Climate Change Communication

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Introduction:

Climate change communication has been evolving for generations with varying degrees of success. It has become clear in recent years that mass communication is developing at a rapid rate yet climate change is still largely misunderstood or dismissed altogether in the United States. There are many reasons for this disconnect between what is actually happening in the global environment and how seriously American populations react to it. To unravel this mystery, we must take an in-depth look at the ineffective tactics and intentional disinformation campaigns that have often surpassed the purely scientific warning of our changing environment. This includes examining relevant industries, politics, media messaging and mass communication strategies that are working; or not.

There's a tremendous amount to unpack when we start to follow the money behind such drastic environmental changes. The industries known to cause the most climate impact have virtually unlimited funds and do not want the profit flow to slow down anytime soon. These vast resources heavily influence our political messaging because, for the right price, certain politicians will pretend like the science is unproven and actively dissuade their constituents from believing it is happening. The media follows trends which industries and politics can often steer any direction they like which means mass communication can get warped and confused.

Another important question to ask is, "Why is this so uniquely a United States problem?" It may come as a surprise to some Americans but there is no other developed country in the world discounting the science of climate change caused by human activity. Even those countries with the least amount of individual freedom and very effective propaganda machines at work seem to have a clear understanding of environmental science. Evaluating how other countries, as

well as the United Nations, are communicating climate change effectively may help to shape future communication methods here in America.

Climate communication of tomorrow is the final element we aim to address in this literary review. There are so many game changing ideas that could turn the tide of misinformation permanently. It is critically important to uncover what is going on in this country to keep millions of people in the dark regarding environmental science. Evaluating multiple facets of this issue can reveal missed opportunities and how to effectively direct our climate change communication before it is too late.

What is Climate Change?

Before we can communicate about any subject, it is critical to have a clear understanding of what it is. Climate change is generally defined as the alteration of global weather patterns as a result of increased carbon dioxide levels in our planet's atmosphere (Pidgeon, 2012). While that definition gives us the "what", it doesn't explain the "why" which is fundamental in comprehending environmental science.

To grasp why carbon gases are overwhelming our environment, Katherine Hoover (2019) believes it is essential to learn about the carbon cycle. Carbon is the most prevalent element associated with life on Earth but as it turns out, it is possible to have too much of a good thing. This crucial element is cycled through our atmosphere and oceans quite naturally through photosynthesis, respiration, sedimentation, burial, extraction and combustion (Hoover, 2019; Erlandson, 2008). Short term cycling of carbon comes via the food chain in which plants remove carbon dioxide (CO_2) from the atmosphere and create sugars by combining it with water. When animals come along and consume the plants, they digest the sugars and then deposit the carbon

back into the atmosphere and soil. Long-term storage of carbon is found in rocks and fossil fuels which are buried deep within Earth's crust and in our oceans (Hoover, 2019; Erlandson, 2008).

This is where humans come in and turn this natural process into an artificial one. Humans impact CO2 levels primarily in three different ways. The first is for well over a century now, we've been extracting fossil fuels and burning them for energy. Additionally, we've been unnaturally breaking down carboniferous rock for various purposes like cement production. Lastly, human population growth has been the leading cause of deforestation in the world. All of these human footprints have a gigantic impact on the global carbon cycle so that atmospheric CO2 levels have been drastically rising ever since (Hoover, 2019). This phenomenon does occur naturally in our environment, but what we've been experiencing since the Industrial Revolution began has brought unprecedented rapidity to these increases. Once CO2 gases reach a certain level, we will not be able to stop the inevitable global extinction (Goldblatt & Watson, 2012).

As it stands now according to a recent U.S. survey; 38% of Americans believe they will personally be harmed by global warming and 65% believe that future generations of people, plants and additional animal species will be endangered (Leiserowitz et al., 2014). It would be better if these numbers reflected the scientific community from which 97% of published scientists agree on the human causes of climate change and the urgency to drastically lower carbon emissions around the world (Ritchie, 2016). This is why effective climate change communication is so critical.

<center>Industrial Influence:</center>

There is ample evidence to determine that certain industries have known of their detrimental impact on the climate for several decades. Exxon, now ExxonMobil, began heavily investing in an ambitious scientific research program in the 1970s and 1980s that conclusively

predicted the vast negative impact of increased CO_2 emissions in the atmosphere and oceans. (Hall, 2015) InsideClimate News conducted an eight-month investigation in which their reporters interviewed former Exxon scientists, federal officials and employees as well as reviewed hundreds of internal document pages. They concluded Exxon's knowledge dated back to July of 1977 when the company's top scientist James Black reported his findings that mankind was influencing the climate through the burning of fossil fuels. The next year, he added that doubling CO_2 in the atmosphere would increase temperatures by 2 or 3 degrees. (Hall, 2015) This probably sounds familiar because it echoes the general scientific consensus today.

Further, within just the last two weeks, Peter Dockrill (2019) revealed newly discovered evidence that shows coal executives understood the global warming science eleven years earlier than Exxon. In an August, 1966 research article of *Mining Congress Journal*, then-president of Bituminous Coal Research Inc., James Garvey, discussed the needed regulation of pollutants associated with the coal industry. He wrote:

> There is evidence that the amount of carbon dioxide in the Earth's
> atmosphere is increasing rapidly as a result of the combustion of
> fossil fuels. If the future rate of increase continues as it is at the
> present, it has been predicted that, because the CO_2 envelope
> reduces radiation, the temperature of the Earth's atmosphere will
> increase and that vast changes in the climates of the Earth will result.
> Such changes in temperature will cause melting of the polar icecaps,
> which, in turn would result in the inundation of many coastal cities
> including New York and London. (Dockrill, 2019, p. 1)

It would be easy to stop right there and point fingers solely at oil and coal companies. Unfortunately, that would glaze over the impact that the agricultural industry has had on our environment and their efforts to make climate change exclusively the fault of fossil fuel emissions. One of the best kept secrets is the level to which this industry affects climate change. Most scholarly articles are written about the vast effects that climate change is having on agriculture while far less is written about the environmental harm being done by commercial farming.

The European Environment Agency (2016) has conducted significant research of the E.U.'s agricultural impact on climate. They have concluded that farming releases significant amounts of greenhouse gases into the atmosphere. Livestock digestion accounts for an incredible amount of methane gas production due to enteric fermentation which is expelled via flatulence, belching and fecal landfills. One may wonder why this is considered "human activity"; after all, cows are a natural species on our planet. The problem is that millions of cattle are bred annually to fulfill the meat industry's quota which far outnumbers the cattle that could exist in the wild. Additionally, nitrous oxide emissions are released as an indirect product of mineral and organic nitrogen fertilizers. These emissions were found to account for 10% of the E.U.'s entire greenhouse gas emissions in 2012 which was far less than the 34% average that is found in the rest of the world (European Environment Agency, 2016).

Not only does agriculture contribute to climate change, but it is also the industry that will be most impacted if serious efforts are not made to mitigate the harm being done to the environment. Changing weather patterns will make it more challenging for crops to grow in areas with less resources and technology and those the effects will be devastating. As described by Kurukulasuriya and Rosenthal (2003), there is an overall consensus that temperature and

precipitation changes will affect agricultural productivity because land and water regimes will change. Research shows that tropical regions with some of the poorest countries will be impacted especially in terms of agricultural productivity. These areas will see produce yield reduction which will only increase poverty levels for those engaged in the agriculture sector (Kurukulasuriya & Rosenthal, 2003). It is important for this industry to come up with alternate ideas and solutions so that millions of humans will not run out of food and potentially starve.

All industries that are contributing to climate change must be able to adapt because their methods that have been in place for hundreds of years will simply not work if the Earth is to remain inhabitable. As stated by Smit and Skinner (2002), "Adaptation in agriculture to climate change is important for impact and vulnerability assessment and for the development of climate change policy" (p. 85). For real action to be done, it is vital that all the industries are willing to implement changes and be forthright if they have any information regarding their carbon footprint

With these shocking revelations about what the fossil fuel and agricultural industries knew and when they knew it, it's clear that climate change communication has been influenced by uncalculatable millions (maybe even billions) of dollars spent on spreading misinformation to the public. They've done this through advertising dollars, political lobbying efforts and mainstream media manipulation. We will delve into these topics more later in the paper but they deserve a little spotlight in the moment. Not unlike the Tobacco industry's 30 plus year false marketing campaign surrounding the health effects of smoking in humans, the fossil fuel industry has intentionally skewed the truth of climate change and its causes (Hall, 2015).

To some people, it makes sense why companies would want to take the heat off themselves, "In a business ethics framework, the issue of climate change brings forth an ethical

dilemma for the oil industry, in the form of a tension between profits and CO2 emissions" (Van de Hove et al., 2002, p. 3). Companies are meant to maximize profits in this capitalist society and most would prioritize making money instead of facing the reality of climate science. Recently, however, more oil companies have been putting money into testing alternative-energy sources, such as large wind farms and solar panels. While this is a step in the right direction, it is something that will take many decades to completely transition and will cost trillions of dollars. That said, it does reflect an understanding that their misinformation communication tactics may have run their course.

<p align="center">Political Influence:</p>

The political communication realm is the perfect segue to the last topic because there is no doubt, the energy and agricultural industries greatly influence public policy. The history of the political relationship with climate change could be an entire paper within itself so we will focus on the broad topic of partisan polarization regarding climate change.

Government knowledge of climate change is not new or even disputed in those non-partisan agencies that are the backbone of American dominance. In 1965, the President's Science Advisory Committee issued a report that cautioned about "marked changes in climate" that would begin by the year 2000. (Jaffe, 2018) The report spelled out clearly that these climate changes would be the direct result of increased CO2 pollution. President Lyndon B. Johnson even mentioned the issue in a speech to Congress saying, "Air pollution is no longer confined to isolated places. This generation has altered the composition of the atmosphere on a global scale through radioactive materials and a steady increase in carbon dioxide from the burning of fossil fuels." (Jaffe, 2018, p. 459)

At this early stage, CO2 emissions and the probable pending climate change was not something considered an imminent threat so it was placed on the backburner. By 1988, however, NASA scientist James Hansen testified before Congress that this problem had become urgent and required immediate attention by lawmakers. As the United States and the rest of the world began to focus their attention more aggressively towards dealing with the threat from CO2 emissions in the early 1990s, the industrial propaganda began to fight back. Fred Singer, a scientist who was best known for battling the EPA against their findings that second-hand smoke was a health risk, entered the national conversation. He first published an op-ed in the *Wall Street Journal* that dismissed the scientific findings as environmentalist sensationalism. Even though Singer sowed the seeds of doubt for the fossil fuel industries to nurture and grow, politically the environment remained a bipartisan issue until 2008. (Jaffe, 2018)

During the Presidential campaign of 2008, Vice-Presidential candidate Sarah Palin attacked environmental scientists as engaging in fraudulent practices without any evidence. This sparked an all-out Republican attack on climate science even though it is overwhelmingly conclusive. The question is, what happened to turn a bipartisan issue into a completely polarized partisan war? We've all heard at length about fossil fuel lobbies pouring campaign donations into the hands of politicians who could be influenced in Washington D.C. What gets far less attention is the funding various institutes received from several fossil fuel organizations like the ExxonMobil Foundation. The George C. Marshall Institute, for example, accepted this funding and then in the early 1990s began publishing an annual pamphlet misrepresenting climate change findings. (Jaffe, 2018) When a few otherwise reputable scientific institutes, funded by fossil fuel, began publishing reports that disputed the environmental urgency of climate science, this gave

talking points to compromised political leaders. This propaganda campaign has been going on for nearly 30 years but gained a stranglehold on the Republican party within the last decade.

Despite this assault from big oil and coal in America, the United Nations has kept the issue moving forward with the *United Nations Framework Convention on Climate Change* and in 2015, the Paris Agreement was signed by all the major players on the world stage. It is a multi-national agreement focused on reducing carbon emissions and marked an unprecedented collaboration among the most powerful nations to reverse climate change. In an entirely partisan move, President Donald Trump recently committed to removing the U.S. from the Paris Agreement (Kim & Cooke, 2018). This was a major blow to climate activists worldwide because it communicated that the most powerful nation on the planet was officially discrediting the issue. This is despite the fact that no other developed nation in the world has any political party dismissing the science of climate change. This is a uniquely American problem.

Media Communication:

The media is a vital tool in relaying information about global warming and its consequences to the general public. Without media, society would not be nearly as knowledgeable about the environmental issues the world is currently facing. Despite the efforts of those who work to warp the truth of climate science, the media has pushed forward facts that have persuaded a majority of the population worldwide.

As described by Arlt et al. (2011), "The threat of rising CO2 emissions was described as early as the 1970s in the report *The Limits of Growth* published by the global think-tank Club of Rome, accompanied by the hope that use of fossil fuels would end before serious climatic consequences arose" (p. 46). After the 1970s, talk about global warming subsided for a while until the media started covering more natural disasters, such as Hurricane Katrina, in the early

2000s. Media outlets, such as traditional news, tend to focus on extreme weather events or catastrophes that are occurring all over the world. This is helpful in bringing the real consequences of global warming to light, but showing such traumatic images can have negative effects as well.

Polar bears have become a symbol for the fight against climate change; a picture of a scrawny white bear sitting on a melting ice cap has been seen time after time, usually with the caption, "Polar Bears are Starving Due to Climate Change". While this image is heart wrenching and seems like it would be helpful to convince people that they must do something about climate change as soon as possible, it might not have any beneficial impact at all. Polar bears are usually associated with faraway places where it is cold, which may create a perception for the general public that climate change is a distant problem and not something for them to worry about. This leads back to the the traumatic images that are shown of weather events, such as floods or hurricanes. That coverage generates concern over climate change, but it fails to offer solutions on how society can make substantial changes to halt damage to the Earth and its atmosphere. We will explore this concept more later in the paper.

Real change is inspired when the media focus their efforts on informing the public about global warming including specific actions that can be implemented to reduce the average carbon footprint. Celebrity public service announcements can be beneficial to help educate the masses. By using celebrities to bring attention to the issue of climate change, fans become more interested in taking steps to change their actions. According to Semenza et al. (2008), "Voluntary reduction in energy consumption by individuals is contingent on their state of awareness and concern about climate change, their willingness to act, and their ability to change" (p. 480).

Similar to celebrity involvement, movies put out by climate change activists have been an effective way to raise awareness for the general public. Additionally, it has been an avenue for researchers to study how the population interacts with educational entertainment. In the last two decades, the best U.S. example was Al Gore's *An Inconvenient Truth*. Gary Jacobsen (2011) revealed in a study that within two months of that film's release, those zip codes inside a 10-mile radius of where the movie was shown experienced a relative 50 percent increase in voluntary carbon offset purchases.

Another movie that was heavily researched after its debut was *The Age of Stupid* which was released in the U.K. This film was successful in creating a global climate awareness campaign called the 10:10 movement. Research demonstrated that this kind of movie is likely to make climate change a more urgent issue, bringing associated fears to the attention of viewers. That said, this awareness does not always last for long after seeing movies like these (Howell, 2014). Experts surveyed the subjects with four follow up questionnaires at different time periods after the movie which revealed the lack of long-term effects.

Social media has introduced a whole new medium of communication used to bring more attention to the issue of climate change and allows for every voice to be heard; for better or for worse. Sites such as Twitter or Facebook allow for people to share articles and then comment on them which opens up a dialogue with others that was not possible 20 years ago. While these communication tools are revolutionary and important, they are also a vessel to spread false and harmful information. After analyzing tweets from Twitter, Hart and Jang (2015) found that Americans on social media approach climate change in terms of true or false. By and large, their attention to the impacts and solutions of the environmental concerns was relatively low. In fact, U.S. social media has been more likely to present climate change as debatable rather than a well-

established fact (Hart, 2015). Williams, McMurray, Kurz, and Lambert (2015) found that analysis of climate change discussions on Twitter show that users fall into one of two categories "climate activist" or "climate skeptic". This finding proves just how powerful the media's influence can be when it comes to controversial topics, and shows the importance of releasing accurate information to the public.

Individual environmental messages are framed by Twitter users after creating a hyperlink to other online sources by utilizing hashtags. Framing refers to making selected aspects of a perceived reality more salient by promoting a particular perspective and enhances the effectiveness of the message (Kim & Cooke, 2018). This changes the way that activists can communicate with specific groups and show what's important for raising awareness. Claire Kim and Sandra Cooke (2018) emphasize how big of a role social media has on communicating globally about the issue of climate change. They suggest that as Trump uses Twitter to falsely disprove climate change, citizens from other countries as well our own see those messages and disinformation spreads from the highest office of the United States.

Climate Change Communication Abroad:

As we've already touched on earlier in this paper, no other developed countries experience the same political partisanship on the subject of climate change. Examining how these nations effectively communicate the environmental crisis that is happening worldwide could help those of us in the United States develop better communication techniques. The article *Developing Communication Strategies for Mitigating Actions Against Global Warming* (2017) demonstrates researchers found that framing was a useful method for making the people of Taiwan care about the environment and promoted positive action. At this point awareness is growing, however, action is not. Shih & Lin (2017) find, "framing global warming as a local

issue may serve as an effective communication strategy because the public does not consider global warming an immediate and personally relevant threat." (p. 845) This study was conducted on Taiwanese university students and found that linking the ad campaign material to local fears promoted behavioral change in the village.

An issue common with global problems is that people tend to care less when they do not have an emotional attachment to it. As discussed briefly in the media communication section of this literary review, if the problem doesn't seem close enough to people, then it is far more difficult to get them to care. An example may be the subject of world hunger vs the tragic burning of Notre Dame Cathedral. World hunger has been an ongoing global issue for millennia that has never generated enough contributions to solve the problem yet Notre Dame got more donations than asked for in less than a week. Research shows that "not every country in the world suffers from the same impacts caused by global warming. People may not feel compassionate about the mishaps happening to those far away from them" (Shih & Lin, 2017, p. 847). Experts found that focusing heavily on the local consequences of global warming has a far more substantial reaction from the public. While this kind of framing in studies has been found to be effective, it is still essential to consider various information processing approaches (Shih & Lin, 2017). Other studies echo these findings concluding that framing climate change as a local issue helps to increase public awareness, prompt mitigating behaviors and generally inspire citizen engagement (Scannell & Gifford, 2013; Spence, Poortinga, Butler, & Pidgeon, 2011).

A. Saleem Khan et al. (2012) offer a more in-depth example of localizing climate changes. In Tamil Nadu, India, local mangroves are being directly affected which is impacting the fishing industry in an area where that is a major factor in feeding the community. In this case, when trying to convince an especially small population that immediate changes need to happen,

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it is a good idea to frame the issue around a resource they depend on. The research showed that "A well-designed environmental message could convince people that they can reduce the scale of the phenomenon and could link adaptation and mitigation actions to people's positive aspirations through providing local examples of climate change impacts and illustrated information" (Khan, et al., 2012, p. 333). Another good example of this concept is when Cape Town, South Africa was expected to run out of water in a matter of months. Once the community started rationing water out of necessity, the aquifer came back to life.

Another tool some outside nations are using effectively to communicate the reality of climate change to their citizens is early education. It is clear that environmental science is an issue that may take more time to understand than just a two-hour movie. Teaching this subject to young students in their regular classrooms could change the way future generations interact with the climate crisis. It is possible this could prevent destructive behavioral patterns in future generations.

Australia is putting this hypothesis to the test as they have incorporated climate change into the curriculum. Before this policy was implemented, pre-service teachers were asked about their thoughts on climate change and some interesting information emerged. Helen Boon (2014) reports that when surveyed, pre-service teachers showed that there is a gap in their understanding of environmental science. Even though over half of the respondents agreed that climate change is a serious issue irrefutably caused by humans, they were still mistrustful of the mainstream sources of climate information. This is certainly a serious issue that must be addressed in any future educational programs.

Building trust is key in climate change communication and should be taken into consideration when building campaign material. This study also examined what knowledge

students in the United States and Australia already held regarding environmental science. Unfortunately, it was revealed that students are full of misunderstandings about our changing climate and the Australian teachers were not any more knowledgeable (Boon, 2014). The complexity of the science was thought to be a major factor in these misconceptions. This data can be helpful in determining how to combat the misunderstandings currently held among students as their school curriculum is being developed to address climate education.

<div align="center">Future Climate Change Communication:</div>

What we know from all the analysis this paper has examined so far is that some climate change communication is to some degree working which should be expanded upon and developed even further. More exciting though, is to explore some new ideas and technologies dancing around the field of environmental education. We can take what we know is effective (or not) and apply that knowledge to new methods of communication currently being developed.

Tania Ouariachi et al. (2017) explore the concept of using online video games as a multi-faceted climate change educational tool. These games integrate a visual and narratological approach to communicating the importance of the looming environmental crisis. It allows us to draw upon what we've learned regarding the effectiveness of personalizing climate change because video games tend to evoke a visceral reaction. When these games are intended to work as a teaching tool they can facilitate intellectual growth as well. The scientists involved in this study were able to determine what messages, messengers and techniques performed best (Ouariachi et al., 2017).

One of the main goals of the game's creators was to provide "a local discourse" by portraying an average citizen dealing with local scenarios. Players are faced with community challenges and are required to make a series of decisions to reduce carbon emissions in order to

fix the problems. This may mean they have to alter their individual footprint or make decisions on a bigger citywide scale (Tania Ouariachi et al., 2017). Players are able to experience visual implications of climate change because most games allow them to travel into the future and observe the consequences of their choices. Making beneficial decisions for the community reaps rewards that reinforce taking action in real life. These games can reach younger audiences which draws from the understanding that starting climate change education early is a powerful tool in itself.

Similar to the online gaming, Aleksandra Dulic et al. (2015) believe 3D virtual simulation environments offer a way to frame the issue of climate change in a cognitive way, offering discussions of personal values, everyday experiences and relevant emotions. Providing an interactive model for communication can allow diverse constituents to participate. This list could include public officials, various industry professionals, scientists, corporate executives, non-profit leaders and under the right circumstances, even children (Dulic et al., 2015). A forum like this participating in a virtual reality can create a space for sharing diverse opinions and conversation. Imagine being able to offer different people living within a particular city a way of virtually experiencing climate change within their community and collaborating on decisions that could save their homes. This technology is still evolving to offer more complex future experiences but it shows a lot of promise for becoming a game changer in climate science communication.

From a journalism perspective, Ann Henderson-Sellers (2010) acknowledges some of the limitations this form of media has faced in promoting effective environmental education. She has participated in and felt stifled by publishing 25 plus page papers that described every aspect of climate science, only to find it made no impact at all. She found a medium she never could have

imagined capable of telling the story she was trying to convey with 10 words and a single cartoon drawing. Cartoons are entertaining and when done well, can be very educational (Henderson-Sellers, 2010). This opened the door for exploring other art mediums that can tell a story in a fun way quickly and effectively. Chalk art has proven to be another dynamic method for conveying the truth of climate change in pictures. These artists have been utilized at festivals around the world to spread facts about the pending environmental crisis. (Henderson-Sellers, 2010) This scenario seems especially helpful because nothing says community more than a local festival.

Victoria Wibeck (2013) takes an academic approach to understand the complexities of the current lack of public engagement in environmental issues and to provide solutions that address those barriers. Understanding how the human brain works is a great first step for this process. For instance, people who are not scientists dealing with this issue have difficulties thinking in probabilities. "People tend to overestimate the probability of relatively infrequent events and underestimate the probability of relatively frequent events" (Wibeck, 2013, p. 397). Further, this research found that doomsday messages, while raising awareness of the issue, was more likely to evoke feelings of helplessness and withdrawal from the problem. We have incorporated quite a bit of focus in this paper on personalizing the issue of climate change by making it community orientated, and the conclusions proposed in this study reflect that. Additionally, framing the messages in such a way that focuses on solutions that are action based rather than problems is essential to educating the public and getting them engaged. Like we saw in the gaming solutions proposed earlier, Wibeck (2013) suggests there is a desperate need to increase the visualization methods in climate change education by expanding the use of metaphors and imagery.

These climate change communication solutions help shape the future of tackling this issue head-on. They reflect what has been working in other countries and here in the United States while taking education methods to the next level. Some ideas express technological marvels while others just use the complexities of the human brain to communicate in a more impactful way. Finding new and innovative ways to share knowledge about this crisis is imperative if we plan to have a future at all.

What Happens Next?

So far in this paper, we've focused heavily on the science behind climate change and the communications that drive public awareness and action world-wide. It is imperative that we peer into the future and take a hard look at what happens if we do nothing at all. While some may liken this exercise to using tarot cards or a crystal ball to make vast predictions about the fate of our planet and species, there is evidence that suggests the future may already be upon us. We'd like to use some of the communication suggestions evaluated in this literary review by providing a visualization to practice what we have learned:

Imagine hurricanes that hit our shores and tornadoes demolish our plains with such frequency and force that whole communities of people are wiped away on a regular basis. Rising sea levels envelop entire cities as though intended to become modern day replicas of ancient Atlantis. The temperature has caused so much drought that giant fires burn year-round and take out hundreds of thousands of acres every day. The lack of rain has made whole countries uninhabitable and massive human migrations have destabilized governments and borders around the world. The influx of hundreds of millions of displaced climate refugees creates a rise in violence that overwhelms militaries and police forces. Meanwhile, the flooding of non-coastal regions escalates and eventually, Portland's rivers completely submerge all of downtown and

Portland State University becomes nothing more than a memory. U.S. food supplies run short and worse, drinkable water is so scarce that it is rationed. Thousands of species are now extinct because their habitats have all burned, run dry of water or flooded. There is no safe space for the privileged; no city unaffected and everyone is just waiting for the oceans to take their last breath and kill us all; just as it occurred during the last mass extinction on this planet.

Next imagine there is a way for one person, you, to travel back in time and raise Hell until the course of our destiny is safe for generations to come. What would you do to save your city and your family and yourself from certain death and destruction? What decisions would you make? Would you become an activist, a climate change communication specialist or a politician who cannot be bought because you've lived long enough to see the real value of money? Like a rich man on the deck of the sinking Titanic, no amount of money can save you when the Earth dies.

Now…look back towards the future, after you made engaged decisions and helped bring millions of others along in the fight. The land is green and lush with plenty of food, water and wildlife to sustain everyone. Cities are bustling but they look different. They're cleaner and brighter because energy is wireless and generated by solar and wind farms sprinkled around the world. Fossil fuels are a thing of the past and we have solved our agricultural woes as well. Portland is temperate and reflective of the efforts people like you prioritized when it counted.

Conclusion:

The journey this literary review embarks on is purposeful and valuable. The science of climate change is vast and conclusive according to every independent research study. When one looks back to the global warming predictions of the 1980s and 1990s, many of them are currently happening. In fact, some of the visualization provided above may not have seemed at all like the

future because mass migrations, giant fires, flooding and record setting storms are already upon us. What this paper brings to light is why the communication has not been as effective as it could have been by now.

There is no doubt that the fossil fuel and agricultural industries have been muddying the waters of climate change communication for decades. These businesses have been so afraid of losing their dominance and profit margin that they have purposely skewed scientific research. They have systematically created an environment that allows politicians to live in an alternate reality. We see this every day more and more since the 2016 electoral college win of Donald Trump to the Presidency. He lies so much and so often that the traditional news outlets have to run disclaimers before they show him speaking literally every single time that he opens his mouth publicly. He has perpetuated a world of alternative facts and in terms of how this effects environmental communication, it has been detrimental. As we discussed, the President of the United States regularly calls climate change a hoax and scoffs about that notion on Twitter every time it snows. The entire world and every true professional in our government know the truth. Even so, this man bases our national policies on this world that exists only in his mind and the danger of that is immeasurable.

All is not lost however. This assignment opened our group members' eyes even further to an issue we were already passionate about. By studying academic materials that delved so deeply into the core of climate change communication, new ideas and hopes surged to the forefront. Examining the many different voices that effect the future of the entire world was profound and inspiring. It is clear that there is a lot of work to be done. That said, the communication tools we learned can be expanded upon and reflected in the work we choose to do after college. We can carry on with a special climate science purpose of helping to educate generations to come.

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