrooms, underneath which were the initials of a former lover. In the beginning we didn't talk about her tattoos much. She had a faded Rolling Stone's tongue on her right wrist, where a watch would have gone. On her right shoulder she had a heart separated by a lightning bolt. Towards the end we talked about them all. We were questioning why she had to die. The tattoos were the most likely contributors to the Hepatitis B disease she contracted. She got the tats in the early days of her military career. Tattoos are part of military culture. Someone was using dirty needles, no doubt. We blamed the military directly. At the time the military was using a jet-injector type gun to mass administer vaccinations. These jet-injector vaccination guns had the potential to cross-contaminate between individuals. Research detailing Hepatitis B exposure and jet-injector vaccination guns can be seen in Canter et al. (1990).

Although not a heavy drinker she had Liver Cirrhosis, too. When asked about it she would often say, "I drink no more than a good soldier should." Being an ex-soldier I understood. I knew her then and it was cute at the time. On her deathbed we talked about how the seemingly innocuous choices (like joining the military, drinking, and getting tattoos) had come back to us negatively. In this case it came back to her in the form of liver cancer. It killed her one day. For her, life just stopped. I was not so fortunate. I live with her death, and now with climate change. Like I have a choice. The questions, "Why her?" and "Why climate change?" linger. With guilt I add, "Why me?" Deep is the pool of sorrow.

If you don't know, Hepatitis B and Liver Cirrhosis are often precursors to ESLD. It was something that we didn't know. Had we known, I guarantee you we would have taken preventive measures. Should response to climate change be any different?

Paradoxically, my life has been both hollowed and enhanced through her death. There is a certain reverence, a certain urgency to life that had hitherto gone unnoticed and a certain sadness that I now possess. Enter global warming as though it were a stage direction. In my mind global warming is a cancer. It is a cancer that is, that is—well let's just say, have you ever heard of a good cancer? Presumably, there are some: "Between 30–50% of cancers can currently be prevented" (World Health Organization, 2017, para. 2). Of course, there's the caveat that the cancer is caught in time, that is, at an early stage. If that sounds familiar it may because that is the same story told with climate change mitigation.

Elaina was wide-eyed to the suggestion that cancer and climate change shared certain commonalities and encouraged me to research them both. The resultant conversations were among the last we would have.

Unlike regular cancer, which not everybody gets, global warming cancer affects everyone. On the one hand, cancer cells transform our body's organs and bones to useless vestiges, and on the other hand, global warming cancer may render our collective ecosystem, our common home, similarly useless. It should go without saying that the planet is sustaining injuries incompatible with life. But it must be said, and loudly. If we are to heal the planet, and hence remain healthy ourselves, it will be because we have turned the global warming narrative into a personal narrative. Global warming is perhaps the most salient issue our generation will face. Globally, anthropogenic climate change is propelled by our institutions and cultures and there is scientific consensus that supports that. The autoethnographic me remembers reading that

somewhere. In the context of autoethnography, memories, admittedly fallible, can serve as data. As a case in point, Wall (2008) stated, "autoethnographies (Yang, 1945) have been composed from headnotes, or memories, alone" (p.45).

On a personal level, anthropogenic climate change is created by the everyday choices that we make. Albeit limited, we have control over the size the carbon imprint we create. We do not need to be drowning in a pool of CO_2. However, because climate change due to excessive CO_2 emissions is a slow and gradual process, we may not realize that we are drowning. Compounding the problem is a lack of social consensus that anthropogenic climate change is real. Perhaps our discursive moves, yours and mine, can change that. Perhaps through multimodal narratives about anthropogenic climate change we can close the divide between scientific consensus (climate change is real) and social consensus (maybe it's not).

Consider the following statement by Christian Jakob, a professor in Atmospheric Science at the School of Mathematical Sciences of Monash University in Melbourne, Australia, "Knowing that the globe is warming through human activity is like understanding that cancer is caused by runaway cell division. It is just the start of the challenge" (as cited in University of New South Wales, 2017, para. 3). Part of that challenge is communicating climate change across a culturally and cognitively diverse populous. To be clear, climate change in the context of the *Anthropocene Adventurer* does not simply refer to natural variations in climate. Instead, it refers to climate caused by human perturbation. In the analogy above, nefarious human activity, particularly the wanton burning of fossil-fuels, reckless deforestation, and unwise land-use practices (Canadell et al., 2010) is the cancer. Meanwhile, climate change is a product of overloading Earth's natural ability to sequester harmful heat-trapping gases. These gases, for example, Carbon dioxide (CO_2), Nitrogen oxide (N_2O), and Methane (CH_4), are collectively

known as greenhouse gases (GHGs) (Canadell et al., 2010; Fuglestvedt, Wang, & Isaksen, 1994). These gases, along with albedo (reflectivity) and solar input, drive positive or negative radiative forcing (RF), the mechanism that causes the earth's temperature to rise and fall (Andrews, Betts, Booth, Jones, & Jones, 2017; Canadell et al., 2010; Hall, 2004). This temperature is largely moderated by the earth's carbon cycle, which when operating efficiently exchanges carbon throughout the earth's carbon stores (atmosphere, ocean, biomass, and earth) and helps to create a state of temperature stasis. When the earth's carbon cycle is disrupted, for example, by earth systems' inability to absorb excessive anthropogenic CO_2, temperatures rise. The more anthropogenic CO_2 emissions rise, the more temperature increases. This is akin to runaway cell division. Perhaps we all have cancer after all, climate change cancer.

Before I delve into the methods I am using (autoethnography, multimodality, and visual communication) to position climate change to the center, I ask you, dear reader, to consider one other statement. According to Steffen, Crutzen, and Mcneill (2007), in response to anthropogenic climate change, "Humanity is, in one way or another, becoming a self-conscious, active agent in the operation of its own life support system" (p. 619). When put this way, the climate-actor and climate-action can be seen to be one in the same. Similarly, "as a method, autoethnography is both process and product" (Ellis, Adams, & Bochner, 2011, p. 273).

Sometimes you are standing too close to the fire, so of speak, to see the big picture. I realized that when I read the following suggestion of how I might rephrase a brief summary of the *Anthropocene Adventurer*:

> This project is a multi-media textual and visual endeavor that considers climate change from a perspective that foregrounds grief and loss. I bring together autoethnography (including reflections on grief and loss in my own life, most importantly the recent loss of

> my wife) with literature and other materials pertaining to climate change so as to encourage new ways of thinking about and dealing with connections between the two. (L. Knopp, personal communication, March 29, 2018)

This kind of conversation turn is exactly what the *Anthropocene Adventurer* seeks to elicit to; (a) propel climate change discourse, (b) strengthen climate-literacy, and (c) increase our identification with climate change. Gubrium (2008) stated, "Sometimes, complicity in actions that "keep the story going" also contributes to *where* [emphasis in original] the story is going. Listeners to stories can virtually induce the elaboration of particular dimensions of experience through their own story-facilitating actions" (p. 257).

The communication exchange example above is an example of how the collective "we" gain a shared identity, a shared consciousness. For the *Adventurer,* the creation of a climate-conscious, climate-literate self is of paramount importance because, although we all at some point in time, have had a direct or indirect relationship with reality, self-identity, and death (or will have) the newness of climate change may not have had the time to locate itself into our collective psyche. For some people, the relationship to climate change and ourselves is dependent on our proximal distance to it and for others, regardless of the distance there is an emotional detachment:

> In fact, knowing about it [climate change] may make people feel paralyzed by the magnitude and complexity of the problem, and they may disengage because of a negative (and fully rational) appraisal of their individual capacity and efficacy to do something about it. (Wolf & Moser, 2011, as cited in Corbet & Clark, 2017, p. 4)

Arguably, climate change is affecting the behavior of individuals and by extension, whole societies. According to Shukla (2013), "higher rates of drug and alcohol abuse, violence, family breakups, and suicide have been seen after extreme weather events" (p. 2). Expressing the magnitude of the problem Shukla stated, "It is believed that between 25 and 50 percent of all those people who face an extreme weather event may have some harmful mental health consequences" (p. 4). Given that climate change impacts are expected to intensify and global population to rise exponentially this statistic is significant.

The *Adventurer* is concerned with how you and I can avoid negative climate change consequences and also how you and I can take responsibility for them. One way may be to attach feelings of human grief and loss of a loved one to the abstract and often invisible phenomenon of climate change. Because of universals in human grief this may be possible for both the individual and society-at-large. Emphasizing possibilities, Rosenblatt (2003) stated, "It is . . . common across cultures that what is grieved after a death is not just the specific loss of a person but much else" (p. 855). For me, my wife's passing gave the abstract and often invisible phenomenon of climate change, form. Now, I cannot help but to see her face everywhere: In the rustling of the wind, in the twinkling of sunlight, in the birth of spring.

Within the context of climate change and human grief and loss, an autoethnographic approach is well-suited to provide an over-arching framework in which to nest my project. Speaking to the scientific research community's reception of autoenthnography as a research method, Ellis, Adams, and Bochner (2011) stated, "in using personal experience, autoethnographers are thought to not only use supposedly biased data (Anderson, 2006; Atkinson, 1997; Gans, 1999), but are also navel-gazers (Madison, 2006), self-absorbed

narcissists who don't fulfill scholarly obligations of hypothesizing, analyzing, and theorizing" (p. 283). Be that as it may, I assure you my sights are somewhat higher.

Autoenthnography. Simply put, autoethnography is part autobiography and part ethnography (Ellis, Adams, & Bochner, 2011). Autoethnography is "a genre of writing that involves personalized accounts in which authors draw on their own lived experiences, connects the personal to the culture and places the self and others within a social context" (Reed-Danahay, 1997, as cited in Maguire, 2006, p. 2). This explanation seems to be adequate. However, on closer inspection there are many forms and approaches to autoethnography that contribute to making that explanation problematic (Jensen-Hart & Williams, 2010). For example, "autoethnographers vary in their emphasis on auto- (self), -ethno- (the sociocultural connection), and -graphy - (the application of the research process)" (Reed-Danahay, 1997, as cited in Wall, 2008, p. 39). In addition, the paradigm alignment, depending on emphasis, differs. For example, autoethnographers emphasizing graphy are more likely to align their research with "objectivism and positivism" while autoethnographers emphasizing auto are more likely to align with "social constructionist and postmodern thinking" (Jensen-Hart & Williams, 2010, p. 452). Although there is separation between autoethnographic types, "analytic and more arts-based/evocative versions," both are capable, according to Jensen-Hart and Williams (2010), "of nurturing an empathic understanding of the other and highlighting reflexivity" (p. 251). According to Ellis, Adams, and Bochner (2011), "autoethnography is one of the approaches that acknowledges and accommodates subjectivity, emotionality, and the researcher's influence on research, rather than hiding from these matters or assuming they don't exist" (p. 274). Commensurate with that line of thought, Maguire (2006) stated, "Evocative expression of personal experiences and emotions is the essence of autoethnography" (p. 5). Indeed, autoethnography "authors draw from their

experiences to show how personal narratives, the core of autoethnography, might be used to infuse critical reflection into their area of interest," in this case climate change discourse and human grief and loss (Jensen-Hart & Williams, 2011, p. 450).

As an entry point to climate change and bereavement studies, autoenthnography seems as valid as any for challenging biases and assumptions and for examining, for example, "what climate change adaptation is (ontology), as well as how we can see/know it (epistemology) shift depending on how the relationship between biophysical change and social-political change is conceptualized" (Nightingale, 2016, p. 42). Complicating challenges to biases and assumptions are our differing everyday life experiences. Though similar in many regards, our life scripts are not universal and are based, in part, on cultural differences. I was reminded of that when I remembered Rosaldo's (1989) epiphany in understanding others' losses through his own personal loss. He and his wife, Michelle, were doing ethnographic field work in the Philippines when she fell from a hillside to her death in a river below. While coping with the tragic loss of his wife he stated that at times,

> Powerful visceral emotional states swept over me, at times separately and at other times together. I experienced the deep cutting pain of sorrow almost beyond endurance, the cadaverous cold of realizing the finality of death, the trembling beginning in my abdomen and spreading through my body, the mournful keening that started without my willing, and frequent tearful sobbing. (p. 171)

At the time, I thought I got the point when I read it. I didn't. As poignant as his description of personal grief was, I just didn't get it. Research alone cannot position you to an understanding of how that kind of loss feels. At the time, the mental image I conjured up was devoid of the experience that would allow meaning-making to be more complete. I get it now. Seven months

after my wife's death I am still angry. It would have been our 36th anniversary the following day. We were looking forward to just holding one another and watching T.V. Unbeknownst to my wife, who had slipped into a hepatic coma the day before, our niece had died of stomach cancer. She was 33 years old. Her mother, my wife's sister, and I now share hugs that are code for the anger we try to hide. An angry sadness envelopes us. I am no longer a husband and she (Olinda), is no longer a mom. Where is the sense in life when things like this happen?

We, Olinda and I, struggle to adapt to a new reality and to a changed identity. We are not alone. According to Lichten (2013),

> All human beings suffer loss as they accumulate ever more years of living. Death, and the attendant suffering known as grief, unites all humanity in the universal experience of the mortal dance of life and death. If one lives long enough and forms social attachments, there is no escaping the inevitability of the death of intimate associates, friends, and family, loved ones whose deaths bring great pain and suffering. (p. 872)

Some, like myself, want to be angry, and need to be angry. Speaking for myself, I just don't know where to direct my anger (although, at the moment it is focused on climate change). I sense that there is a certain kind of ugly guilt waiting for me when I ceased to be angry. I cannot, not be angry. At least not until I have made sense of my wife's death. To that end, I may be angry for a long while. It is meaning-making through anger, or bust. Intellectualizing my loss is just not doing it for me. What am I supposed to do with the statement, "Grief is the price we pay for loving," anyway? (Abrams, 1999, as cited in Lichten, 2013, p. 872)

It is interesting that I chose climate change, in addition to Elaina's death, to be angry at. Climate change is caused by everyone, to some degree. Therefore, it would be accurate to say

that I am angry at everyone, including myself. My mom used to say, "A hard head makes for a soft behind." Who comes up with these sayings? Don't worry, you are not lost. I am off on a tangent. I'm trying to segue to the next section and finding it difficult to explain the relevance of multimodality to meaning-making. Perhaps a mental illustration will help. Imagine your 5 senses; taste, sight, touch, smell, and sound. Now imagine you lose, one by one, these senses until they are gone. As you lose these learning elements your ability to make meaning is diminished. Now add them back in, one by one. With each addition, meaning is enhanced. According to Armour (2003), "meaning reconstruction is not something we simply think and feel, we live it and we make our constructions real through action in our world" (as cited in Gillies & Niemeyer, 2006, p. 58). Hence, all meaning-making is fluid. Emphasizing this point, Jewitt (2013) stated, "The meanings in any mode [e.g., textual, aural, linguistic, spatial, and visual] are always interwoven with the meanings made with those of other modes cooperating in the communicative ensemble. The interaction between modes is itself a part of the production of meaning" (p. 251). For us, all of us, reconstructing a sense of meaning and purpose in our lives after experiencing the loss of a loved one, means working through "feelings of meaninglessness and hopelessness" (Gillies & Niemeyer, 2006, p. 33). Multimodality integrates meaning from multiple sources (modes) and "opens up possibilities for recognizing, analyzing and theorizing the different ways in which people make meaning and how those meanings are interrelated" (Jewitt , 2013 p. 250). At the moment, anger is the webbing that holds me together. Anger is also driving my quest for understanding why life is so brief.

Multimodality. Within the last 2 decades, multimodality has emerged to emphasize and extend meaning making to other modes of learning, consequently decentering language from traditional descriptions, e.g., sign/signifier (Adami, 2016; Jewett, 2013). Emphasizing that

meaning is not made in isolation from other modes of learning, multimodality challenges the primacy of verbal language (Adami, 2016; Cope & Kalantzis, 2009). This *conscientizacao* or critical consciousness—"The term conscientizacao refers to learning to perceive social, political and economic contradictions, and to take action against the oppressive elements of reality," — is at the core of multimodality (Freire, P., Ramos, M. B., & Macedo, D. P., 2005, p. 35). That people *do* language from available resources or modes, e.g., "writing, image, moving image, sound, speech, gesture, gaze, and posture" and are active in its day-to-day production is an underlying assumption of multimodality (Jewitt, 2013, p. 253; see also Kress, [1996]2006). Relatedly, "Synaesthesia is integral to representation. In a very ordinary, material sense, our bodily sensations are holistically integrated, even if our focus of meaning-making attentions in any particular moment might be one particular mode" (Cope & Kalantzis, 2009, p. 179).

There are at least 2 theoretical perspectives grounding multimodality (Jewett, 2013). One view uses available resources (modes) to engage, realize, and extend meaning potentials; in other words, as people adapt to increasingly sophisticated technology, new modes of teaching and learning materialize, and more modes become available (Cope & Kalantzis, 2009; Jewitt, 2013). The other view comes from research and the methods and procedures researchers use to qualitatively and quantitatively codify multimodal outcomes (Adami, 2016; Jewett, 2013; Kress, 2006). In either case, the line between modes, or structures of teaching and learning, become less clear in multimodal approaches. This blurring is encapsulated in the key concept of modal affordance: "Modal affordance suggests all modes are partial in making meaning" (Jewitt, 2013, p. 254). Indeed, "Much of our everyday representational experience is intrinsically multimodal" (Cope & Kalantzis, 2009, p. 179).

Drawing a direct link from multimodality to multiliteracy, and ultimately to human well-being, Cope and Kalantzis (2009) stated,

> The kind of person who can live well in this world is someone who has acquired the capacity to navigate from one domain of social activity to another, who is resilient in their capacity to articulate and enact their own identities and who can find ways of entering into dialogue with and learning new and unfamiliar social languages. (Cope & Kalantzis, 1998, as cited in Cope & Kalantzis, 2009. p. 174)

In the context of multimodalities and the metalanguages they produce, "a Discourse integrates ways of talking, listening, writing, reading, acting, interacting, believing, valuing , and feeling (using various objects, symbols, images, tools, and technologies) in the service of enacting meaningful socially situated identities and activities"(Gee, 2001, p. 719). Derived from multiple genres, multimodality brings climate change into the public mind through an endless array of climate change visualizations. Thus, "there are many processes that open our eyes to the possible effects of climate change" (Wormbs, Doscher, Nilsson, & Sverker, 2017, p. 159).

According to Corbett and Clark (2018), "For many people, climate change is generally seen as something abstract and distant—something that they know about, but do not 'feel'" (p. 1). For this reason there may be teaching and learning opportunities afforded to multimodal approaches that are not present in the traditional approach of teaching and learning using "monomodal formalities of written language" (Corbett & Kalantzis, 2009, p. 179). In a discussion of climate change engagement and climate stories within the disciplines of Arts and Humanities, Corbett and Clark stated,

> The arts and humanities can play an important role in disrupting the social and cultural worldviews that filter climate information and separate the public from the reality of

> climate change. Whether it is the visual arts, dance, theater, literature, comedy, or film, the arts and humanities present engaging stories, corporally sensed and felt experiences, awareness of interdependency with the world, emotional meanings, and connection with place. Climate stories, especially those based on lived experiences, offer distinct ways to engage a variety of senses. They allow the "invisibility" of climate change to be seen, felt, and imagined in the past, present, and future. They connect global issues to conditions close to home and create space to grieve and experience loss. They encourage critical reflection of existing social structures and cultural and moral norms, thus facilitating engagement beyond the individual level. (p. 1)

In this light, a multimodal approach to communicating and acting upon climate change knowledge might begin with personifying climate change and end with the conclusion that climate change is the baby we are all raising, cancer face or not. That is quite the visual as we lead, ironically, to this next section.

Visual communication. According to Barnes (2011), "There is no grand theory about visual communication" (p. x). However, "Smith, Moriarty, Barbatsis and Kenney 2005 present a number of approaches to the study of visual communication, including aesthetics, perception, representation, visual rhetoric, cognition, semiotics, reception theory, narrative, media aesthetics, ethics, visual literacy, and cultural studies"(Barnes, 2011, p. x). What has developed as theory has come from a wide variety of disciplines, including, but not limited to, "art history, cognitive theory, communication theory, cultural theory, feminists studies, graphic design, literary theory, semiotics, and psychology" (Barnes, 2011, p. x). Because the study of visuals in climate change communication is relatively new, when compared to the study of climate change through more traditional forms, i. e., written and oral forms (Braasch, 2013), additional climate change

perspectives are emerging, for example, from the field of Humanities through visually heavy genres such as theater, dance, and films (Corbett& Clark).

I adopt the visual communication perspective put forward by art historian E. H. Gombrich, who, according to Barnes (2011), "argue[d] that the relationship between image and society can be viewed as an ecological system—social situations influence image-making and vice versa" (p. x.). From this view, visual communication is very much alive. Comparably, Barnes "define[d] visual communication as the process through which individuals—in relationships, organization, and cultures—interpret and create visual messages in response to their environment, one another, and social structures" (p. 3). Highlighting the essential nature of symbolic representation, particularly visual symbols in meaning-making, Barnes stated, "visual communication is a fundamental human experience" (p. 3).

According to Barry (2005), "the eyes are, in fact, a direct extension of the brain into the environment" and as such play a key role in survival, most notably in the development of the fight-or-flight response (p. 48). Meaningful to my rationale, Barry asserted, "as we physically experience the fight-or-flight response, an emotional memory is laid down to guide future action. The greater the impact of the emotional experience, the more deeply the emotional memory is etched" (p. 59). Referring to "how important emotional processing is to perception," Barry stated, "Without it, we are in fact lost, and could not function adequately in everyday life" (p. 48). Furthermore, Barry (2005) asserted, "In the process of our becoming, visual communication plays a crucial role, one that is particularly vulnerable to emotional learning and to manipulation by political, economic and other vested interests" (p. 58).

Accentuating the importance and power of visual communication, Schneider (2017) stated, "images hold the potential power to change reality itself by means of people's

imagination, that is, by changing how people think and make decisions about the future" (p. 234). It is because "imagery has the power to engage at an affective, emotional level" that, in the context of climate change discourse, visual communication is of paramount importance (O'Neill, Boykoff, Niemeyer, & Day, 2013, p. 414). In keeping with the aforementioned sentiments, Burke, Ockwell, and Whitmarsh (2018) stated, "insights from social psychology based research on climate communication emphasise that behaviour change will not occur without both cognitive engagement (people need to understand the issue) and affective or emotional engagement (people need to care about the issue)" (p. 95).

Correspondingly, in a qualitative study exploring the perception of climate change images by the public, Nicholson-Cole (2005) stated, "it [is] easier for participants to visualise present and future climate change issues in relation to their personal lives and those of their families" (p. 265). Simply put, climate change imagery that have people in them are more likely to be personally meaningful to the viewer. Climate imagery that contains, for example, "a lexicon of 'cause' and 'solution' icons," as well as portrays the human subject, may help to close the emotional distance between here-and now-climate change and climate change of the future (Braasch, 2013, p. 35). In addition, this type of imagery may evoke a sense of responsibility, increased concern, and a willingness to act (Braasch, 2013).

Nikolajeva (2014) stated "in reading images, we project our own embodied emotions onto represented figures" (p. 717). Highlighting her work with young children and basic emotions, Nikolajeva drew from cognitive literary theory to highlight the importance of picturebooks to young readers. Putting on center the "vast research within psychology and neuroscience about how children and adults engage with visual stimuli," Nikolajeva stated, "the common misconception about picturebooks is that they are simply are books for very young

children" (p. 711). Distinguishing between picturebooks, "a narrative art form that creates meaning through the synergy of two media, the verbal and the visual" and "books with pictures," Nikolajeva stated, "it is the interaction of text and image that is highlighted as the foremost characteristic of picturebooks" (p. 711). She noted that way adults and children internalize this interaction are similar. However, "empirical research confirms that children respond stronger to visual emotion ekphrasis when it is not supported by words" (Nikolajeva, 2014, p. 718). Nikolajeva stated, "emotional ekphrasis implies a representation of an emotional state by verbal, visual, or multimedial means" (p. 713). Relative to engagement with climate change discourse, "the concept of emotion ekphrasis" highlights the interplay of emotions (e.g., happiness, sadness, anger, fear), especially in relation to the conflict between words and images and self-perceived vulnerabilities (Nikolajeva, 2014, p. 711).

According to Welsh (2007) the term ekphrasis originated in ancient Greece and "was one of the last rhetorical exercises students were taught and the challenge was to bring the experience of a person, a place, or a thing to an audience" (para. 3). According to Squire (2015), "the term *ecphrasis* [alternate spelling, emphasis in original,] has been appropriated to encompass a much wider range of meanings, most notably within the fields of comparative literature, art history, and visual culture studies" (p. 1). Although the meaning of ekphrasis has been broadened over time, its main tenet is that it speaks to visual-verbal relations, especially in regard to the emotional "conflict between word and image" (Welsh, 2007, para. 1).

According to Metag, Schäfer, Füchslin, Barsuhn, and Kleinen-von Königslöw (2016), climate change imagery can "evoke perceptions of salience ('The image makes me feel that climate change is an important issue') and self-efficacy ('The image makes me feel that I can do something about climate change')" (p. 199). Given that "salience and self-efficacy are relevant

preconditions of public engagement" the types of images used to portray climate change issues, while needing to attract attention to climate change issues, must do so with caution (Metag, Schäfer, Füchslin, Barsuhn, & Kleinen-von Königslöw, 2016, p. 208). For example, citing a number of scholars (i.e., Bechara & Damasio, 2005; Kollmuss & Agyeman, 2002; Moser, 2007; O'Neill &Nicholson-Cole, 2009) Burke, Ockwell, and Whitmarsh (2018) stated,

> It is generally agreed that applying visual imagery to the communication of climate change is a powerful tool for emotional engagement, yet authors warn that negative emotions – such as provoked by apocalyptic visions of the future – can be detrimental to the decision-making process and result in denial, distancing, apathy and resignation. (p. 97)

Relatedly, O'Neill and Nicholson-Cole (2009) stated, "fear is generally an ineffective tool for motivating genuine personal engagement. Nonthreatening imagery and icons that link to individuals' everyday emotions and concerns in the context of this macro-environmental issue tend to be the most engaging" (p. 355). Reiterating that stance, Corner, Shaw, and Clarke (2018) stated, "Images of climate change impacts can be overwhelming" and desensitizing (p. 21). For example, "A narrow visual vocabulary currently frames climate change in the public mind: polar bears, melting ice-caps, smokestacks and potentially polarising images of environmental protesters" (Corner, Shaw, & Clarke, 2018, p. 20). The researchers reported that a narrow visual vocabulary can "undermine the effectiveness of outreach activities by failing to engage audiences, and can detract from the reach and value of efforts to engage with the public and communicate the importance of climate change" (Corner, Shaw, & Clarke, 2018, p. 20). According to Metag et al. (2016), "It seems that the most common pictures used in the media either entirely fail to evoke the feeling that climate change is important or fail to make people

believe they can do something about it" (p. 220). So while climate change imagery has the power to engage people at an emotional level, it also has the power to disengage.

According to Kress and van Leeuwen ([1996]2006), "The growing role of pictures [. . .] changes the way information is presented and has implications for *what* [emphasis in original] is presented" (as cited in Forcefield, 1999, p. 164). The *what* they were referring to concerns, in part, both the singular points of view arising from a reader's-viewer's "gender, age, and cultural backgrounds" and the "authorial intentions that underlie pictures" (Forcefield, 1999, p. 173). Given that the strength and duration of an individual's motivation to act in response to climate change may be dependent on the strength and duration of one's emotional response to climate change, how pictures are visually framed for the public eye may affect the way climate change is sustained in the public mind. Highlighting the need for people to be at the center of climate change, Braasch (2013) stated, "It is the human connection, to each other and to other species, that matters more now than the pure science and distant destruction" (p. 39). That is not to say that climate change science is not important, especially in regard to placing ourselves within the context of a climate changing world.

Climate Change Science

Marotzke et al. (2017) proclaimed, "The 2015 Paris Agreement at COP21 [Conference of Parties] has liberated climate research from discussing what is already known —the world is warming and humans are largely responsible" (p. 89). According to Sample (2005), "Svante Arrhenius, a chemist who became Sweden's first Nobel prizewinner" had published calculations to the same effect in 1896, 119 years earlier.

The carbon cycle. Unrestrained greenhouse gasses, primarily CO_2 emissions, are a legitimate concern for those examining the hullabaloo surrounding human-induced climate

change. According to Knobbe and Schaller (2018), "atmospheric CO_2 is a dominant control on Earth's climate" (p. 43). Greenhouse gases trap heat. And in moderation that is desirable. In fact, the stable temperature of the Holocene, the past 11,500 year period in which human societies and the ecosystems they depend on, has evolved under climatic conditions "with century-to-century average global temperatures varying by no more than plus or minus 1° C." (McMichael, Woodward, & Muir, 2017, p. 10). Thus far, according to NASA (2018), greenhouse gases have "act[ed] as a thermal blanket for the Earth, absorbing heat and warming the surface to a life-supporting average of 59 degrees Fahrenheit" (para. 1).

Earth is the only known life sustaining planet, owing its success to a life-favorable greenhouse gas effect. Too much greenhouse effect creates climatic conditions such as those found on Venus, a planet whose "surface temperature is hot enough to melt lead" or Mars, a planet frozen due to not enough greenhouse gas effect (NASA, 2018, para. 1). Under those scenarios, CO_2 can be thought of as a "planet-killer" (Loris, 2009). CO_2 can also be thought of as a global temperature thermostat. Because "carbon-climate feedbacks can enhance either sources or sinks of CO_2" CO_2 concentrations can work to increase or decrease temperature (Canadell et al., 2010, p. 304). In addition, CO_2 is responsible for "80% of the current growth in climate forcing" and may have synergistic effects on other greenhouse gases (Canadell et al., 2010, p. 302). For example, according to Canadell et al. (2010) "a recent spike in concentration suggests that methane emissions are highly sensitive to climate fluctuations, and thus possibly to climate change, and wetland distribution" (p. 303). Methane (CH_4), along with nitrogen oxide (N_2O) and CO_2, is among the "three strongest and most important long-lived [a hundred years or more] GHGs" (Ask the Experts, 2014, p. 17). This is important because an understanding of

how carbon interacts with other biogeochemical cycles may be critical to Carbon Dioxide Removal (CDR) efforts and our successful adaptation to climate change.

CO_2 emissions are inextricably tied to temperature fluctuations and, as of the industrial revolution, to human activity. During the Holocene, the period of time in which humankind was learning to dominate Earth's ecosystem processes, nature has moved its carbon in-and-out of its carbon stocks, without much variation on climate. Now, however, the carbon flux and feedback cycles characteristic of that period have been disrupted by the extra carbon being released through anthropogenic activities, such as fossil-fuel burning, deforestation and other land-use changes, as well as industrial endeavors. For example, "on average, 1.9 tonnes of CO_2 are emitted for every tonne of steel produced. According to the International Energy Agency, the iron and steel industry accounts for approximately 6.7% of total world CO_2 emissions (World Steel Association, 2011, p. 4). An additional 5 percent of the world CO_2 emissions comes from concrete production. According to Mohammed, Caruso, Elkamel, Croiset, and Douglas (2008), "concrete is the world's most important construction material, and for each tonne of Portland cement (an essential component of concrete) produced, approximately one tonne of CO_2 is emitted to the atmosphere" (p. 482).

CO_2 is created when a carbon atom and 2 oxygen atoms are combined either through photosynthesis, respiration, or combustion. According to Schulze-Makuch and Irwin (2008), "Carbon is the universal building block for life as we know it" and is found in all living and some non-living things, like diamonds, one of the hardest substances known to man, and graphite, one of the softest (p. 89). It is the sixth most common element in the universe (Pappas, 2017, para. 5) and makes up 18 % of our bodies (Schirber, 2009, para. 14). It is an essential element. However, in the last 150 years, CO_2 emission levels have increased at a rapid rate:

from preindustrial CO_2 emission levels of 280 ppm's, to today's level of over 400 ppm's. Because temperatures rise as CO_2 levels rise, an understanding of the carbon cycle is a prerequisite to understanding global warming.

On Earth, carbon is primarily contained in one of four major carbon reservoirs; the atmosphere, ocean, land, and the earth's crust. The latter being the largest and from which fossil fuels are derived. Carbon reservoirs both emit and store carbon. Carbon flux occurs when carbon moves from one reservoir to the next. For example, carbon that is released from the earth's crust via the burning of fossil fuels or land-use changes, such as deforestation, is captured in the atmosphere where through geophysical and chemical processes, it is absorbed (primarily) into the ocean. Carbon reservoirs, also known as carbon pools or stocks, can act as a carbon source (carbon emitting) or as a carbon sink (carbon absorbing). Prior to the Industrial Era, conditions were such that the ocean, the world's largest store of CO_2, had a balanced proportion of CO_2 emitted through gaseous exchange between the ocean's surface water and the atmosphere and received through natural sources such as, volcanoes, forest fires, and weathering (Gabel, 2010, para. 8). Now, "however, since carbon concentrations in the atmosphere have increased, the ocean now takes more carbon from the atmosphere than it releases" (NASA, 2016, para. 9). As a consequence, the oceans are becoming saturated with CO_2, resulting in ocean acidification and stored carbon that will eventually release back into the atmosphere. According to Harde (2017), "the IPCC estimates that about 15–40% of the additional emissions cannot further be absorbed by the natural sinks and are accumulating in the atmosphere" (p. 25). Understanding the carbon cycle, or more specifically, understanding how carbon sinks, such as oceans and forests, "sequester or release CO_2 to or from the atmosphere is important to understand as mankind alters Earth's climate with the burning of fossil fuels" (Gabel, 2010, para. 2).

According to Ciais et al. (2010), “The feedbacks between climate change and the carbon reservoirs are not well known or understood. The spatial and temporal distribution of natural sinks over land and oceans remains elusive, which precludes better quantification of their underlying mechanisms and drivers” (p. 7). What is known is that “the removal of human emitted CO_2 from the atmosphere by natural processes will take a few hundred thousand years” (Harde, 2017, p. 25). Joos et al. (2013) found, in a “carbon cycle-climate intercomparison project,” that even in the short term, “ for a 100 Gt-C emission pulse added to a constant CO_2 concentration of 389 ppm, 25±9% is still found in the atmosphere after 1000 yr; the ocean has absorbed 59±12% and the land the remainder (16±14 %)” (p. 2793).

Carbon reservoirs are enormous. For example, the Earth’s crust stores 100,000,000 PgC (Petagrams of carbon), the oceans stores 38,000 PgC, the atmosphere stores 750 PgC, and plants and soil add an additional 2060 PgC. A “Petagram (Pg), also known as a Gigaton (Gt), is equal to a billion (1,000,000,000) tonnes” or 2.2 trillion pounds (Globe Carbon Cycle, 2009, p. 4). Carbon, and its varied compounds, move back and forth between reservoirs, albeit very slowly. It is this slow, but balanced movement that is responsible for the Earth’s previous climate stability. It is widely accepted by the scientific community that the anthropogenic CO_2 emissions that humans contribute to this movement is responsible for global warming. In fact, “the greater the climate expertise among those surveyed, the higher the consensus on human-caused global warming” (Nuccitelli, 2016, para. 2). CO_2 and other greenhouse gases, such as Methane (CH_4), Nitrous oxide (N_2O), and Chlorofluorocarbons (CFCs) function as either a “forcing” or feedback mechanism, or both. It is these forcing and feedback mechanisms that modulate the greenhouse effect. According to Harde (2017), “a better understanding of the carbon cycle is a necessary prerequisite for all future climate change predictions” (Harde, 2017,

p. 25). The reality is that the Earth's carbon reservoirs can't keep up with global anthropogenic CO_2 emissions. A better understanding of the carbon cycle is also key to understanding the consequences of environmental exploitation, i.e., the loss, dispersal, and migration of terrestrial and aquatic species, deforestation, and fossil fuel depletion. This understanding may, in turn, trigger a responsibility to protect—not only ourselves but future generations and essentially all life. After all, it should come as no surprise that "We can dump only so many billion tons of CO_2 into the atmosphere before there are dire consequences" (Heal, 2017, p. 76).

Forests and environmental exploitation. According to Steffen, Crutzen, and McNeil (2007), because of global warming "The Earth is rapidly moving into a less biologically diverse, less forested, much warmer, and probably wetter and stormier state" (p. 614). Nowhere, at this moment, is the presence and impact of global warming felt stronger than in the forestry sector. As described by Organization For Economic Cooperation Development (2013), "Forests are among the most diverse and widespread ecosystems on earth, and have many functions; they provide timber and other forests products; have cultural values; deliver recreation benefits and ecosystem services, including regulation of soil, air and water; are reservoirs for biodiversity; and act as carbon sinks" (p. 44).

Unfortunately, the "world's rapid population growth over the last century" has diminished the forest's capacity to provide the ecosystem services that we have come to rely on (Hinrichsen & Tacio , 2002, p. 1). Forest loss may have catastrophic consequences for humanity. According to Keong (2016), "1.6 billion rural people worldwide depend on forests to some extent for their socio-economic sustenance" while "1 billion out of 1.2 billion extreme poor in the world depend on forest resources for all or part of their livelihoods" (p. 1006). Additionally, "over three quarters of the world's accessible fresh water comes from forested

watersheds and two thirds of all major cities in developing countries depend on surrounding forests for their supply of clean water" (Fabricius, 2011, para. 12).

Forests are important in many ways. For example, "while forests cover nearly 30% of the Earth's surface, they are home to 80% of the world's terrestrial species of animals, plants and insects" (Prolman, 2017, para. 6). Human life, to some extent, is dependent on forest biodiversity. According to Singh and Islam (2012) "Humans use at least 40,000 species of plants and animals on a daily basis" (p. 150). In agreement with just how important forests are, Keong (2016) stated, "Apart from serving as a supply base for production input and human needs such as food, water, raw material, the tropical rainforests also represent a rich reservoir for medical plants and herbs," adding, "3.5 billion people in the developing countries rely on plant-based medicine for their primary health care*"* (p. 1006). The takeaway in this section is that according to Vince (2017), "Humans have the power to heat the planet further or to cool it down, to eliminate species and engineer new ones, to resculpt the terrestrial surface and to determine its biology (p. 6).

Ocean acidification. According to Keong (2016), "it is indisputable that the climate regulating services provided by oceans touch the core of human existence" (p. 1007). Given that oceans produce 70 to 80 percent of the world's oxygen that seems a reasonable enough statement (Witman, 2017). In addition to providing that life-sustaining eco-service, the "world's oceans are the main source of protein production for 3 billion people; are directly or indirectly responsible for the employment of more than 200 million people; and contribute $270 billion to the planet's gross domestic product" (Lubcheno, Cerny-Chipman, Reimer, & Levin, 2016, as cited in Alexander, 2017. para. 5). Recent human activities, however, have put the oceans at risk for oceanic carbonate system failure (Hofmann & Schellnber, 2010). According to Feely et al.

(2010), "when anthropogenic CO_2 is absorbed by seawater, chemical reactions occur that reduce seawater pH, concentration of carbonate ion , and the saturation states of the biominerals aragonite and calcite" (p. 442, see also Boyce, Lewis, & Worm, 2010).

Ocean acidification, the term commonly used to describe those chemical reactions, disrupts the web of food chain by altering primary production, defined here as "the synthesis and storage of organic molecules during the growth and reproduction of photosynthetic organisms" (Coutts & Hahn, 2015, p. 9774). According to Burd et al. (2016), "The net transfer of organic matter from the surface to the deep ocean is a key function of ocean food webs. The combination of biological, physical, and chemical processes that contribute to and control this export is collectively known as the 'biological pump'" (p. 5). The biological pump is one of three ocean vertical pumps, the others being the solubility pump and the carbonate pump: Together they control the "biologically mediated biogeochemical fluxes of carbon in the changing ocean" (Legendre, Rivkin, Weinbauer, Guidi, & Uitz, 2015, p. 433). These pumps are the mechanisms that move carbon; via photosynthesis and respiration, decomposition, fecal matter, and pressure from the ocean's surface to the deep depths (Sigman & Hain, 2012). The importance of these pumps, to both marine life and human life cannot be overstated. For example, "It has been estimated that natural atmospheric concentrations of CO_2 are almost 200ppm lower than they would be without the transport of organic material produced in the surface ocean to depth" (Barange et al., p. 1). However, "the magnitude of the BCP [biological carbon pump] is predicted to decline in response to global climate change, resulting in reduced ocean carbon storage and hence increased atmospheric CO_2 levels" (Henson et al., 2011, p. 1). The biological pump "is critical in setting the distributions of nutrients in the mesopelagic ocean, which ultimately, through upwelling and vertical mixing, determine the distributions in the upper

ocean and hence the biodiversity and ecology of the surface ocean" while "the carbonate pump which is an important part of the biological export controls the rates of acidification in the world's oceans" (Burd et al., 2016, p. 60). An overloading of these pumping mechanisms puts life in the ocean, as well as life on the terrestrial surface, in peril.

Ocean acidification is a result of human-induced CO_2 emissions. According to Doney (2009), "the cumulative human CO_2 emissions over the industrial era now amount to close to 560 billion tons" with about half that remaining in the atmosphere and the other half absorbed by the land and ocean carbon sink (p. 17). To emphasize the impact of human-induced CO_2 on the ocean, Kolbert (2006) stated, "humans have pumped enough carbon into the oceans—some hundred and twenty billion tons—to produce a .1 decline in surface pH" (p. 2). There is cause for grave concern if we use as a reference point the ph level in the human body: "a drop of 0.1 pH units in human blood pH can result in rather profound health consequences, including seizures, heart arrhythmia, or even coma" (Goodwin & Lee, 2016, p. 82). Correspondingly, Feely (2010) stated, "the ocean's daily uptake of 22 million tons of carbon dioxide is starting to take its toll on the chemistry of seawater (p. 8). Feely, Sabine, and Fabry (2006) illuminated, "When carbon dioxide is absorbed by the oceans it reacts with seawater to form carbonic acid" (p. 1). Carbonic acid interferes with the "fundamental physiological processes such as respiration, calcification (shell/skeleton building), photosynthesis, and reproduction" in marine organisms (Goodwin & Lee, 2016, p. 82; see also Hoegh-Guldberg et al., 2007). Specifically, carbonic acid has a negative effect on some marine life by reducing the availability of aragonite and calcite, the mineral building blocks needed by small marine organisms, such as coccolithophorides, foraminifera, and pteropods [planktonic animals] to create "external calcium carbonate skeletons" (Orr, p. 681). According to Hofmann and Schellnhuber (2010),

"Coccolithophorides and foraminifera, which sit at the front-end of the marine food chain, play an important role in sustaining the biological carbon pump. Planktonic foraminifera alone contribute between 25 to 50% to the total amount of the oceans' biogenic calcification" (p. 1889). Additionally, Hofmann and Schellnhuber (2010) stated, "pteropods are regarded as one of the most important components of the food web in the Arctic and Antarctic oceans. Their loss would have tremendous consequences for polar marine ecosystems" (p. 1889). According to Doney (2006), "these tiny creatures constitute a major food source for fish and marine mammals, including some species of whales" (p. 62). Additionally, it is reported, by "generating roughly half the planetary primary production, marine phytoplankton affect the abundance and diversity of marine organisms, drive marine ecosystem functioning, and set the upper limits to fishery yields" (Boyce, Lewis, & Worm, 2010, p. 591). Unfortunately, as Boyce, Lewis, and Worm (2010) have observed, "global phytoplankton concentration has declined over the past century" (p. 591). Declining phytoplankton concentration may lead to marine community and ecosystems shifts, as well as have societal consequences (Gooding, Harley, Tang, & Brown, 2009; Przeslawki, Ahyong, Byrne, Worheide, & Huthings, 2008). Adding more depth to the topic, Worm et al. (2006) warned, "the elimination of locally adapted populations and species not only impairs the ability of marine ecosystems to feed a growing human population but also sabotages stability and recovery potential in a rapidly changing marine environment" (Worm et al., 2006, p. 790). Highlighting that plight, Urban (2015) stated, "Even species not threatened directly by extinction could experience substantial changes in abundances, distributions, and species interactions, which in turn could affect ecosystems and their services to humans" (p. 573).

Species that depend on coral reefs, for example, are subject to substantial ecosystem changes. According to Hoegh-Guldberg (2007), "coral reefs are among the most biologically

diverse and economically important ecosystems on the planet, providing ecosystem services that are vital to human societies and industries through fisheries, coastal protection, building materials, new biochemical compounds, and tourism" (p 1737). Corals, as well as clams, oysters, lobsters, and sea urchins are among the oceans' many calcifying organisms. Recall that calcifying organisms need aragonite and calcite to build and maintain their shells/exoskeletons and that ocean acidification reduces the availability of those essential minerals. Research has demonstrated that ocean acidification has been shown to cause shells to exhibit decreased growth rates, deform, or dissolve (Fabry, Seibel, Feely, & Orr, 2008; Gooding, Harley, Tang, & Brown, 2009; Kleypas, 1999). Alarmingly, "general predictions are that ocean acidification will be detrimental to reef growth and that 40 to more than 80 per cent of present-day reefs will decline during the next 50 years" (Maier, Watremez, Taviani, Weinbauer, & Gattuso, 2012, p. 1716).

In addition to the ocean becoming more acidic, the ocean is also warming. It is estimated that "over 90% of the total heat accumulated in the Earth's climate system goes toward warming the ocean (Bindoff et al., 2007; Church et al., 2011, as cited in Abraham, 2013, p. 468). Gooding et al. (2009), in their study of "the sea star *Pisaster ochraceus* [emphasis in original], a keystone predator" noted: "elevated temperature and CO_2 have synergistic negative effects on the calcification rates of tropical corals" (p. 9316). For example, rising temperature is responsible for coral bleaching: "when water temperatures rise too high, corals lose--or perhaps expel, no one is quite sure--the algae that nourish them. (The process is called 'bleaching,' because without their zooxanthellae [algae] corals appear white.)"(Kolbert, 2006, p. 6). According Kolbert, "Joanie Kleypas, a reef scientist at the National Center for Atmospheric Research, in Boulder, Colorado" offered what could be considered a full perspective: "While one, bleaching, is an acute stress that's killing them off, the other, acidification, is a chronic stress that's preventing

them from recovering" (p. 7). Ominously, Hofmann and Schellnhuber (2010) stated, "Since invertebrates such as pteropods, sea urchins, and brittlestars which form calcerous skeletons are main components of the marine food web, their disappearance would have disastrous consequences for marine life and associated human livelihoods" (p. 1895). Kolbert stated, "Taken together, acidification and rising ocean temperatures represent a kind of double bind for reefs: regions that remain hospitable in terms of temperature are becoming increasingly inhospitable in terms of saturation, and vice versa" (p. 7). Underscoring the situation, Parks (2010) stated, "sea life conditioned to the current alkalinity probably won't have time to adapt to rapid increases in acidic conditions" (p. 20). Gooding et al. (2009) emphasized, "Anthropogenic climate change poses a serious threat to biodiversity. In marine environments, multiple climate variables, including temperature and CO2 concentration, are changing simultaneously" (p. 9316). However, based on their research with the sea star, which instead of a shell "has hundreds of tiny calcareous ossicles embedded within and connected by soft tissue" Gooding et al. (2009) cautioned that we should not be too hasty to draw conclusions (p. 9316). According to Gooding et al. (2009), "increased temperature and CO2 had positive and additive effects on sea star growth rates" (p. 9317). In regard to ocean and climate change, a new knowledge baseline is being created almost daily as novel experiments are being carried out and new climate change models created, which may be why Gooding et al. (2009) concluded, "responses to anthropogenic climate change, including ocean acidification, will not always be negative (p. 9319). Dustan , Doherty, and Pardede (2013) offered this counterpoint, however, "globally, coral reef decline is embodied by the loss of coral cover, which is itself a proxy for reduced structural complexity analogous to terrestrial deforestation" (p. 9). While the jury may be out on the full ramifications of global warming, the verdict seems clear, "There is sufficient evidence

proving ocean acidification threatens our futures and cannot rationally be ignored" (Parks, 2010, p. 21). Urban (2015) warned, for example, "extinction risks from climate change are expected not only to increase but to accelerate for every degree rise in global temperatures" (p. 573). Similiarly, Hofmann and Schellnhuber (2010) stated,

> Future research should focus on the investigation of the synergistic long-term effects of the different individual processes triggered by ocean acidification. Research in the field of ocean acidification is still in its infancy and, hence, our understanding of its repercussions on marine biota, the preservation of carbonate sediments, etc. is far from being complete. It is now the responsibility of the humanity to avoid a dangerous interference with the climate system and start to reduce anthropogenic emissions of CO_2, immediately. (p. 1895)

One thing from climate research appears certain, "understanding the observed magnitudes and patterns of the factors influencing global CO_2 emissions is a prerequisite for the prediction of future climate and earth system changes and for human governance of climate change and the earth system" (Raupach, Marland, & Ciais, 2007, p. 10288). However, as indicated in the sub-text of that statement, public understanding of climate change must be accompanied by "civic engagement with the issue," that is, if we are going to bring about a reduction of actual and potential harm climate change can cause (Moser, 2004, p. 34). According to Steffen et al. (2011), "We are the first generation with widespread knowledge of how our activities influence the Earth System, and thus the first generation with the power and the responsibility to change our relationship with the planet" (Steffen et al. 2011, p.757).

Climate change is, first and foremost, an Earth ecosystem health issue, and by extension a human public health issue (Keong, 2016; Boeckmann & Zeeb, 2016; McMichael, 2013). Keong

(2016) stated, “indeed, man’s continued existence hinges on maintaining ecosystem health” (p. 1004). Unfortunately, “due to air and water pollution, habitat destruction and temperature change, extreme biodiversity loss continues unabated” (Burns & Tobin, 2017, p. 149). According to Smith (2008) “the emergence of historically rapid climate change in the twenty-first century adds new and urgent dimensions to the age-old challenges of public health due to poverty, inequity, ignorance, complacency, counterproductive personal behavior, conflict, infection, and environmental stress” (p. 11). Sadly, although “the rich will find their world to be more expensive, inconvenient, uncomfortable, disrupted, and colorless—in general, more unpleasant and unpredictable, perhaps greatly so. The poor will die” (Smith, 2008, p. 11). For those that do not die, “climate change is likely to make hard lives even harder” (McMichael, Montgomery, & Costello, 2012, p. 26).

Lubchenco, Cerny-Chipman, Reimer, & Levin (2016) stated, “the grand challenge for humanity is to meet the basic needs of people in an equitable manner today while simultaneously restoring and maintaining ecosystem functioning for future generations” (p. 14507). Part of this challenge involves sustained engagement with climate issues, however, as Moser (2004) noted, “nothing holds anyone’s attention at consistency high levels over long periods of time. Such an expectation for climate change would be entirely unrealistic” (p. 43). Providing the right incentives for sustained engagement with climate issues is paramount to mitigation and adaptation strategies. Pointing to an “affective gap,” Burke, Ockwell, and Whitmarsh (2018) stated,

> It is argued that some of the obstacles to personal engagement with climate change are in part due to the fact that the very idea of ‘climate’ is a statistical phenomenon; measured on timescales frequently longer than human lives (e.g. Hulme, 2009). This type of

> abstract information relies on analytical processing of second hand information, rather than emotional understandings based on lived experience (Epstein, 1994; Weber, 2006). This, in turn, creates a perception that climate change affects temporally and geographically distant people, and is therefore perceived as irrelevant to people's day-today lives. (pp. 95-96)

This distancing of climate change, as occurring downstream and not in our backyards, is part of the collective disconnect that climate change scholars are trying to address. For example, Burke, Ockwell, and Whitmarsh stated, "achiev[ing] affective public engagement with climate change [. . .] might hold the key to unlocking broader climate compatible behaviour change" (p. 95). Furthermore, citing Chawla, (1998,1999) and Kollmuss and Agyeman (2002), the researchers stated, "an emotional investment appears to be very important in shaping values, attitudes and beliefs about the natural world and the stronger a person's emotional reaction the more likely they are to engage in pro-environmental behavior" (p. 97).

On a personal note, I became an active participant in combating climate change when Elaina was diagnosed with cancer. According to Keong (2016), "more than 2/3 of all medicines with cancer fighting properties come from rainforest herbal or medical plants" (p. 1006). It is disheartening to think that a cure for her cancer (or anybody's cancer) may be loss due to deforestation. Although a cure is too late for her, there are others. In speaking to our relationship with others, Kiehl (2016) stated,

> if our relationship is rooted in a sense of attunement and caring, then we truly value the material world around us. We value the lives of others who are affected by our actions. Our sense of relating would be empathically in tune with the world, which would mean that our decisions would include not just our interests but the interests of others. (p. 98)

I can't tell to you, specifically, how to locate climate change in your everyday lived experience, or how you can "generate sustained and constructive engagement with the issue of climate change," but I can tell you that if your motives for climate change engagement are altruistic and come from your heart, you will likely make a positive impact on your world, and the world of those around you (Moser, 2004, p. 37).

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Reflection

Recall from the introduction that I was running, hiding actually, from death. Facing death is not an easy thing to do. With *Living with Loss in the Anthropocene* I set out to discover what the hullabaloo surrounding climate change was all about while taking my mind off the cancer that was eating my wife (ironically, I had to put my mind to climate change and cancer research in order to do that—take my mind off of it). What I found, in the case of end stage liver cancer, was that there was nothing that could be done. Elaina was diagnosed with that accursed disease at about the same time I was imagining the substance of the Anthropocene Adventurer. Being the darling that she was, she would sometimes help me with my school projects (see pictures of her in Appendix B). This project would be our last. She would die midway through its completion. The diagnosis of liver cancer simply came too late. An earlier diagnosis would not have changed the prognosis much, but it would have given us more time to do some of *the everything that we always wanted to do*. When Elaina was diagnosed, she was given 6-12 months to live. We didn't have the time to change our quality of life. Given the news that Elaina was dying, we, she and I, started to notice how time and place gained singular significance. We started to question what was important in life. In so doing, we unknowingly, as Willox (2012) put it, "extend[ed] the concept of a mournable body beyond the human in order to frame climate change as the work of mourning" (p. 141). Ultimately, how to equate human grief and loss to climate change is what this project was about. She would have been so proud to see how this project turned out. She would have been pleased, I think, to hear me conclude, "You know what honey?" "The five stages of human loss and grief can be seen as synonymous to stages of climate grief and end-stage liver disease is synonymous with climate change." I know she would have smiled to hear me say, "The Sky *is* Falling! Henny Penny." She might

have even laughed, though our laughing days were pretty much over.

Climate change scholars have suggested that a turn to the Kubler Ross Grief Cycle; Denial, Anger, Bargaining, Depression, and Acceptance may help to lessen the emotional divide that can be created by the often invisible and distant effects of climate change. The suggestion is that if we personify climate change, perhaps as I have in linking human loss and grief to the abstraction of climate change, the emotional distance will close and the invisible will become visible. Elaina would not have been pleased to see me give (figuratively) climate change her face. I mean, sure we would have agreed that climate change needs a face, just not her face. Nor would she have cozied up to the idea that our last hug, our last kiss, our last I love you could have been thought of as an extinction event. Perhaps, as I think about it now, she would have appreciated that I've come to the epiphany that climate change has everyone's face. Humankind are the cancer that is causing climate change.

This project had several moving parts, and less developed was the aspect of learning to live and die in the anthropocene. Though I realized that I would have to divide my time between thoughts of Elaina, cancer, climate change, and how I would present these thoughts to an audience, I didn't realize how much of Elaina would be lost in the "research". It was one thing to read *Intergovernmental Panel of Climate Change* reports and "MedPage Today" articles looking for answers and explanations and another to remember crying as I told my brother that my getting cancer smart or climate change smart didn't prevent Elaina's death. I didn't even notice how weak she was getting. She never complained, even after the cancer had eaten the crest of her ilia and it had become difficult to stand, sit, or even lay down.

What I found when I researched climate change research was that issues embedded in climate change discourse; fossil fuel burning, deforestation, ocean-acidification, and human

population growth, for example, all point to sustainability concerns and warrant immediate action. That action, is swayed by our sense of agency, which in this case is influenced by positive or negative opinions of the reality of climate change. In a nut shell, we can either believe climate change is real and act in our best interest, or we can choose to believe that climate change is much ado about nothing, and do nothing except let future generations deal with the climate problems being caused today. This latter perspective is counter-productive to producing the kind of mind-set that is needed to abate the ill effects of climate change. Pointing to a need for a paradigm shift, Braasch (2013) stated,

> It is the human connection, to each other and to other species, that matters more now than the pure science and distant destruction. Climate scientists are still giving the facts, but many are also publicly expressing concern for their fellow humans. People still need to understand the physical changes caused by excess greenhouse gases, and the more they see those close to home who are harmed by climate disasters, the more they will comprehend changes around the world. With that will come inspiration from images of those whose actions are reducing the damage and creating a better future for everyone. (p.39)

To move people from "investigation into Climate Change science being driven by 'curiosity' or 'in pursuit of Climate Change knowledge'" to a standpoint of climate change as being a personal tragedy and a social problem may not be easy (Muhammad Ishaq-Ur, 2013, p. 5). We need to personify it, perhaps as I have, and put a face to it. A cancer face worked for me.

> One of the penalties of an ecological education is that one lives alone in a world of wounds. (Leopold, 1953, p. 165)

The *Anthropocence Adventurer* K-12 Teaching and Learning Document

Okay, remember that hoodwinking I promise not to give you? The *Anthropocene Adventurer* K-12 Teaching and Learning Document is less of a how to teach climate change and more of a why to teach climate change document—a heuristic. As such, I never intended to include a catch-all lesson plan. I apologize if that was what you were expecting. Instead, what I offer is advice. Climate change tipping points are seen as happening in the not so distance future. Students in the classroom now, as well as students in classrooms in the near future, will reach these tipping points as they come of age. It makes for better-than-best practice to develop a teaching pedagogy that incorporates elements of climate change into every lesson. Surveys conducted by Reynolds, Bostrom, Read and Morgan, (2010) have indicated that even "relatively well-educated laypeople [. . .] did not have a clear understanding of these facts [i.e. global warming is caused by increased atmospheric carbon dioxide, and fossil-fuel combustion is the major source of atmospheric carbon dioxide]. Instead, their mental models of the climate issue were encumbered with many secondary, irrelevant, and incorrect beliefs" (p. 1536). What we believe are the "facts" of our reality guide our emotional response to that reality. In other words, our emotions guide the decisions we make. In this paper I argued that the perceived distance (spatial and temporal) and invisibility of climate change may lead to a lack of affective response. Without an affective connection to climate change, climate change may not gain significant meaning enough to enact pro-environmental behaviors.

Because I am cognitively mature, I have been able to use human loss and grief as an entry

point to climate change discourse. Children will need other entry points. There are a large number of age appropriate lesson plans available in the Common Core State Standards and Next Generation Science Standards, for example, to draw from. By incorporating climate change discourse into one's teaching pedagogy, children's emotional investment to climate change may increase along with their climate change knowledge. Providing children with multiple points of entry to climate change discourse may enable students to make an emotional connection between climate change and their lives. It is my belief that with a focus on climate change in schooling, the young adults that emerge from our secondary schools will be better equipped to handle the everyday of climate change. It is, after all, their world that is being transformed.

In closing, I have used a snapshot of my life story, as told through personal narrative and visual communication (see Appendix A), to convey a message of the importance of making climate change personal. What I didn't convey in this paper is how I used critical theory and the art form of culture jamming, which is "aimed at breaking an existing chain of signification," to frame the digital photo collages I created for the *Anthropocene Adventurer* (Levine, 2017, p. 119). Climate change is more than polar bears on thin ice or changing landscapes. Bringing this up now is to wed authorial intent to the images. The climate change imagery in Appendix A should be of note. It is climate change as seen through my eyes.

Leopold, in the epigraph at the beginning of this section, frames the image of an environmentalist as having to go it alone, against great odds, and at personal expense. Leopold follows the epigraph statement with the following:

> Much of the damage inflicted on land is quite invisible to laymen. An ecologist must either harden his shell and make believe that the consequences of science are none of his

> business, or he must be the doctor who see the marks of death in a community that believes itself well and does not want to be told otherwise. (Leopold, 1953, p. 165)

I prefer to think Leopold as a realistic visionary, not as a pessimist. Besides, he has a point, "we can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in" (Leopold, [1949]1987, p. 181). Non-judgmentally I presume, he stated, "there are some who can live without wild things, and some who cannot" (p. 5). We have all by now heard the idiom, "you can lead a horse to water but you can't force him to drink." It does not mean we (those of us who can't live without wild things) should quit trying to afford the opportunity to others (who can live without wild things) to drink from nature's well. In fact, in light of the time-sensitive nature of climate change, with its actual and potential disruption of human and non-human ways of life, we should lead others to the well more often.

There are so many good things that can be put into this last section that it will be hard not to fashion it like a patchwork quilt. Quilts are sometimes ugly, but I've never known a quilt to be anything but warm and cozy. Meadows and Sterman (2002) stated,

> Sadness. Fear. Anger. I think it's impossible for anyone to understand the state of the earth without feeling these emotions. In our controlled culture, we're not welcome to act them out in public, but we do need to let ourselves feel what we feel. Strong emotions are appropriate. And, if we don't sweep them under the rug, they could be a force for reversing the gloomy trends, which are, almost all, reversible. The only way we will ever engage in a shift to new, sustainable ways of living is by caring and feeling. I don't know about you, but when I really let myself experience the state of the world, my first reaction is bottomless, unutterable sorrow. That moves quickly into outrage. The sorrow I can deal with; the outrage I used to suppress—after all, it might offend someone. Now I use it to

> give me courage. When I get mad, I have to move. With half-suppressed anger, I tend to swing out and do something impetuous and ignorant. But a fully felt, grounded, familiar anger can move me through a lifetime commitment to make things better. (p. 122)

That makes three of us, at least, who through investment in anger feel compelled to act proenvironmentally. I mean, there was "Hope" in Pandora's Box, wasn't there? I would argue that it belongs to the angry. At the very least, hope is worth fighting for. Where would we be if, for example, Rachael Carson hadn't been angered and outraged over the widespread use of the pesticide DDT and the havoc that it brought?

Allow me to share a recent story. Elaina, more so than I, had been raised as a "Christ Believer," for a lack of a better word. We were baptized, independently in our youth, and again as young adults after we were married. We went to church semi-regularly then. As I recall now, it was probably for the children's sake. We saw to it that our kids were circumcised and baptized in accordance with our beliefs. However, life had stricken us with a series of painful blows, the kind that bring into question the benevolence of God. Our religious beliefs were shaken and we quit going to church. In her last days, I begged her to pray with me. She would not. I was crushed by the fact that she might not get into heaven. I brought out the "Good Book" and I prayed. Luckily, I found the passage:"the unbelieving husband is sanctified by the wife, and the unbelieving wife is sanctified by the husband" (1 Corinthians 7:14, King James Version). My faith will allow her to pass through the gates of Heaven. Needless to say, I am a re-believer. And re-angry. It's aggravating to be angry (not to mention un-Christ-like) and it takes a lot of energy and work to stay angry. In Kubler-Ross's Stage Theory, anger is almost always revisited, as are the other categories. Her stages can be more suitably thought of as incomplete processes. Think of that as backing for this textual quilt.

I have been waiting for ladybugs to show up in my backyard, or elsewhere in my life. It's spring. It's bound to happen. Elaina said she was coming back as a ladybug. I now have a permanent pro-environmental attitude towards them. Ironically, this attitude has transformed previously held beliefs about bugs (all life actually). What if something went wrong? What if instead of a ladybug she was reincarnated as a spider? There was a spider in the house the other day and instead of rushing to kill it I got a jar and tissue and caught and released it outside. Let's just say that behavior is not typical for me. It's not the kind of climate action that is going to change the size of my carbon footprint, but it is the kind of action that will help me deconstruct previously held beliefs and ways of thinking and enable me to construct more environmentally friendly views. A break from the typical will save lives.

This next part is rather strange. I found a smoking gun article at the eleventh hour. I think you should see it. So here's my way in, I'm thinking (and that's where it really get weird—when I'm thinking). I'm going to try present the article by using what I am calling "death by bullet point." I've never tried that before so I don't know how well it will work, or if it will work. I've never even used bullet points in a paper before. Suffice it to say, I suspect I will be breaking a number of conventions. Although you will see the credit in the reference section, I'll list the article title below. That way we can get a sense, upfront, of what we are getting ourselves into (I haven't forgotten, dear reader, that you are a companion on this journey. There were many times I wanted to stop to ask you if you were o.k., or what you thought. They would have been rhetorical questions, I know. But as you read this, know you have been in my thoughts. Now that we are near end all I can think to say is, "Fare-thee-well my friends, until we meet again").

The article we will be looking at is, "Affected by nature: A hermeneutical transformation of environmental ethics," a literature review written by Francis van den Noortgaete and Johan de

Tavernier. It was written in 2014. For the purpose of creativity and clarity all citations assigned to a particular bullet point should be considered as having "(as cited in van den Noortgaete & de Tavernier, 2014)" embedded within them. For example, (as cited in van den Noortgaete & de Tavernier, 2014, pp. 572-573) shortens to "([. . .] pp. 572-573)". I will also provide my personal narrative within brackets in the bullet points, all other text should be considered as directly quoted. To be clear, scholars cited within the van den Noortgaete and de Tavernier text are as cited by van den Noortgaete and de Tavernier, however, I will include them in the reference section for your convenience. To place the following in context, the *Anthropocence Adventurer* K-12 Teaching and Learning Document is a sort of environmental hermeneutic in which questions of the anonymity of climate change and expressions of human loss and grief are linked to provide an entry point to the personalization of climate change. Accrediting Paul Ricoeur, van Buren (2013) stated, "the main task of hermeneutics is to clarify and mediate 'the conflict of interpretations' in the world (p. 17).

In their article abstract, van den Noortgaete and de Tavernier (2014) stated, "the value-action gap poses a considerable challenge to normative environmental ethics" (p. 572). I can see that. It's hard to act when you are devoid of feelings. The reviewers examined "insights [from environmental psychology, education, and anthropology] on what effectively motivates proenvironmental behavior. The emotional aspect apparently forms a key element within a transformational process that leads to an internalization of nature within one's identity structure" (p. 572). They tied the bow pretty nicely when they stated, "Hermeneutics is found to play a crucial role in the processes that lead to lasting and consistent motivation toward proenvironmental behavior" (p. 572). Smoking gun, right? We'll see. I only read it once, but it looks promising. Okay, what are we doing with bullet points again? It might be best if I refer to

them as quasi-bullet points since I am stretching the convention to the limit (remember, my voice is contained within brackets):

- [The climate-knowledge and climate-action discrepancy is known as the] "value-action gap" (Flynn, Bellaby, & Ricci 2009), sometimes also referred to as the "attitude-action gap" (Mairesse, Macharis, Lebeau, & Turcksin 2012), "theory-action gap" (Kretz 2012), "intention-behavior gap" (Davies, Foxall, & Pallister 2002), or "moral judgment–moral action gap" (Williams & Gantt, 2012) [No matter what it's called, the affective gap, in an environmental context, points to an emotional disconnect between our individual and collective "selves" and the natural environment]. ([. . .] pp. 572-573)
- Reviewing the body of available research in their 2009 monograph on conservation psychology led Susan Clayton and Gene Myers to conclude that "the link between attitudes or other cognitive constructs and behavior is typically weak or indirect" (2009, 33) [It can be surmised, based on previous climate disasters, when it comes to response to climate change, behavior that is not strong and direct (read preemptive) will have dire consequences]. ([. . .] p. 573)
- Elizabeth Shove deconstructs any overly optimistic expectations by positing that the value-action gap "is only mystifying if we suppose that values do (or should) translate into action" (2010, 1276) [That's an interesting perspective, but counter-productive to saving the human and non-human lives that will be lost due to mismanagement of Earth resources]. ([. . .] p. 573)
- [Seminal affective gap research has aligned rationalistic perspectives found in education models to proenvironmental behaviors]. These models of proenvironmental behavior are based on a linear progression: from environmental knowledge to environmental

awareness and attitudes, which, in turn, are supposed to lead to proenvironmental behavior (Kollmuss and Agyeman 2002, 241). This view continues to be influential, even if research has shown that, in itself, this progression will not lead to the substantial behavioral changes hoped for (Owens and Driffill 2008, 4414). [It can be argued that education is good for everything, however, it can also be argued that education isn't everything]. ([. . .] p. 573)

- So-called "information-deficit" approaches, based on this widely criticized "knowledge-attitude-behavior" model of environmental learning (Goralnik and Nelson 2011, 183) and taking as a premise that providing further information influences attitudes on environmental issues, however, only have a limited impact on actual behavior and fail to durably engage people around the issues dealt with (McKenzie-Mohr 2000, 544; Agyeman and Angus 2003, 359). [For me, trying to personally connect to climate suffering meant addressing research's quantitative-qualitative divide (a partial cause of the affective gap, if you ask me). I found, through climate science and human loss and grief research, that while interesting, factoids about climate change pulled fewer heart-strings than did human element stories. In asking myself, now, "Why?" I suppose the answer is because we, you and I, have a known and lasting relation with human loss and grief, whereas we are just now beginning our life affair with climate change, with all its pleasant and morbid glory. It seems to make sense to apply our lived and collective experience of the human life and death cycle to the "unknownness" of climate change. Especially the part where we love. Love is what makes grief bearable. Love is what makes life durable. Guess what? I'm feeling less angry just thinking about it. The sadness

over Elaina's death will only go away when I die though, I guarantee it]. ([. . .] p. 573-574)

- [After some arguing, recommending, and concurring about "the effectiveness of environmental ethics," researchers (e.g. Barr, 2004; Booth, 2009; Kretz, 2012) concluded,] There indeed is a real risk that, without sufficient attention to the value-action gap, ethics remains a discourse falling short of its normative aim [Reiteration is good. It drives the point home. However, if by "normative aim" researchers mean "staying alive," then an environmental ethics is more of a survival skill than an aim]. ([. . .] p. 574)
- Research results from diverse subfields of psychology and neuroscience, including more recent brain-imaging research, provide indications that emotions play an influential role in moral deliberation (Craigie 2011, 54) and in moral education (McCuen and Shah 2007, 45) [Unfortunately, morals aren't part of the curriculum. At least not in American schools. Schools strive to be value neutral, except for that whole myth of meritocracy (beyond the scope of this present paper) thing. I'm sure that you will agree that the children in school today, and tomorrow, will be instrumental in providing climate change solutions. Perhaps a more humanistic approach in education would lead to healthy and positive environmental emotions. By all indications that is where we need to start, with children and with schools. A turn away from today's romantic education and a return to yesteryear's modern classic education would, perhaps, infuse environmental emotion into future leaders of tomorrow]. ([. . .] p. 574)
- [After some back-and-forth and thoughtful deliberation,] Huebner, Dwyer, and Hauser, however, remark[ed] that the current neuroscientific research cannot really specify at

what point(s) of the moral process emotions arise or intervene, even if there are persuasive indications that emotions do play a role in morality. They even contend that the current evidence remains insufficient to support the hypothesis that emotional processes would mediate moral judgment (Huebner et al. 2009, 1–2). However, they do admit that studies indicate that the most important and primary role emotions might have is precisely in motivating action. [I think everybody is over-thinking climate change and focusing more on problems than solutions. I read recently that if we leave 60-80 percent of our remaining fossil-fuel in the ground then we may be able to stabilize Earth temperature. Just that one act provides countless solutions and we don't necessary need to be emotive to accomplish that. We (and I guess the "we" in this case means they, the powers that be) just need to be less greedy and needy]. ([. . .] p. 575)

- [Addressing the value-action gap can be problematic, for example,] Drawing on available studies of patients with either psychopathy, autism, or acquired sociopathy, Lisa Damm comes to the conclusion that due to their impaired affective capacities, such persons appear unable to display full moral agency. According to her, this suggests that "emotion is not necessary for possessing moral and social knowledge as embodied in rules and judgments. Nor does emotion appear to be necessary for exhibiting behavior that is consistent with moral norms" (Damm 2010, 288). [Additionally,] in this same light, it is interesting to see that in an experiment comparing "moral forecasting" and actual moral behavior, Teper, Inzlicht, and Page-Gould found that persons tend to inaccurately predict (mostly in the negative sense) how they will morally behave in certain situations. According to Teper et al., this is due to the respondents' inability, under experimental conditions, to access the affective component of actual experience in real-life moral

dilemmas (2011, 557). [That's quite the puzzler the researchers have put before us. How do we make decisions of and about the world if we are not fully in the world?]. ([. . .] p. 575)

- Environmental psychology over the last decades has been extensively studying factors that influence human behavior toward the natural environment. [You think? Can you image the economic crisis in the health sector when we are all sick from solastagia or other climate-related illnesses? Not that I think with the bottom line, in fact I argue that it, the bottom line, has led to our current predicament. For example, according to Green Security Alliance (2013) "If world population reached 9 or even 10 billion by 2050 (in the UN HIGH scenario), we may need more than 3 Earth's to accommodate mankind's demands since the specific economic foot-print per person is growing as well (as cited in Oberheitmann, 2013, p. 4)]. ([. . .] p. 575)
- A positive connection to nature often takes root at an early stage of life and remains relatively stable afterwards (Müller, Kals, and Pansa 2009, 60). Research indicates that time spent within "wild nature," in a participative way such as walking, playing, or camping during childhood, has a significant positive correlation with both adult environmental attitudes and behavior. Engaging as a child in more "domesticated" forms of nature such as planting, caring for and harvesting flowers or vegetables on the other hand is positively correlated to environmental attitudes, but only marginally to proenvironmental behavior (Wells and Lekies 2006, 13). There obviously is a clear difference between both types of activities. The experience of nature outside of the agricultural or gardening sphere permits what Bonnett calls an "apprehension of that quality of the *self-arising* in things," which is "beyond human authorship; present from

out of themselves" (Bonnett 2012, 290). Apparently, it is the direct experience in and with nature as truly *other*, not as an object of control, which is significant in motivating care and concern for the natural world. One needs to acknowledge the "silent side" of such childhood experiences, which presume both a receptive and responsive sensitivity to nature (Chawla 1999, 380–81). [For individuals lucky enough to have such exposure to nature, it is intuitive to think that the world has meaning beyond our grasp. We embrace the unknowing and honor nature for the mysteries it provides. For example, in 1964 I was 5 years old. My military family drew duty at Fort Lewis Army Base, Tacoma, Washington. We lived on fort in housing at the back gate, "Old North Fort." I've always referred to it as "God's Country." As fate would have it American Lake was in our back yard, literally. We, the lake and I, were separated only by the fence that ran through the backyard. In retrospect, I think learning to climb a fence was one of the first things I learned to do independently. As a 5 year old, there would be many memorable firsts. Drawing from a previously written work, I'll paint a small picture. "There was a lilac bush on the side of the house that drew hummingbirds that seemed the size of crows. Flocks of them would come and go and I would swing at them in adervish fashion trying to catch one. The old lady's cat would always be there, cheering me on. They were nice, the old lady and her cat. She gave me a fifty-cent piece once, a Benjamin-half, you know, with the liberty bell on the back. It was a '63, hot off the press and it felt like a million bucks. I don't remember how I earned it. I think she just liked me and gave me the coin. I looked out for the cat. We were a devilish sort, the cat and I. I remember the day the neighborhood bully threw the cat in the lake and it drowned. There was nothing I could do but hate him. I remember when the old lady had asked, "Have you seen the cat?" I had

to tell her that the bully had thrown her in the lake and it drowned. The old lady and I would be sad for a long time after that. I didn't know it at the time but I would be sad a lot. Sometimes my conscience would take me to a pond behind the Casteen's house (the neighbors across the street) and I would hunt salamanders like a big game hunter in size 5 tennis shoes. There were a lot of wild times in '64, like the time I climbed a big tree just a little too far and froze at the top for a long, long while, or the time I hit a large wasp nest with an even larger rock. I didn't know it at the time but it would all become memories of a love story." I was a precocious child. I won't bore you with the details but my brother Barry and I were just talking about the "silent side" of growing not just close to nature but growing as a part of nature. Our identities were shaped, in part by our connection to nature. After the divorce of 1967 Stepdad took us to Dover, Ohio. A redeeming quality, to the loss the lake and so much more, was that in Dover there was a 5 acre corn field in our back yard, a bare 5 acre field in our front yard, and most importantly the Tuscarawas River was a block from the house. On our side of the river the levy road ran for several miles. On the other side, the Canal, some say Erie Canal, had only been partially filled in. We were as rural as rural could be. And the trains, boy did we have trains! I love trains! For a very comprehensive glimpse of what used to be my nature, or my childhood home, as it were, visit the Library of Congress website:

https://www.loc.gov/resource/g4084d.pm006840/?r=0.38,0.171,0.203,0.126,0

If you like cartography, you'll be impressed. The map has a nice Ken Burn's type zoom effect. If you like zoom effects, you be impressed. If you like trains, let me tell you, you will be impressed. If you like rivers, you guessed it, you will be impressed. There is a boat on the river in the left-portion of the map. Imagine you are on it and throwing a rock

over the side to the undeveloped housing track near the train. You would hit my childhood home. You can't miss it. That's where I grew up in the late 1960's and 1970's. I missed a lot of school because of that river. Who could blame me? Oh, the stories I could tell you about fishing and trains. My brother lives in Georgia so he visits Dover from time to time. Referring to the wild space in the top right portion of the map, "It's all still there, or most of it," he says. He added, "But, they fenced off the access to the river." Bummer, there's no reason for me to return, now. I would put the map in an appendix but you wouldn't be able to see the detail I am describing so I will trust you will go to the website to increase your experience of this part of the story. I should try to get back on task. Now, where was I?]. ([. . .] p. 576)

- Such participative child experiences [like mine] of nature fall under the "experiential domain of knowledge," gained through the direct personal encounter with a subject, person, or a thing (e.g., a place). It entails knowledge through relationship and involves both cognitive and emotional connections (Burnard 1988, 128). According to Goralnik, Millenbah, Nelson, and Thorp, it is the affective component, as suggested in the language of emotion and in the focus on relationships, which differentiates it from other forms of learning (2012, 417). One could speak of "emotionally engaged learning," considering emotion as an integral piece of the process (Chapman, McPhee, and Prodman 1995, 241). At a later stage of life, such learning is still conceivable but might become less evident, since through formal education and the influence of scientific and economic thought frames, nature will gradually become objectified and seen in utilitarian terms, which tends to weaken the emotional bond between humans and nonhuman nature (Kopnina 2012, 245–46). However, the encounter with nature only occurs authentically "through

the immediate and sensuous engagement with the particularity and manifold suchness of emplaced things rather than through abstraction and intellectually constructed models" (Bonnett 2012, 292). Such an encounter requires a receptive disposition of heart and mind, the "adoption of an attitude that is neither an indifference nor a possessive desiring, but rather a dialogical openness" (Bonnett 2007, 716). [Unfortunately, far too many people never get the chance to commune with nature. Urban sprawl is largely responsible. The tragedy is that, at the same time we are trying to invest, emotionally, in the natural environment, it is disappearing. In turn, this will leave even less opportunities to connect]. ([. . .] p. 576-577)

- Davis and colleagues found that individuals who reported greater levels of commitment to the environment also reported greater proenvironmental behavior. This commitment—over time—can lead to a "transformation of motivation" so that, behaviorally, the well-being of the natural environment is taken into account, highly similar to what happens in interhuman personal relationships (Davis et al. 2009, 175, 178). So, a form of acquaintanceship develops "in which there is a knowing of the embodied by the embodied that, at its deepest level, apprehends the other in its alterity and not primarily as a vehicle or obstacle to satisfying our desires. Taken thus, it can be seen to constitute a kind of love" (Bonnett 2007, 716). [See what I mean by smoking gun? This is exactly what I have been alluding to in this paper. We need to transfer love, and the attendant grief that we feel for each other, to the natural environment. Only then will we care enough about global warming to do something about it]. ([. . .] p. 578)
- Wesley Schultz has linked connectedness to nature with the extent to which an individual includes nature within his/her cognitive representation of self/identity (Schultz 2002, 67–

68). Utsler sees a hermeneutical dynamics at work in this construal of environmental identity, involving a process of repeated interpretation (Utsler 2014, 139–40). He particularly discerns a Ricoeurian dialectics in the development of an "environmental identity," a "self-understanding in relation to the environment" (Utsler 2009, 174). This inclusion of the other (in our case, nonhuman nature) as a part of the concept of self leads to a willingness to act on its behalf. This is a particular application of ideas from within the social psychology of interpersonal closeness: "[t]he extent to which one includes another person as part of the self is a core operationalization of relationship closeness (. . .). Further, as relationship closeness increases, so does empathy and willingness to help" (Mayer and McPherson Frantz 2004, 504). [I sensed that I was on the right track with linking human loss and grief to climate grief in order to gain an appreciation for the earth. At the project's conception, I didn't realize how timely and urgent this avenue of discourse had become. I am enjoying how uniquely death by bullet point is allowing me to join my voice with others. I hope that you, too, are enjoying this blended conversation]. ([. . .] p. 578)

- Encompassing nonhuman nature in one's sense of identity appears to provide a way of overcoming dualism or alienation (Tam 2013, 64). According to Susan Clayton, this encourages conservation behavior, because the object of protection is tied to the self. As a consequence, the motivation to act on nature's behalf becomes internal, rather than external. Considering nature as part of one's conception of identity, however, presumes a certain change in personal worldview, removing oneself as the sole center of things. Susan Clayton rightly points out that such a shift entails limits on human control of the natural environment: "we have to love what we get rather than create what we want"

(Clayton 2003, 60). It seems that a relational paradox, a tension, applies here: encountering and treating nature as genuinely *other*, and as a consequence not under our control, is precisely the prerequisite for letting nature become part of the *self*. [The tragedy is that many of us don't have any nature to other. Not wild nature anyway. We have, for the most part domesticated nature to the point that it is molded in our own image. Because we, some of us anyway, have idolized ourselves, we make nature pay homage when it should be the other way around]. ([. . .] p. 579)

- The importance of sufficient freedom in childhood experiences, enabling what has been called an "emotional access" (*emotionalen Zugang*) to nature is underlined (Eigner and Schmuck 1998, 52). Chawla also found that this kind of informal outdoor activity is reported by environmental activists as the major determinant of their commitment (Chawla 1999, 25). So, the opportunity for emotionally engaging, unmediated experiences of nature, appears to be crucial. Sudden transformative moments or momentary shifts have been documented in the life stories of many environmentalist figures (Hards 2012, 763), but transformative learning usually does not occur in an "epiphanic" manner, rather through a more gradual "active engagement with everyday experience" (Kovan and Dirkx 2003, 107). Already Mezirow, founder of the concept of transformative learning, stated that it can occur either in the form of "accretion" or of a more "epochal" moment (Brock 2010, 136). Walter [2013] too sees the transformative learning of figureheads like Leopold, Carson, and Suzuki overall as gradual processes, integrating rational, emotional, and spiritual elements (2013, 38). This echoes Kovan and Dirkx's own observation that the environmental activists they interviewed also attribute their commitment to deep emotional and spiritual connections with nature, in addition to

the obvious rational side of their professional activities (2003, 109) [I remember my elementary school years as being ones in which I was constantly getting field-trip permissions slips signed. No dairy farm, no public park, no museum was off limits. That was in the 1960's. I don't imagine those places have disappeared. The education system just doesn't promote those activities like they used to. And we wonder why there is an affective gap between our "selves" and the outside world]. ([. . .] p. 582)

- Leslie Sponsel phrases the spiritual aspect within environmentalism, mentioned alongside the cognitive and emotional, as the conviction "that the ecocrisis will be resolved, or at least markedly reduced, only if there is a *fundamental rethinking, refeeling, and revisioning of the place of humans in nature.*" Those involved "believe that religion and spirituality can generate such a profound transformation in many individuals, groups, and societies" (Sponsel 2011, 39; emphasis in original). From this viewpoint, the (immanently oriented) notions of spirituality within environmentalist thought appear to encapsulate the crucial emotional, relational, transformative, and hermeneutical aspects also found within the psychological research on proenvironmental behavior. So, this belief actually is a sound environmentalist intuition, whether or not it is framed in spiritual terms ["only if there is a *fundamental rethinking, refeeling, and revisioning of the place of humans in nature*" certainly bears repeating. Dealing with the devastating loss of Elaina is my way of rethinking my place in the world. Driven by necessity, I have changed because my world has changed. Similarly, my world has changed because I have changed. Circular as that may sound, it, nonetheless, underlies the metamorphism that I have gone through to affect change in the only place I know I truly can, within myself. This change manifests in a spiritual and environmental awakening. For me, this

awakening is a wake-up call. Similarly, climate change could be thought of as a spiritual and environmental wake-up call]. ([. . .] p. 583)

- In a recent study on the link between the spiritual dimension of nature experience and environmental responsibility, it was found that those who experience nature in a spiritual way "increasingly start to feel 'related' and 'connected' to their surroundings. Some participants explained sensing their physical boundaries as softening and becoming more porous to the environment. Others described it in terms of a sense of 'belonging' or 'homecoming'" (Hedlund-de Witt 2013, 171). Interestingly, those who stated that they "feel part of nature" were also "more inclined to identify with the interests or well-being of nature" (Hedlund-de Witt 2013, 172). Their connectedness to nature, spiritually articulated, fosters a drive toward proenvironmental behavior through forms of internalization. All of this has a marked hermeneutical dimension since, for most, such experiences are accompanied by a deep sense of purpose and meaning (Hedlund-de Witt 2013, 174). [Like a resounding clarion call delivers a message, or directs one to battle, I have been alerted to climate change through encompassing human grief and loss. Responding to it, I have found both purpose and meaning to why I should change my personal and environmental behavior. My contention is that if its works for me, it might work for you, too. Individual acts change the person, collective acts change the world]. ([. . .] p. 583)
- Our current environmental situation indicates that attempts at universal normative foundations for environmental ethics have proven to be insufficiently capable of dealing with a tenacious value-action gap. If environmental ethics aspires to be effective, it should let itself be inspired by what empirical research reveals to be conducive to

enduring behavioral motivation. For it is precisely understanding "what determines reality from rhetoric," and trying to bridge them, that is essential (Barr 2004, 246–47). Acknowledging the important, affectively-driven hermeneutical processes which research reveals to be active in the transformative experience of nature, proves essential. To Bonnett, "ethical concern does not arise in some pure form of the kind that can adequately be articulated in sets of universal abstract principles. Rather it is the case that our antecedent involvement in a place (and therefore the world) conditions all understanding, including the ethical" (Bonnett 2012, 295). [Drawn to feminist studies, I am reminded of Haraway's (1988) "situated knowledge" concept. In speaking to it, and to science, she stated, "science becomes the myth, not of what escapes human agency and responsibility in a realm above the fray, but, rather, of accountability and responsibility for translations and solidarities linking the cacophonous visions and visionary voices that characterize the knowledges of the subjugated [. . .] situated knowledges are about communities, not about isolated individuals. The only way to find a larger vision is to be somewhere in particular" (p. 590). I have found, recently, that to be in the moment with others, both human and non-human, is that somewhere in particular]. ([. . .] p. 584-585)

- "Clearly, this represents a radical challenge to the traditional ethical position" (Bonnett 2012, 297). Approaching the experience of nature from within a meaning giving horizon also does not make the being of nature transparent nor does it deny "the inherent mystery in its self-arising. Quite the reverse. Mystery is only possible in the logical space where significances are in play" (Bonnett 2007, 715). Hermeneutical ethics is therefore also well-placed to research on environmental commitment. But how to approach the challenge of hermeneutically rethinking environmental ethics? [. . .] van Tongeren stated

> that "ethics as hermeneutics" first "searches for constants and for possible ways to collect and arrange experiences, once they are put into words, under their common denominators, and by so doing, in a constantly ongoing process, to encompass the assembled experiences into a theory of moral life" and second "inquires about the structure of every possible moral experience, about the preconditions for the possibility of moral experience, or the moral character of our existence as understanding beings" (van Tongeren 1994a, 212). [Human loss and grief, I argue, is the common denominator that connects humanity (as is the love and joy that are inextricably tied to them). It is my hope that we can use our experience with human loss and grief to close the environmental affective gap. This may be possible because human loss and grief speaks to more than just denial, anger, bargaining, depression, and acceptance. It also speaks to rebirth. Focusing on this rebirth may lead to lasting pro-environmental behavior. That is what I see as the value of connecting human loss and grief to environmental grief]. ([. . .] p. 586-587)

I hope that death by bullet point wasn't too unpleasant to read. There was a lot to unpack and I thought this stylistic choice would be the best way to do that.

After Elaina's death I felt a loss of identity. I didn't know who I was without her. I am still figuring that out. In searching for my new self, I used her death, and my response to it, as a way to personalize climate change. It seemed logical to me, since I was mad at the world, to give climate change an identity that I could relate to. But more than that, I used the transformative nature of grief and mourning to give life meaning, meaning that had been seemingly lost, or hitherto unattained. According to Braga and Braga (1975), "When you fully understand that each day you awaken could be the last you have, you take time that day to grow, to become more

of who you really are, to reach out to other human beings" (p. 164). Why should my story be important to you? You will have to decide for yourself, of course, but in my storytelling of human loss and grief and climate grief I sought to elicit sympathy for the earth and its inhabitants. There is nothing as poignant in life as the loss of a loved one, human or non-human. Consider the following statement before you decide whether my story is important,

> grief and mourning have 'we-creating' capacities, exposing our known, unknown and unacknowledged connections to others, and allowing for opportunities to reach across differences to connect with others. In this light, grief and mourning can also question fundamental assumptions about what we choose to value — and what we choose to grieve and mourn — including climate change induced ecological loss and degradation. (Cunsolo & Ellis, 2018, p. 276)

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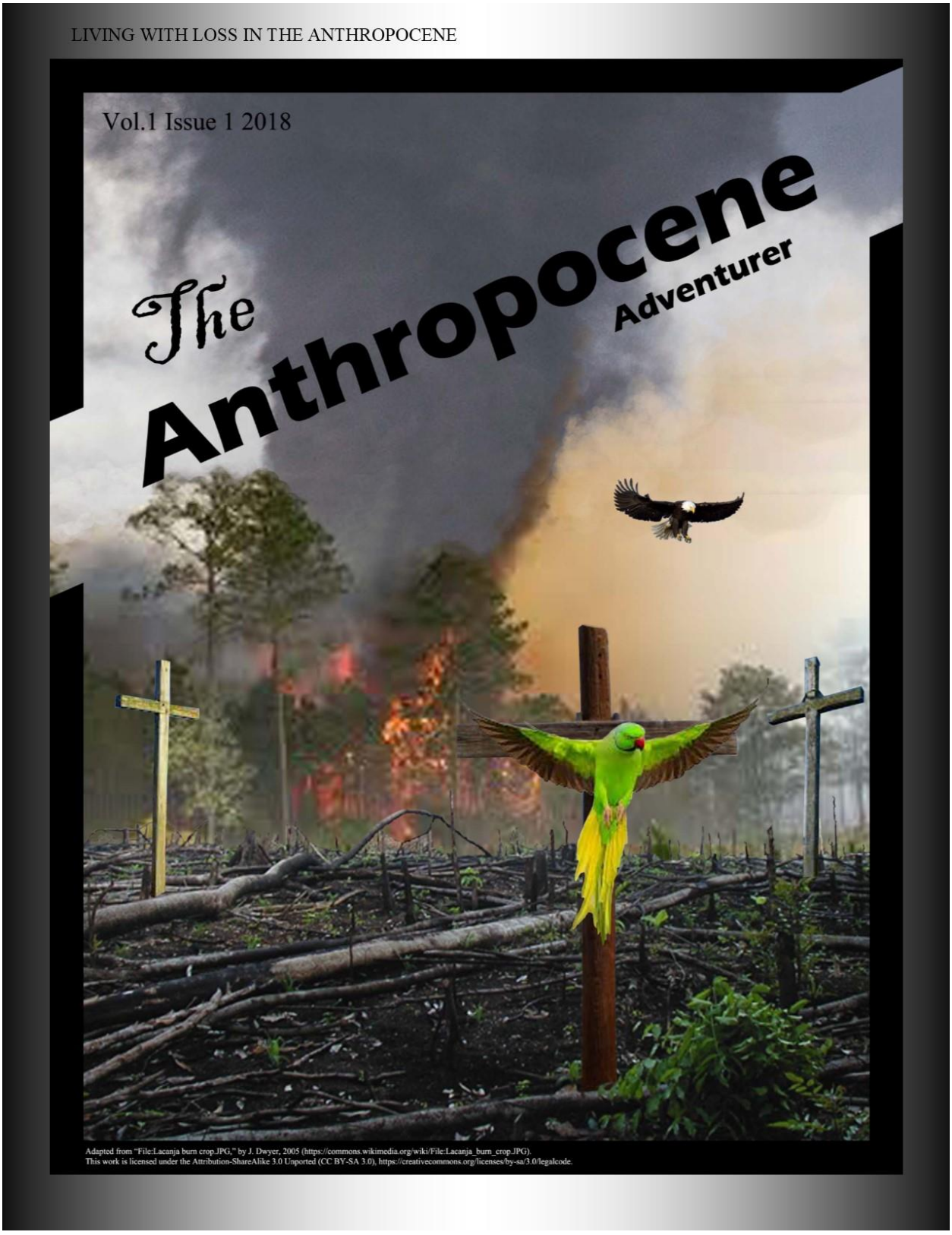
Appendix A


LIVING WITH LOSS IN THE ANTHROPOCENE
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Adapted from "File:Lacanja burn crop.JPG," by J. Dwyer, 2005 (https://commons.wikimedia.org/wiki/File:Lacanja_burn_crop.JPG).
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LIVING WITH LOSS IN THE ANTHROPOCENE

Our Being in the World

Adapted from "File:Noahs Ark.jpg," by E. Hicks, 1846 (https://commons.wikimedia.org/wiki/File:Noahs_Ark.jpg). In the public domain.

Throughout history humankind's worldview has been shaped by an attachment or detachment to nature (Kiehl, 2016, p. 87). Drawing heavily on Heidegger's concept of dasien or "being in the world," Kiehl (2016) "illuminates the inextricable interconnectedness between our being and the world's being" (p. 86). Describing interconnectedness with the world as a "coparticipatory process" Kiehl (2016) proclaimed that by "not reflecting" on our roles in this coparticipatory process "our presence in the world will continue to create crises of imbalance" (p. 86). Creating and maintaining balance with the world is important because it is within the world that we discover ourselves.

Extinction is Forever

Representing various field of study, some researchers and scholars (e.g., Crutzen, 2006; Moser, 2004; Steffen, Crutzen, & Mcneill, 2007) have concluded that human-induced climate change is real and is a cause for grave concern. Citing biodiversity loss, loss of habitant, and structural damage to Earth Systems these scholars have raised a call to arms to help abate eminent social and environmental damages. Other researchers and scholars (Anderegg, Prall, Harold, & Schneider, 2010; Dunlap, 2013; Van Rensburg, 2015; Vlassopoulos, 2012; see also Stern, Perkins, Sparks, Richard, & Knox , 2016) have expressed doubts that response to anthropogenic climate change warrants the urgency proposed by their peers. Citing the naturalness of changing climate, a lack of universal agreement among climate change scientists and policy-makers, as well as what they deem insufficient evidence, they hold that a business-as-usual position is perhaps the most prudent stance.

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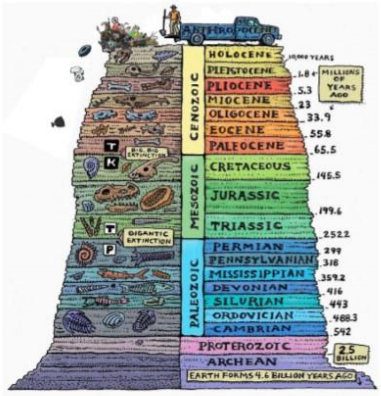
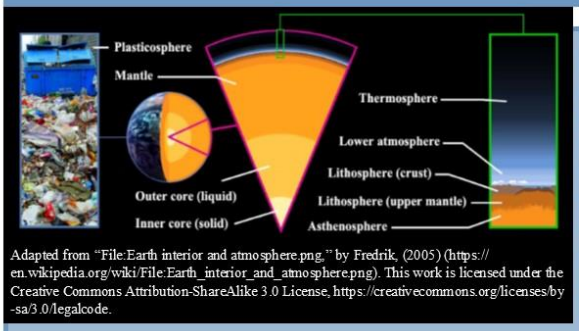
The Past

Eras, periods, and epochs are separated by boundaries "defined either via Global Stratigraphic Section and Point ('golden spike') locations or by adopting a numerical date "which, in the past have been set apart by millions of years and characterized by glacial and interglacial periods brought on by Global Climate Change (GCC) (Zalasiewicz et al., 2008, p. 4). According to Singh (2006) "The vast expanse of geologic time has been separated into eras, periods, and epochs" and "often each era ends with a major extinction, which eliminates the dominant life forms and paves way for newcomers" (p. 28, 30).



Adapted from "10 Interesting Facts About the Geological Time Scale," by R. Troll, 2015 (http://www.geologyin.com/2016/12/10-interesting-facts-about-geological.html). Adapted with permission.

The Present



Adapted from "File:Earth interior and atmosphere.png," by Fredrik, (2005) (https://en.wikipedia.org/wiki/File:Earth_interior_and_atmosphere.png). This work is licensed under the Creative Commons Attribution-ShareAlike 3.0 License, https://creativecommons.org/licenses/by-sa/3.0/legalcode.

According to International Commission on Stratigraphy (2016), some members of the scientific community and members of a "scientifically engaged public" have called for the adoption of the term "Anthropocene" to denote human causation of abrupt changes to Earth Systems dynamics. Anthropogenic changes to the earth environment are said to "rival global geophysical process" and "suggests that we need to fundamentally alter our relationship with the planet we inhabit" (Steffen et al., 2001, p. 739). This altered relationship may be possible today because: "With the advent of anthropogenic GCC [Global Climate Change] and the concurring acts of ecological-social destruction, the vast conceptual veil perpetuating society's ultimate illusion that the fate of the human species is somehow separate from the fate of the Earth is finally tearing" (Godfrey & Torres, 2016, p. 1).

The Future

In some climate change scenarios the game is over. The 2015 Intergovernmental Panel on Climate Change (IPPC) has declared "The precise levels of climate change sufficient to trigger abrupt and irreversible change remain uncertain, but the risk associated with crossing such thresholds increases with rising temperature" (WGII SPM p. 14).

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Adapted from "20+ Great Global Warming Posters," by Syaan, 2012 (http://www.ddesignerr.com/20-great-global-warming-posters/). Copyright 2012 by Daniel Reuber.

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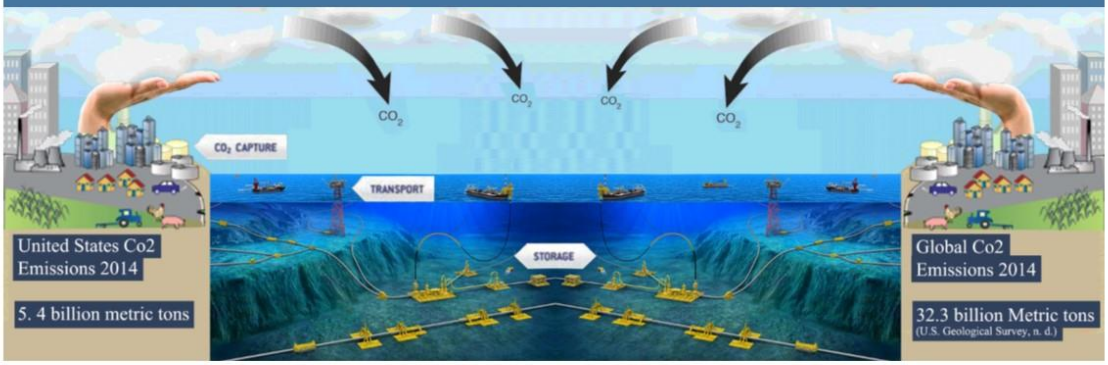
The other CO_2 Problem



Adapted from "Coral reefs under rapid climate change and ocean acidification," by O. Hoegh-Guldberg, et al., 2007 (https://atmos.washington.edu/2009Q1/111/Readings/Hoegh_Guldberg_2007_Coral_reefs.pdf). Copyright 2007 by the American Association for the Advancement of Science.

The earth's atmosphere is but one of two carbon dioxide reservoirs—"about half of all the CO_2 emitted over the last 250 years has been absorbed by the ocean (Placky, 2015). Rising atmospheric CO_2 emissions are correlated to ocean acidification, the chemical process in which CO_2 is converted to Carbonic acid (H_2CO_3). H_2CO_3 lowers the ocean's ph. level and consumes calcium carbonate ($CaCO_3$), a chemical compound needed by some marine animals in the creation and maintenance of their shells and skeletons, for example; plankton, shell-fish and corals. This chemical imbalance has put the marine environment, of which humankind relies heavily upon for subsistence, in peril: "Because climate change and ocean acidification are both caused by increasing atmospheric CO_2, acidification is sometimes referred to as 'the other CO_2 problem'" (Nordhaus, 2015, p. 114).

Consequences and Impacts

According to United Nations Development Programme (UNDP), "Oceans serve as the world's largest source of protein, with more than 3 billion people depending on the oceans as their primary source of protein" in addition, "over three billion people depend on marine and coastal biodiversity for their livelihoods" (UNDP, 2015). Though the impacts of climate change will affect everyone not everyone will be affected the same (Alston, 2014; Denton, 2002; Rodenberg, 2009). Vulnerable and marginalized populations, women in particular, disproportionally bear the brunt of GCC consequences (Bäthge, 2010; Gaard, 2015).

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LIVING WITH LOSS IN THE ANTHROPOCENE

Change can be a good thing

Adapted from "Distracted boyfriend," by A. Guillem, 2017 (http://knowyourmeme.com/memes/distracted-boyfriend). Copyright 2017 by Antonion Guillem.

Women are powerful agents of change, and as such , "Women can help or hinder in dealing with issues such as energy consumption, deforestation, burning of vegetation, population growth and economic growth, development of scientific research and technologies, policy making, and should be included in all levels of strategies to adapt to climate change" (Araujo, Quesada-Aguilar, Aguilar, & Pearl, 2007). With increasing complexity, global changes as seen in ecological changes (e.g., deforestation and land usage) and geological changes (e.g., sea level rise and ocean acidification) are intertwined with societal impact. Intimate relationships that we have with each other bear directly on the intimate relationship we develop with the global home we call Earth.

Societal change begins with personal change, education and awareness

Ecological Impact

Response to rapid climate change requires immediate action. Unfortunately, climate change may be happening too quickly for some species to adapt , or simply move out of the way. Coral reefs are particularly at risk . For example, "coral cover in the Caribbean has declined by an amazing 80 percent in the last three or four decades and by 50 percent during that same period in the Great Barrier Reef" (Heal, 2017, p. 21).

Adapted from "Want and Ignorance," by Sol Eytinge Jr., 1868 (http://www.victorianweb.org/art/illustration/eytinge/42.html). Adapted with permission.

Human Impact

Natural and environmental disaster "studies have shown that women and children are 14 times more likely to lose their lives in a natural disaster" (Araujo et al., 2007, as cited in Bathge, 2010, p. 5). At the crux of the matter is that "approximately 80% of the world's population (the global South) has generated a mere 20% of global greenhouse gas (GHG) emissions: in other words, the other 20% (the global North) is responsible for 80% of the accumulated GHG emissions in our atmosphere" (Egero, 2013; Hartmann, 2009, as cited in Gaard, 2015, p. 25).

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Climate-change Children. Images from two separate photographs were modified to create this image. The pregnancy aspects are from "Women are breaking the climate taboo and questioning whether to have kids in such a world," by E. Scotti/Fusion, 2018 (https://projectearth.us/women-are-breaking-the-climate-taboo-and-questioning-wh-1796423072). Copyright 2018 by Gizmodo Media Group. The fire aspects are from "Fire Wallpaper HD," by Wallpaperset, 2018 (https://wallpaperset.com/fire-wallpaper-hd). This work is licensed under Creative Commons Zero (CC0) license.

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Silenced

Adapted from "Women's Rights," by Al Jazeera America, 2016 (http://america.aljazeera.com/topics/topic/issue/womens-rights.html). Copyright 2016 by Al Jazeera America.

Djoudi et al. (2016) stated, "the capacity to adapt and respond to [climate] change is shaped by power relations determining access to resources, information and the availability of options and choices" (Tschakert 2012; Djoudi et al., 2013, as cited in Djoudi et al., 2016, p. 248). According to Alvarez and Lovera (2016), "the patriarchal system has marginalized women in implementing biodiversity and climate commitments on the ground" (p. 265). As a result, "women are for the most part not well-represented in environmental policy formulation. The climate debate is perpetuating the under-valuation and misunderstanding of women's contribution to environmental management (Denton, 2002, p.12). However, according to Perkins (2014), "women are often the key agents of change. They possess invaluable knowledge local ecological, social and political knowledge that is crucial for climate change adaption and mitigation. Also , in their roles in the teaching ,caring, health, and administrative professions, women's skill are central for the community-building, social interdependence, and cultural change" (p. 17). Despite these attributes, "Women are patently absent from the climate change decision-making process. The climate debate has not sought to address the existing marginalisation of women, nor their need to be integrated in environmental policies" (Denton 2002, p.11).

But not unaffected

Citing the World Health Organization, Preet, Nilsson, Schumann, & Evengård (2010) stated, "Putting health at the heart of climate change is essential, with the gender dimensions being an important aspect" (p. 1). For example, "Increase in frequency of extreme events (i.e., drought and heat wave) are likely to exacerbate women's workload, specifically in water fetching, and fuel wood collection. Carrying of heavy loads on their heads or on their backs can cause severe backaches and spinal injuries" (Yadav & Lal, 2017, p. 6).

Figure 1. Women Pulling Stagecoach. Images from three separate photographs were isolated and combined to create this figure. The women aspects are from "Images for the word: India Water Crisis," by Free Synonymizer, 2017 (http://canacopegdl.com/keyword/india-water-crisis.html). Copyright 2017 by Science Team. The stagecoach aspects are from "Tyranasaurus T-rex Rex Dinosaur Fantasy Stagecoach," by Max Pixel, 2016 (https://www.maxpixel.net/Tyranasaurus-T-rex-Rex-Dinosaur-Fantasy-Stagecoach-1419052). This work is licensed under Creative Commons Zero (CC0) license. The Sustainable Development Goals logo aspect is from "SDGs, Contributions of WMO Community," by World Meteorological Organization, 2018 (https://public.wmo.int/en/our-mandate/what-we-do/wmo-contributing-sustainable-development-goals-sdgs). The Anthropocene Adventurer magazine supports the Sustainable Development Goals. The SDG logo and images are used with permission. To view the UN guidelines for use of the SDG logos please visit http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/10/UN-Guidelines-for-Use-of-SDG-logo-and-17-icons.October-2016.pdf.

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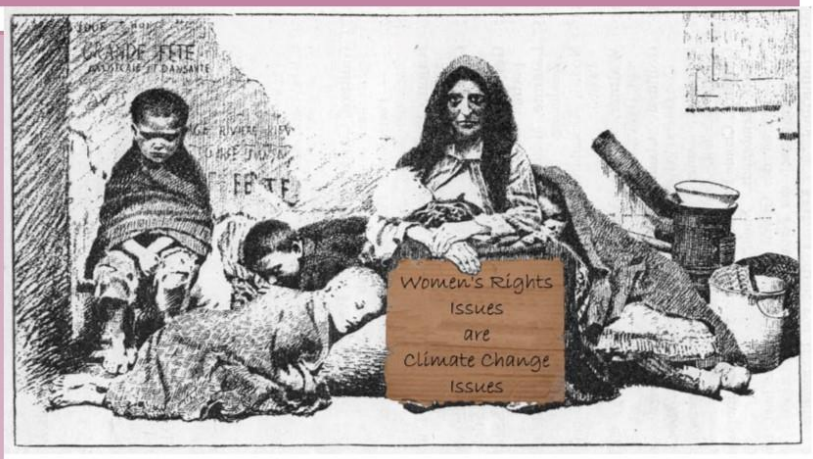
**As I went walking I saw a sign there , And on the sign it said "No Trespassing."
But on the other side it didn't say nothing, That side was made for you and me.
Woody Guthrie**

According to McMichael (2013), "projections by the United Nations that today's population of 7 billion will increase to 9.3 billion by 2050 should reactivate the debate about whether we can succeed in pursuing realistic objectives for a healthy climate without curtailing the actual number of humans pressing on the environment" (p. 1336). Many countries already have stringent immigration laws. Rapid "population growth heightens human vulnerability to climate change in numerous ways and may force people to migrate to areas that are either environmentally marginal or more at risk to the negative impacts of climate change" (Stephenson, Newman, & Mayhew, 2010, p. 152).

Climate change exacerbates social issues

Rochette (2016) spoke of "changing the discourse around climate change to one of social justice" (p . 387). One reason for this proposed shift away from a scientific and ecological perspective and towards a more humanistic one is that "women are disproportionally affected by global climate change as a result of poverty, socially constructed gender inequalities, gendered work and family responsibilities, reliance on natural resources for livelihoods as part of "women's work", and the limited financial, social, and institutional resources available to women across the board" (Perkins, 2015, p. 17). These issues, according to Rochette (2016), can be better addressed with a more humanistic approach to climate change.



Homeless Family: Image and text were combined to make this image. The image is from "File:Glaspalast München 1883 146.jpg," by F. Pelez, 1883 (https://commons.wikimedia.org/wiki/File:Glaspalast_München_1883_146.jpg). In the public domain. The text is from "Women's rights issues are climate change issues," by J. Podesta and T. E. Wirth, 2018 (https://www.washingtonpost.com/opinions/womens-rights-issues-are-climate-change-issues/2018/03/22/c52b2b00-f55a-11e7-b34a-b85626af34ef_story.html?utm_term=.4084a3a2c612). Copyright 2018 by The Washington Post.

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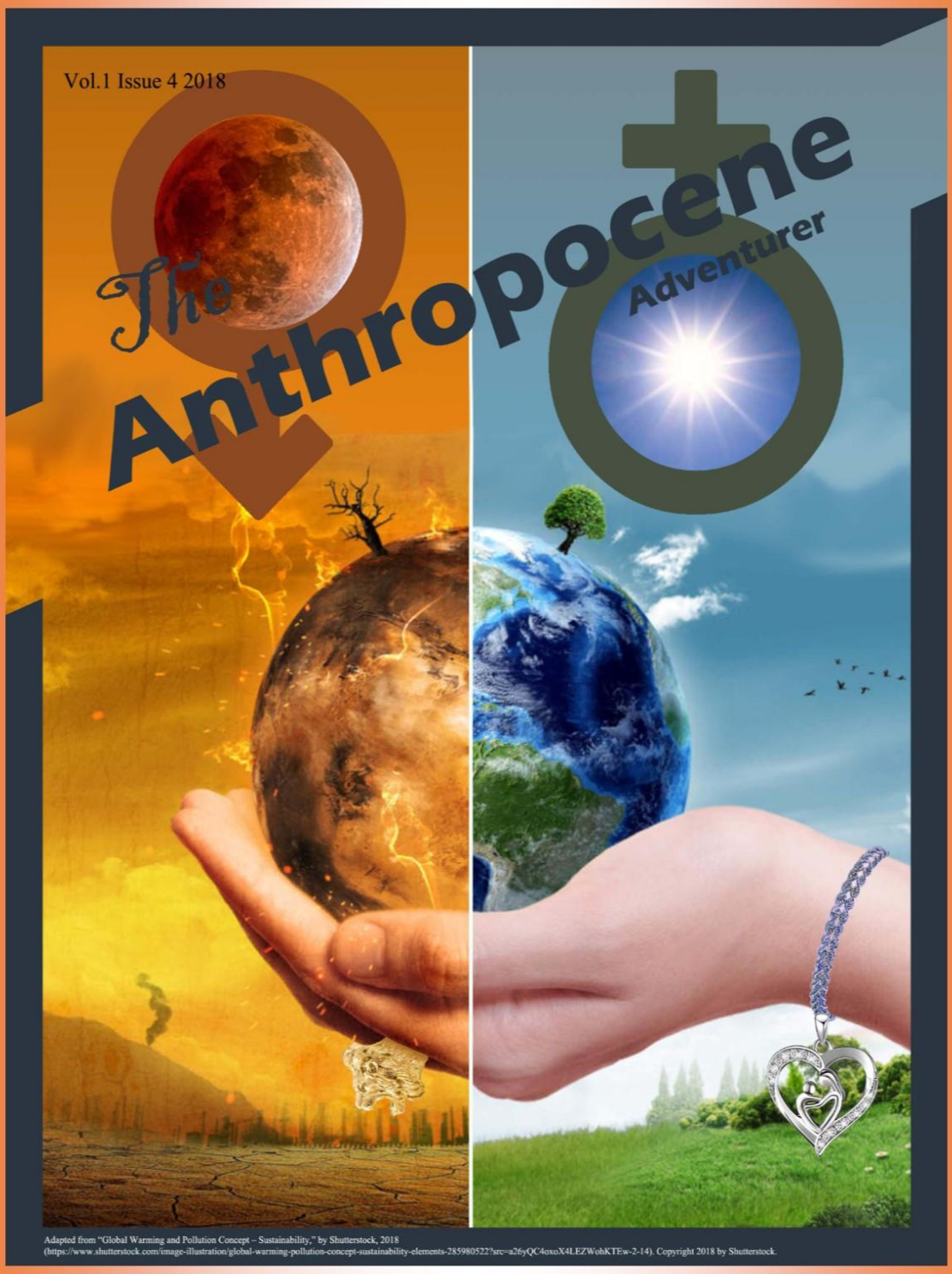

Adapted from "Global Warming and Pollution Concept – Sustainability," by Shutterstock, 2018 (https://www.shutterstock.com/image-illustration/global-warming-pollution-concept-sustainability-elements-285980522?src=a26yQC4oxoX4LEZWohKTEw-2-14). Copyright 2018 by Shutterstock.

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Privilege is often unearned

Adapted from "Group of People Having Fun Together Under the Sun," by H. Lopes, 2018, (https://www.pexels.com/photo/group-of-people-having-fun-together-under-the-sun-708392/). This work is licensed under Creative Commons Zero (CC0) license.

Office of Health Equity's Climate Change and Health Equity Program (2017) stated, "Both climate change and the health inequities share similar root causes: the inequitable distribution of social, political, and economic power and the subsequent creation of inequitable systems and living conditions. People experiencing historical and current systemic discrimination based on race tend to experience worse health outcomes on average, as a direct consequence of these power imbalances, systems, and living conditions. Climate change exacerbates the existing health inequities experienced by some communities of color" (para. 1).

Access to clean water should be a human right

According to Vjy (2018), "every 21 seconds, one child dies due to an illness related to water? It is very shocking to know that 780 million worldwide do not have access to clean water, which is roughly 2.5 times the population of the United States, 12 times that of the UK, and 34 times that of Australia. In most of the developed and developing economies, clean drinking water is made available to all the citizens. However, it is not the same in under developed countries; where all the women collectively, spend 200 million hours per day on an average collecting water. Due to the non-availability of clean water, 3.4 million people die every year, when considered population wise, is the death of entire Los Angeles every year! It is the responsibility and a duty of every privileged citizen in the world to whom water is available, to help the others who are struggling for the same" (para. 1).

Adapted from "Celebrating 1 billion liters of clean water," by Dr.G. Allgood, 2014, (https://www.worldvision.org/blog/celebrating-1-billion-liters-clean-water). Copyright 2018 by World Vision.

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Contraceptives and sterilization for the global South is at the heart of climate change population discourse.

Adapted from "Photo Gallery Ritz-Carlton Hotel," by Moscow Hotels, 2018 (http://www.moscow-hotels.net/ritz-carlton-hotel/photo-gallery/). Copyright 2018 by Moscow Hotels, JSC.

Wilson (2017) "argue[d] that contemporary population policies represent more than a discursive smokescreen for the destructive impacts of global capital accumulation—they are in fact deeply enmeshed in strategies for its expansion. As such, they rely upon embodied coercion and violence which is racialized and gendered, even as they invoke narratives of reproductive rights and choices" (p. 442).

Wilson also contributed, "rather than countering the developed/developing world dichotomy, the renewed emphasis on population growth in the SDG era actually reinforces the differential and racialized valuation of lives, those which are 'grievable' and those which are defined as 'ungrievable'" (p. 442).

Climate Change U: All for one and one for all

Adapted from "University of Oxford," by H. P. Kuklinski, 2010 (https://www.flickr.com/photos/18016623@N00/5221209321). This work is licensed under the Creative Commons Attribution-2.0 Generic (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

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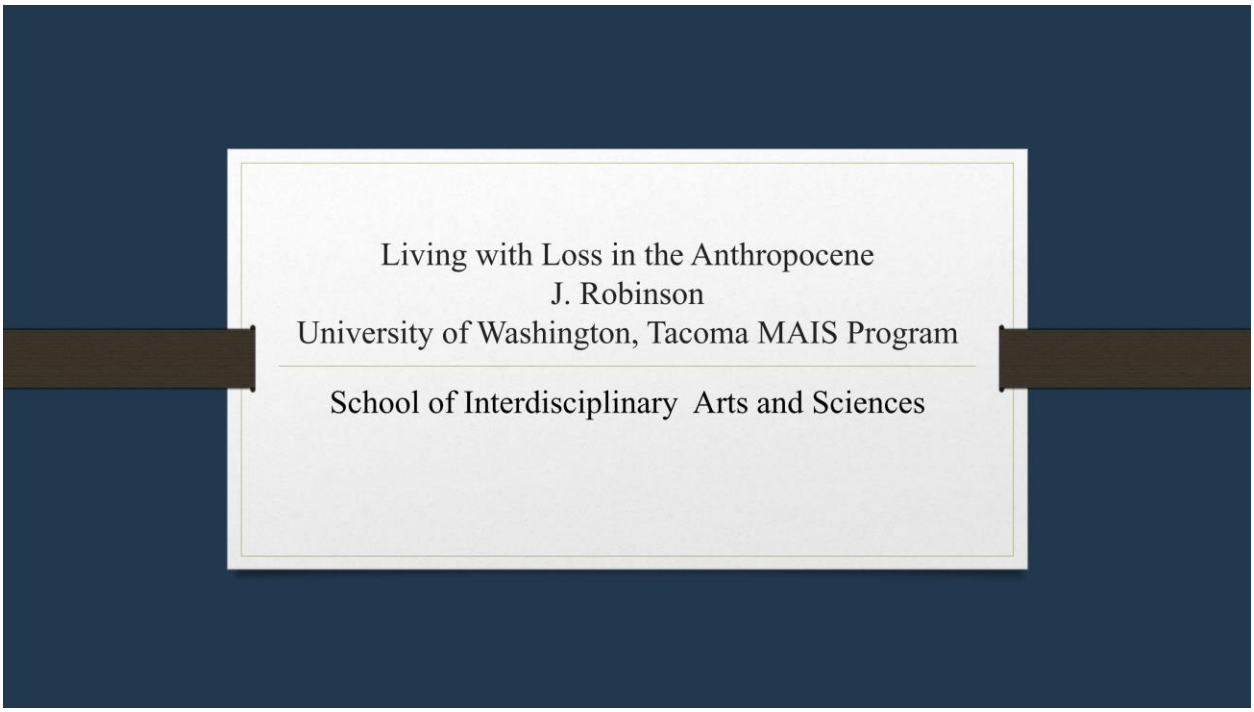
Appendix B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School of Interdisciplinary Arts and Sciences


The Anthropocene Adventurer
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