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A Conservative Concern

*Conservative Ideology, The Environmental Crisis, and Why
They Can Be A Perfect Pair*

Alexandra Ferreira

Abstract

The world's current geopolitical landscape is in its most fragile state since World War II, as the specter of environmental disaster due to climate change and environmental degradation lies at the center of and looms over social, political, and economic conflict. This paper incorporates applied science, social sciences, environmental science, and the humanities into an interdisciplinary analysis of the climate change debate as well as possible solutions from the conservative perspective. Chapter 1 employs quantitative and statistical data of the natural sciences of environmental chemistry and ecology. It uses data from the United Nations IPCC report on climate change to reinforce the increasingly pressing need to address the current climate crisis in terms of scientific evidence of environmental degradation as well as its direct economic cost to society. Chapter 2 draws from the social sciences, incorporating environmental politics in analyzing statistics regarding republican opposition to environmental policy, and explains why right-leaning Americans tend to do so. It presents statistics on both national environmental movements and anti-environmental movements, such as disinformation campaigns and climate denial. Chapter 3 also engages the social sciences, focusing on environmental economics and presenting the subject through a conservative lens as a potential asset to the political right. Chapter 4 utilizes disciplines of the humanities and social sciences, specifically environmental history and politics, to present the environmental crisis as a threat to national security, mainly sighting the destabilizing effects that have factored into the historical violence and insurgency seen in Middle Eastern countries. Chapter 5 incorporates the disciplines of the natural sciences and the social sciences, providing information on the adverse effects that many forms of environmental degradation have on human health. Chapter 6 again draws from the humanities and social sciences, offering recommendations for new pieces of legislation, and

suggestions for individual civilians to begin effectively addressing the climate crisis in today's world.

Keywords: climate change, environmental policy and law, ecology, environmental economics, national security, conservative ideology, republican party.

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Introduction: Lobsters, Laws, and Locals

Last year, I was scuba diving off the coast of the Bahamian island of Nassau when I developed a strong disbelief that top-down environmental regulations will eventually save the planet from the climate crisis we are facing. Although recreational scuba diving and political analysis do not normally go hand in hand, conclusions I made that day have since driven much of my research and writing. Chris, my dive buddy, and I were checking out a protected reef not even a mile from the island's coast, which has been an established and internationally recognized marine preserve for as long as I have known about the dive spot. In this preserve, ecotourism and recreational fishing are allowed, but commercial fishing is prohibited. To protect the already degraded lobster population in the area, using scuba gear to lobster fish is specifically outlawed. Chris brought his spear with him in preparation for a possible encounter with anything that might be good for dinner, and he ended up getting a lobster. When we surfaced from the dive, he had me get back on the boat before him so he could quickly toss me the lobster to immediately throw into our tank, getting it out of sight.

Chris sensed my confusion, as there were no police boats in sight, and even if there were, we both knew the preserve's laws to be minimally enforced by local authorities at best. I teased, "What are you so afraid of, is a lobster going to come arrest you?" After a seemingly forced laugh, Chris explained that he was not fearful of being caught by local law enforcement, but rather local divers or fisherman doing the same thing as he was. He told me that the locals think the rules don't apply to them, and because they do whatever they please in their waters, he will too. Although this makes him sound confident in what he was doing, the careful manner in which he did it stemmed from an experience when local fisherman once boarded Chris' boat while he was scuba diving, and stole oxygen tanks and lobsters he speared a few miles away on a previous

dive. He said he had noticed the boat at the locations of both dives that day. A couple days later, Chris and I stumbled upon a couple of locals in the middle of a night dive, swimming with dim underwater lights and huge lobster nets. They didn't have a dive flag on the surface of the water to indicate they were there, and it was clear that they were gathering lobsters to sell the next morning.

This experience showed me how social and cultural rifts can have an effect on environmental protection. Local divers and fishermen feel a sense of entitlement to the water, which is embedded in Bohemian culture as an island nation, causing them to disregard laws put in place to protect the lobster population they have clearly been exploiting and nearly forcing out of the area. Complicit in this policy neglect is the corrupt police force around the preserve, which only administers punishment to foreigners, while providing protection for locals. This information will never be quantified into an international data set or used to enhance future policies, although it has a significant impact on the disconnect between high-up authorities and individual citizens, as well as the ecological well-being of the area's waters. National social, cultural, political, and economic norms of the island prevent the success of top-down regulation, and have possibly even led to an overall increase in lobster harvesting whether or not it was legal.

Although lobster fishing is a necessity for many citizens of the Bahamas, the overexertion of this resource may lead to more harm than good, and can have a domino effect on other fish populations in the area. While the use and manipulation of ecosystem goods and services is what has allowed humanity to get to where it is today, it may also be what brings humanity, or at least the world as humanity knows it, to a bitter end- and top-down regulation may not be able to stop it. In this paper, I will dig into what leads people to decide against environmentally friendly

lifestyles and steers them away from environmental action. In Chapters 1 and 2, I will provide quantitative data on the current state of the climate crises and the lack of environmental action in the United States, respectively. In Chapter 3, I will explain how the tendency to use cost-benefit analysis in making everyday decisions keeps people from converting to more sustainable lifestyles. In Chapter 4, I explain the effect of social media and the internet on human knowledge of environmental issues as well as environmental worldviews. In Chapter 6, I discuss the various and severe health issues associated with different forms of environmental degradation, such as pollution. Lastly, in Chapter 6, I offer recommendations for future legislation, and suggest simple and easy steps for individuals to reduce their ecological footprint.

Chapter 1: Numbers Never Lie

There is no doubt that human activity has lead the planet into its current climate crisis. All credible scientific data on the subject concludes that human activity is degrading ecosystem goods and services to their limits, and is directly responsible for climate change and most of the other environmental issues seen today. In contrast to the overwhelming evidence of environmental degradation and climate change, in the United States, the issue is still up in the air. The longer it is allowed to hang over the nation the worse the problem will become, and the less it will matter whether an individual is rich, poor, American, Indonesian, liberal, or conservative- the impacts will take their toll on all.

As it can only exist both within and in connection to nature, human life is completely dependent on natural capital- the resources and services the environment provides. Accompanied by human capital and manufactured capital, natural capital is a vital input of economic systems through which humans generate, allocate, and obtain all goods and services.¹ These are also

¹ G. Tyler Miller and Scott E. Spoolman, *Living in the Environment*, 17th ed., (Belmont, CA: Cengage Learning, 2012), 614.

known as ecosystem goods and ecosystems services. A textbook definition of an ecosystem is “a set of organisms within a defined area or volume that interact with one another and with their environment of nonliving matter and energy.”² Ecosystem services can be considered the perks or favors humans get from ecosystems, which come in a few different forms. Humans see the benefits of all of these, which are described by the Millennium Ecosystem Assessment’s Synthesis on *Ecosystems and Human Well-Being*, one of the most important and informative collections of current scientific data and analysis on environmental issues available to the public. The Millennium Assessment describes them as “*provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.”³ This assessment explores the specific connections between human life, human well-being, and the ecosystem goods and services they both depend on and exploit. It explains how the well-being of all humans, regardless of socioeconomic standing, is clearly and inextricably linked to environmental health and natural capital. According to the Millennium Assessment, human well-being is a product of different aspects of human life, all of which are grounded in access to natural capital. Specifically, human well-being takes into account an individual’s access to materials including food, air, and water, health, social connections, security in both resource access and safety, and level of freedoms in choosing, acting, and achieving.⁴ As an entity existing from and within nature, humanity both has an unavoidable effect on ecosystem goods and services and is unavoidably affected by those same goods and services. Economic systems,

² Ibid., 7.

³ Millennium Ecosystem Assessment Program, *Ecosystems and Human Well-Being: Synthesis*, (Washington, DC: Island Press, 2005), V.

⁴ Ibid., V.

legislation, technological developments, and religious beliefs influence land use, the treatment of animals, the disposal of waste, and the use of resources, which are all directly connected to natural capital, which directly connects back to human life and well-being. More importantly, it offers some of the most pertinent data available on the degradation and changes natural capital is experiencing around the world.

Another extremely significant collection of scientific data and analysis, the Synthesis Report on the Intergovernmental Panel on Climate Change's Fifth Assessment Report explains, "Warming of the climate system is unequivocal, and since the 1950's, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed,

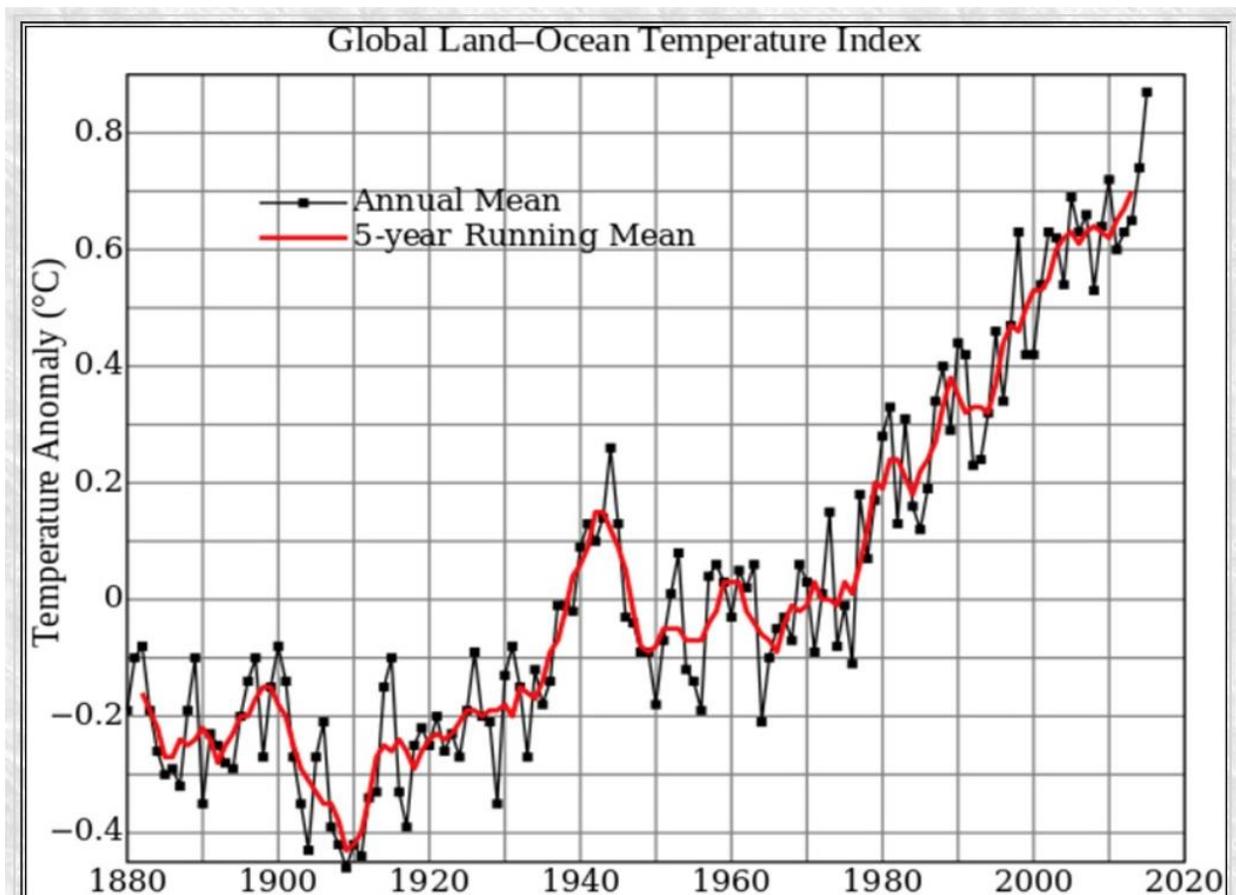


Figure 1: Global Average Temperatures From 1880-Current. Source: <http://www.roperld.com/science/globalwarminggraphs.htm>

the amounts of snow and ice have diminished, and sea level has risen.”⁵ Since 1983, each decade has gotten warmer and warmer, making the last thirty years most likely the warmest in the last 1,400 years.⁶ As the ocean is constantly working to store carbon dioxide, a valuable ecosystem service of regulating air quality and climate, its acidity has consequently increased by 26% since the Industrial Era.⁷ This has contributed to the death of about 20% of all coral reefs, as well as the degradation of about 20% more, just in the last 20-30 years. While it may seem like humans will remain minimally affected by the life or death of coral reefs, a reef area only the size of a city block has an economic and ecological service value totaling over 1 million dollars per year.⁸ Additionally, 90% of oceanic fish species reproduce either on reefs or in coastal areas and mangrove forests- which are estimated to be losing a football field of space every thirty minutes.⁹ Among others, these ecological goods and services humans need from the ocean are only one example of an ecosystem service analyzed by the Millennium Assessment- 60% of which are concluded to be either damaged or being exploited unsustainably by humans.¹⁰

Without an extensive background in ecology, biology, or environmental science, many scientific facts are hard to contextualize into in the larger climate change debate. Even highly intelligent people may not understand the relevance of the reproduction of oceanic fish in coral reef habitats, or how this is connected to global weather patterns. Furthermore, they may just frankly not care about fish, polar bears, or other animals they do not have a connection to. Scientific facts on environmental degradation the lose their meaning when they are not understood within their ecological context, allowing people to respond with “So what?”

⁵ IPCC, *Summary for Policymakers, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, (Cambridge, UK, and New York, NY: Cambridge University Press, 2013), 2.

⁶ *Ibid.*, 2.

⁷ *Ibid.*, 4.

⁸ Miller, *Living in the Environment*, 252.

⁹ *Ibid.*, 252.

¹⁰ Millennium Ecosystem Assessment Program, *Ecosystems*, 6.

Therefore, it is extremely useful to understand the degradation of the planet's ecological health in terms of dollar signs. Only a few years ago a fishery in Newfoundland succumbed to overfishing and crumbled, which left tens of thousands of people out of work, and called for monetary support and professional retraining that ended up totaling over \$2 billion.¹¹ In 1996, the variety of irresponsible agricultural practices cost the United Kingdom \$2.6 billion.¹² Floods, fires, storms, droughts, and earthquakes, which are increasing in frequency as temperatures increase and human activities become more and more invasive, cost about \$70 billion in 2003.¹³ In addition to costs seen in the past, the continuation of sea level rise, desertification, species extinction, and pollution will have insurmountable political, social, and economic effects on populations all over the globe, regardless of their current political, social, or economic standing. Going against not only scientific conclusions but simply logical conclusions, citizens of the United States continue to oppose environmental legislation, and fail to make efforts to reduce their individual effects on the world's ecosystems.

Chapter 2: The Root of the Rifts

There have been a plethora of studies done on the correlation between political party affiliation or ideology and concern for environmental issues. Altogether, they clearly convey a divergence between the right and left sides of environmental politics, which became more and more distinct in the last few decades. During the early 1970's attitudes toward environmental issues were considered far more unified between Republicans and Democrats in their support for proactivity in addressing the issues.¹⁴ The difference in levels of support between the two groups

¹¹ Ibid., 6.

¹² Ibid., 9.

¹³ Ibid., 9.

¹⁴ Aaron McCright, Chenyang Xiao, and Riley Dunlap, "Political Polarization on Support for Government Spending on Environmental Protection in the USA, 1974-2012," *Elsevier Social Science Research Journal*, (2014): 256.

even declined between 1974 and 1990, which was the year of the 20th Anniversary of the celebration of Earth Day. During this year, public endorsement of environmentalism peaked and the differentiation of opinions along ideological and party lines bottomed out.¹⁵ Since then, republican and democratic parties have veered away from each other, gaining speed in opposite directions ever since.¹⁶ While citizens opposing environmental regulations and the environmental movement in the United States are not exclusively conservative, right-wing, or republican, the vast majority of them are. Although environmental issues are not tied up in ideological differences themselves, they immediately bring deep political cleavages to the surface when they are the subject of both casual conversation and governmental policy.

The conservative disinclination to support environmental policy and the subsequent war on climate science that is currently ensuing can be explained in a few different ways. Primarily, conservative ideology directly opposes the type of governance and regulation solving environmental issues seems to imply. As mentioned above, ideological cleavages began to reflect support or opposition to environmentalism beginning in the 1990's. This can be viewed as a consequence of the disintegration of the Soviet Union, whose ideology seemed to be partly recovered by environmental policy framework.¹⁷ Solving environmental issues was equated with a call for larger government, increased government spending, higher taxes, and market restrictions- all things republicans and conservatives contend. The Anti-environmentalism attitude of conservatives kick-started an anti-environmental movement, which resulted in the entire republican party finding itself further to the ideological right than before, with new influences such as the Tea Party.¹⁸ Consequently, partisan polarization manifested itself within

¹⁵ Ibid., 256.

¹⁶ Ibid., 258.

¹⁷ Ibid., 256.

¹⁸ Ibid., 258.

the American public, further encouraging political elites and candidates to denounce climate change and policy, intensifying the strategies in the anti-environmental game plan over and over again. The feedback loop between voters and politicians results in a vicious circle of partisan polarization- a circle trapping a bipartisan issue in political gridlock.

The ideological inclination to reject climate science, in addition to other political and economic inclinations linking themselves to the issue, are clearly visible in President Donald Trump's 2016 election storyline and eventual withdrawal from the Paris Agreement. Like most other republicans during their campaigns, President Trump conveyed skepticism about anthropogenic climate change, and repeatedly vowed to dismantle business and industry regulations that the environmental solutions currently being pursued called for. This is an essential step, as many republicans agree, to rebuilding the United States economy, creating jobs, and relieving a burden the Obama administration ordered business to bear. As a 2017 study by a Chinese economist explains, "Obama believes that the Paris Agreement strengthens the U.S. leadership in international affairs, whereas Trump believes that the agreement weakens U.S. sovereignty," and President Trump places "overwhelming weight on mitigation's economic costs and belittles its ecological and economic benefits, which is consistent with his nationalistic and isolationist 'America First' world view."¹⁹ President Trump's connections with the fossil fuel industry, exhibited by his placing of Scott Pruitt, former Oklahoma Attorney General who lead a legal attack on Obama's Clean Power Plan in defense of petrochemical interests, at the head of the EPA, and his personal desire to dismantle Obama administration efforts, as seen in his common personal attacks on Obama and his policy initiatives even after his election, are not based on scientific facts, but are economic, political, and personal justifications for his rejection

¹⁹ H.-B. Zhang, "U.S. Withdrawal From the Paris Agreement: Reasons, Impacts, and China's Response," *Advances in Climate Change Research*, (2017): 4.

of climate change.²⁰ Additionally, the profound political and social cleavages that have been bubbling over across the country since the beginning of his presidency served as a buffer for the international and domestic criticism he was sure to receive in pulling out, which further encouraged deciding against the continued participation in the Paris Agreement.. Here, an anti-environmentalist stance backed by reasoning lacking any reference to scientific evidence of anthropogenic environmental degradation is once again painted as a central feature of the republican agenda and conservative ideology.

Another significant factor in the increasing conservative rejection of environmentalism as a whole is the availability of information that conflicts with the evidence found in the IPCC and other scientific analyses spurring on the movement. In his book *The Politics of Climate Change*, Anthony Giddens explores popular climate skepticism, a few of its most well-known champions, and how they contribute to the rejection of climate science. Fred Singer and Dennis Avery argue that current climate warming patterns are nothing out of the ordinary, and the IPCC is the front of a global public relations campaign.²¹ Patrick Michaels outright denies the accuracy of the IPCC findings and the legitimacy of its conclusions. Bjorn Lomborg, author of *The Skeptical Environmentalist*, believes in the facts of climate science, but attributes its popularization to alarmist behavior, which has consequences for other pressing global issues that are being pushed to the side, such as extreme poverty, AIDS, and war.²² The book and documentary *Merchants of Doubt* unapologetically critiques the climate disinformation campaigns that gain traction so easily in the United States, especially among conservative and right-leaning ideologies, through no fault of their own. This documentary exposes some of the most popular disinformationists,

²⁰ Ibid., 4.

²¹ Anthony Giddens, *The Politics of Climate Change*, 2nd ed. (Cambridge: Polity, 2012), 18.

²² Ibid., 19.

many of whom first gained experience in the field while receiving checks from tobacco companies to convince the public that smoking is not bad for you. Big Tobacco companies circulated the same creed current climate disinformation campaigns aim to exploit. An internal message of one of the companies preached, “Doubt is our product, since it is the best means of competing with the ‘body of fact’ that exists in the minds of the general public.” It continued, “It is also the means of establishing a controversy. Within the business we recognize that a controversy exists.”²³ *Merchants of Doubt*, along with other documentaries such as Leonardo DiCaprio’s *Before the Flood*, shed shocking light on the amount of money that flows from the oil and gas industry into Washington, D.C., and to disinformation dissemination. The fact that more than ten billion U.S. dollars has moved from oil, gas, and coal industries to just the twenty-two senators alone that wrote appeals to President Trump pushing him to pull the U.S. out of the Paris Agreement in May of 2017 can speak for itself, although that is only the tip of the iceberg.²⁴

As mentioned in Chapter 1, the issue itself is also difficult to grasp, and has become more so as it develops and expands. As Miller writes in his textbook, “The focus of environmental issues has shifted from easy-to-see dirty smokestacks and filthy rivers to more complex, controversial, long-term, and often invisible environmental problems such as climate change, biodiversity loss, and groundwater pollution.”²⁵ The environmental agenda has thus been politicized by both the right and the left, and sits as one of the many things the United States currently finds itself deeply divided over. The politicization of the climate crisis primarily pitted conservative ideology against environmental proactivity in Congress as a way to cater to fuel

²³ Naomi Oreskes, *Merchants Of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2011).

²⁴ Zhang, et. Al., “U.S. Withdrawal,” 4.

²⁵ Miller, *Living*, 650.

industry interests, which trickled down to party affiliates across the country. The complexity of environmental issues, the casting of doubt onto credible scientific findings, the injection of unfounded scientific claims into the debate, and the social, political, and economic climates within which these factors converge all contribute to the attachment of conservative ideology to anti-environment stances. Taking a step back from examining the relationship between the political or ideological right and the facts on the degradation of ecosystem goods and services allows one to see how conservative ideology was essentially unwillingly dragged into the ring to fight on behalf of the oil and gas industry, to which a relatively small number of right-leaning individuals were monetarily addicted to. Now, while 99% of real, credible scientists agree on the theory of anthropogenic climate change, which is the same percentage of scientists that agree on the theory of gravity²⁶, only 10% of the public in the United States holds it to be one of the more important issues to be addressed.²⁷

Chapter 3: The Right Side of Environmental Economics

As mentioned in Chapter 2, economic arguments are one of the main obstacles to getting people on board with environmentalism. Primarily, adopting environmental policy, regulations, and lifestyles are largely believed to be extremely costly for the public sector, private businesses, and individual citizens alike. In 2007, a working paper from the National Bureau of Economic Research and Massachusetts Institute of Technology's Joint Program on the Science and Policy of Global Change assessed the possible outcomes of legislation centered on greenhouse gas emissions cap-and-trade mechanisms that were slated for review by the U.S. congress at the time. It estimated that policies aimed at a 50% to 80% decrease in U.S. greenhouse gas production from production levels in 1990 (achieved by 2050) might result in a 1.1% to 2% loss

²⁶ Fisher Stevens, *Before the Flood*, National Geographic, (2016).

²⁷ Miller, *Living*, 650.

in national GDP.²⁸ The costs accounting for the 1.1% to 2% of GDP would be incurred by large producers of carbon dioxide (CO₂), and were estimated based on the quantity of CO₂ emitted and its per ton emission price, which was held to grow from \$120 in 2015 to \$200 in 2050.²⁹ As the annual growth of national GDP is considered to be a characteristic of a well-functioning economy, the prospect of losing up to 2% of the indicator is extremely undesirable. For private companies, environmental departments enforcing regulations and standards can be seen as the most expensive, inconvenient departments by a mile. Due to new standards and regulations in industries such as the construction industry, companies have had to purchase permits, retrofit or replace machines, monitor work site environmental conditions, work within environmental time windows and constraints, pay for the testing and recycling or disposal of materials, and spend administrative time and effort to fulfill all these requirements among many others. Even for a small-scale project lasting only 6 months in duration, the costs of complying with perimeter air monitoring requirements in New Jersey can total around \$200,000 without any instances of exceedances in air pollutants, which would result in an even bigger price tag.³⁰ For businesses that existed before such environmental policies were put in place, these new costs are extremely unwelcome. In the public sector, both the price and idea of regulatory oversight, enforcement, and the commission or expansion of environmental government agencies can snowball and wind up seeming equally unattractive. This makes legislation that depends on attentive oversight in order to be effective extremely difficult for the government to pass and execute, as “developing and adopting a budget to finance government agencies, the programs for which they are

²⁸ S. Paltsev, et al., "Assessment of U.S. Cap-and-Trade Proposals," *National Bureau of Economic Research Working Paper Series*, no. 13176 (2007): 37.

²⁹ Paltsev, "Assessment," 37.

³⁰ Langan Engineering and Environmental Services, Inc., "Perimeter Air Monitoring Proposal: Kearny Generating Station – Class H Substation and 230kV Switchyard Projects," (2017): 3.

responsible, and the enforcement of laws and regulations within those programs is the most important and controversial activity.”³¹ Additionally, many express concern over the economic burden of possible job loss due to environmental regulations that hurt specific industries. A 2002 study published in the *Journal of Political Economy* found that in the wake of the 1970’s U.S. Clean Air Act Amendments, 500,000 jobs were lost within the regulated sectors.³² Republicans and conservatives attempt to protect American industries, private businesses, and individual jobs, as well as oppose large and tax-expensive government operations and restrictions, therefore tend to reject environmentalism right off the bat.

While all hits will seem good right off the bat, many will end up being foul balls- one of these being the decision to believe the economic arguments against environmentalism such as those summarized above. The shortcomings of many anti-environmental economic arguments stem from the fact that fundamental economic assumptions and analyses are generally inapplicable to public goods and services, which are non-competitive and non-exclusive. Economic analysis is done atop a base of fundamental assumptions about the market, which are neatly summarized, “There are no public goods, no externalities, no monopoly buyers or sellers, no increasing returns to scale, no information problems, no transaction costs, no taxes, no common property, and no other ‘distortions’ between the costs paid by buyers and the benefits received by sellers.”³³ In reality, each of these assumptions is violated by the causes and effects of environmental issues, which leads to inaccurate cost-benefit analysis, the omission of significant variables, undeniable market failures, and skewed data that unintentionally hides

³¹ Miller, *Living*, 643.

³² Reed Walker, “The Transitional Costs of Sectoral Reallocation: Evidence From the Clean Air Act and the Workforce,” *Quarterly Journal Of Economics* 128, no. 4 (November 2013): 1789.

³³Don Fullerton and Robert Stavins, “How Economists See the Environment,” *Nature* 395, no. 6701 (October 1998): 433.

these problems. Even when leaving out any valuation of destroyed or protected ecosystem goods and services, which might be difficult to understand or support by someone outside of an environmental field of study or work, analysis still fails to incorporate critical economic considerations.

A 1.1% to 2% decrease in GDP in 2050 (mentioned above) may be a convincing statistic when reported on its own, but these numbers were a small piece of a 77-page report. The same report also states that allowance sales in cap-and-trade systems can generate annual revenues climbing from \$130 billion to \$370 billion in 2015 to \$250 billion to \$515 billion in 2050.³⁴ This can also be seen as an extra \$1600 to \$4900 per year for each household of four. While this already sounds like a home run for the economy, these numbers are still leaving out the monetary benefit of avoided costs of increased health care and damage caused by pollution and climate change. The study states, “No assessment was carried out of the economic effects of climate change avoided or ancillary benefits of emissions mitigation, but of course these benefits would provide at least a partial offset to the mitigation cost.”³⁵ Additionally, the revenue from a new or increased tax can replace the revenue from other taxes, eliminating them entirely. If possible, the new revenue can even be redistributed back to households- this is known as the ‘double dividend hypothesis,’ which was recently introduced to the environmental economic discourse by conservative economists. There is a great deal of literature affirming the potential of green taxes to lower current taxes on labor and capital. A 2015 article from *Engineering Economics* successfully tests this theory by applying it to payroll taxes and concludes, “Given the fact that the efficiency costs of environmental taxes are considerably lower than the payroll taxation in the EU, it is possible to apply payroll tax cuts and consequently increase the ratio of environmental

³⁴ Paltsev, “Assessment,” 39.

³⁵ *Ibid.*, 37.

taxation.”³⁶ Furthermore, there is also a vast body of literature expressing the potential environmental policies and the conversion to sustainable industries have to create jobs. Again, the statistic (presented above) of 500,000 jobs being lost as a result of legislation passed in the 1970’s is a small excerpt from a fifty-page article, which says that such a number would be challenging to understand without first understanding the lost long-run wages due to job transitions.³⁷ It even goes so far as to essentially debunk such a claim, saying “Numerous publications have highlighted the lack of credible estimates pertaining to the costs and economic incidence of environmental regulations for workers in these industries.”³⁸ As explained in the documentary *This Changes Everything*, logically, the pipe-fitters, electricians, laborers, operators, engineers, managers, and executives involved in a tar sands extraction project such as that at Fort McMurray in Alberta, Canada will be equally qualified for the same position in another field.³⁹ New industries also create new jobs, both specialized and unspecialized, which also contribute to overall economic benefit. Germany, which gets 30% of its electricity from nuclear technology, saw a net gain of 400,000 jobs after promoting nuclear energy.⁴⁰ In conclusion, environmentalism can act as a promotor of economic growth and well-being, even without accounting for the monetary value of ecological goods and services. Contrary to popular belief, efficient environmental policies do not have to lead to increased public or private costs, a greater tax burden, or increased unemployment. In fact, the continued neglect of environmental issues and failure to implement sufficient policy addressing them might end up ushering in the very things it is trying to avoid.

³⁶ Danuse Nerudova and Marian Dobranschi, "Double Dividend Hypothesis: Can it be Validated by Carbon Taxation Swap With Payroll Taxes?" *Engineering Economics* 26, no. 1 (January 2015): 30.

³⁷ Walker, "Transitional Costs," 1789.

³⁸ Walker, "Transitional Costs," 1789.

³⁹ Naomi Klein, *This Changes Everything*, Abramorama, (2015).

⁴⁰ Klein, *Changes*.

Chapter 4: National Security and Climate Change

If the United States government was neglecting a national security threat that costs billions of dollars and millions of lives every year, destabilizing the international geopolitical structure, and forcing people to support the radical terrorist groups that directly oppose the American way of life, one would think conservatives and republicans would be enraged, as any citizen should be. This threat would undoubtedly have to be vigorously addressed and quashed. Otherwise, the government would be subjecting people both at home and abroad to decreased political and civil rights and freedoms, life-threatening conditions, and the domestic implications of living in a nation at war. Unfortunately, this is not a hypothetical threat to national security- it is being faced by the United States today. The U.S. is still dealing with the War on Terror, which comes with a devastating cost of human lives, freedoms, rights, and resources- a war whose beginnings were inextricably tied to climate change and its unforeseen consequences. In the past few decades, environmental degradation's calamitous effects on social, political, and economic security have been experienced and become evident throughout in many different countries, both rich and poor.

Climate change was a primary source of friction leading up to the eruption of the Arab Spring, the tide of both violent and non-violent public uprisings in Northern African and Middle Eastern countries, which lead to an already politically unstable region being scattered with political upheaval, overthrown regimes, civil wars, and momentous insurgencies. Afghanistan had been a global source of opium for centuries, until the Taliban took power and required farmers to convert their poppy fields to wheat fields.⁴¹ The crop was used for heroine, therefore supplying it was considered fundamentally un-Islamic, and the Taliban effectively halted the

⁴¹ Hal and Marilyn Weiner, *Journey to Planet Earth: Extreme Realities*, Season 8, Episode 1, (PBS, December 2014).

flow of 75% of the world's supply of heroine overnight. The Taliban was driven from power in 2001- the same year many regions around the world were hit with unprecedented droughts that drastically effected North African and Middle Eastern countries, the span and intensity of which were products of climate change. In Afghanistan alone, 1 million people were living in drought conditions, many of which depended on agriculture for subsistence and income.⁴²

This combination of events left farmers desperately looking for a way to feed themselves and their families, while Taliban leaders were searching for the resources needed to continue their insurgency. Converting Afghan wheat fields back to poppy fields, which need only a sixth of the water to grow, provided a solution for both parties.⁴³ Farmers began cultivating poppy under the supervision of Taliban forces, who protected them from the Afghan government and allowed them to continue feeding their families. In return, the Taliban exploited the desperate and vulnerable farming communities, mandating that they pay taxes when moving their crops, allow them to store weapons in their towns and homes, and let them recruit their young men to join their fight.⁴⁴ The suffering of local communities at the hands of global warming explains how the Taliban's support, funding, and supply of manpower flourished as the region's socioeconomic, political, and environmental state deteriorated.

Again in 2010, climate change induced another unprecedented environmental event. The jet stream, one of the currents of winds that account for the planet's weather, divided into different paths. One section of the stream moved south and picked up an immense amount of moisture and fueled unusually violent annual summer monsoons in Pakistan. The downpours swamped 25% of the country and left 200 million people homeless, leading meteorologists to

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

call the monsoon season “the most destructive extreme weather event caused by climate change.”⁴⁵ The Pakistan government’s emergency response and relief efforts were hindered by the destruction of government infrastructure itself, which left its suffering citizens without the aid they were counting on. The Taliban seized the opportunity to win over the discontented public in Pakistan by providing assistance to citizens, which resulted in even more public approval of the influential radical group. This caught the attention of the U.S., which sent relief efforts to compete with Taliban relief efforts, fearing the threatening consequences of the group gaining too much ground.⁴⁶

The other section of the jet stream brought unbelievably high temperatures to Russia, bringing on a severe drought, unbearable heat waves, and thousands of wildfires across the country. Its capital was smothered in a toxic smog, and at 100 degrees Fahrenheit, Moscow saw its highest temperatures in the previous 500 years. The wildfires, smog, and extreme heat were eventually responsible for 56,000 Russian deaths.⁴⁷ Being one of the largest exporters of grain, it was predicted that Russian farms would produce 100 million tons of grain that year. Wheat and corn fields were singed by this change in climate, decreasing the actual yield to only 60 million tons- 40% less than expected. In response, Vladimir Putin temporarily banned the export of grains in the summer of 2010, attempting to keep domestic prices stable, while other grain-exporting countries reported similar yields due to extreme weather. Among these countries was China, the world’s largest producer and consumer of wheat, being responsible for 18-20% of the wheat consumed globally.⁴⁸ China’s usual winter wheat harvest accounts for 22% of their annual harvest, normally allowing them to be self-sufficient. The country began to see a lack of rainfall

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ Troy Sternberg, “Chinese Drought, Bread and the Arab Spring,” *Applied Geography* 34 (2012): 520.

in November 2010, and quickly fell into its most extreme drought on record.⁴⁹ 35 million Chinese citizens fell victim to an estimated wheat shortage of 10 million tons, a severe lack of potable water and power sources, income and livelihood losses, and a national economic cost of \$2.3 billion.⁵⁰ In attempt to maintain sufficient resources and thus social stability, the Chinese government was forced to purchase more foreign wheat than usual. The combination of Russia's export ban, and China's increased imports, along with additional climate-choked wheat yields in other key countries such as Canada, Ukraine, and Australia, resulted in wheat prices more than doubling from June 2010 to February 2011.⁵¹

This jolted the Arab region, as the Middle East contains nine out of the ten largest importers of grain, and resulted in plummeting food supplies and skyrocketing bread and grain prices.⁵² This was the spark that ignited the Arab Spring. People that normally would have stayed away from political protests and activist agendas in general were thrown into the middle of the agitation that had been brewing under a repressive regime for decades. News media aired clips of protesters in Tunisia and Syria waving bread, and one interviewee in central Cairo told a reporter "I came here just to ask for rice, for a home, for a dignified life... for a regime in power for 30 years to go away."⁵³ The radical Sunni group known as the "Muslim Brotherhood" harnessed this discontent in a similar way as the Taliban and garnered support, changing their catch phrase from "The solution is Islam," to "Give us our daily bread."⁵⁴ Additionally, President Mubarak was finally removed from office on February 11, 2011, only 10 days after a *Business Insider*

⁴⁹ Ibid, 521.

⁵⁰ Ibid, 522.

⁵¹ Sternberg, "Chinese Drought," 522.

⁵² Ibid.

⁵³ Ibid.

⁵⁴ Ibid.

article was published with the title “Non-Political Bread Riots Are Breaking Out in Egypt, Killing Three.”⁵⁵

The preexisting sources of socioeconomic strife in this fragile region were exacerbated by ecological degradation, which led to the rising cost of living linked to surging food prices. Issues that had been fermenting under indifferent political elites were no longer tolerable, and political turmoil became the default state of the already fragile Arab world. As Troy Sternberg of Oxford University’s School of Geography concludes in a research article for the scientific journal *Applied Geography*, “The effect of climatological hazards on wheat production in 2010-11 is a striking example of how climate hazards, agriculture and politics can become interwoven across spatial scales.”⁵⁶ He continues, “Similar scenarios are likely to be repeated as climate volatility, expanding populations and competition for resources disturb global markets and potentially national stability.”⁵⁷ As it is no secret, the volatility left in the wake of overthrown political regimes leads to the invigoration of insurgent and terrorist groups, and has historically compromised the national security of the U.S., among all other countries involved. Such losses cannot be quantified by any measure or statistic, but the human costs of the 9/11 terrorist attacks and U.S. military operations in the Middle East alone are reminders enough that any factor contributing to these kinds of geopolitical conflicts cannot be ignored by any government or citizen. In addition to security threats created by international geopolitical conflict, climate change also holds the threat of increasingly severe weather disasters, which have proven to be just as costly. In many regions of the world, 2017 saw an unprecedented amount of devastation caused by severe weather including intense flooding, hurricanes, and wildfires.

⁵⁵ Gus Lubin, “Non-Political Bread Riots Are Breaking Out in Egypt, Killing Three,” *Business Insider* (February 1, 2011). <http://www.businessinsider.com/egypt-bread-riot-2011-2>

⁵⁶ Sternberg, “Chinese Drought,” 523

⁵⁷ *Ibid.*

Oceans absorb an estimated 25-30% of the carbon dioxide humans emit into the lower atmosphere, therefore they help soothe the planet's surface temperatures, but harbor more thermal energy themselves.⁵⁸ Because hurricanes and other storms are fueled by the thermal energy of the water they develop above, and both surface temperatures and ocean temperatures are increasing, global warming would logically lead to more severe tropical storms. A study published in 2008 estimated that an increase in temperature of the Atlantic Ocean by just 1° Fahrenheit (.80 Celsius) would result in the total number of annual hurricanes and tropical storms increasing by one third, and intense hurricanes, which carry winds over 100 miles per hour (177 kilometers per hour), by 45%.⁵⁹ The number of hurricanes developing per year is keeping in step with this prediction, as it has increased from 49 in 1970-1979 to 75 in 2000-2009.⁶⁰ During the span of just one month, two Category 4 and two Category 5 hurricanes developed, and three major hurricanes hit the same region.⁶¹ While it usually takes 2-3 days for a Category 1 storm to build up to a Category 5, 2017's Hurricane Maria did this in just fifteen hours- less than half the normal time.⁶² Among others leading relief efforts in the southern United States and Caribbean, the Honorable William B. Long, administrator of The United States Federal Emergency Management Agency (FEMA), testified to the unprecedented season of disasters before the House Committee on Homeland Security in November of 2017. Long explained that FEMA was amid its longest activation in the history of the agency, still working in the aftermath of Hurricane Harvey, Hurricane Maria, Hurricane Irma, the California wildfires (continued to burn until December 2017), and 25 other disasters stretching through 19

⁵⁸ Miller, *Living*, 503.

⁵⁹ Miller, *Living*, 508.

⁶⁰ Subhojit Goswami and Akshit Sangomla, "Flood of Hurricanes," *Down to Earth* 26, no.10 (October 2017): 27.

⁶¹ *Ibid*, 26.

⁶² *Ibid*, 28.

jurisdictional regions.⁶³ At the time, between the three major hurricanes and the wildfires in California, 25 million United States citizens had been affected, representing 12% of the country. Long said that in just under two months, a record-breaking 4.5 million citizens registered for FEMA assistance programs, and the agency was estimating that it would spend \$16-17 billion on relief for Harvey and Irma alone.⁶⁴ Since Hurricane Harvey hit, 1.1 million Americans had been displaced to shelters, which reached its highest point with 200,000 citizens in one night. Additionally, these disasters resulted in FEMA having to rescue 9,000 people, along with another 20,000 lives saved by state, local, and civilian responders after Harvey.⁶⁵ In Texas alone, just the first phase of recovery is estimated to amount to \$457 million.⁶⁶

Vice Admiral of the U.S. Coast Guard Karl Shultz, Commander of the Atlantic Area, testified that the Coast Guard had rescued 11,300 people, identified or salvaged 3,600 damaged or sunken vessels, and deployed 3,000 service people, consisting of 2,000 active duty Coast Guard members, 800 reservists, 150 civilians, and additional volunteer Auxiliarists.⁶⁷ Admiral Shultz also explained that while the Coast Guard had still been nationally deployed during the disasters, it suffered critical damages to more than 40 of its facilities. Specifically, the Coast Guard will need about \$1.3 billion to rebuild infrastructure and vessel damage, \$70 million of which was still needed for restorations after Hurricane Matthew in 2016.⁶⁸ Following Admiral Shultz, Deputy Commander General of Civil and Emergency Operations of the U.S. Army Corps of Engineers Donald E. Jackson testified that the Corps was still in the process of removing 1

⁶³ “H Transpo Hearing on the 2017 Hurricane Season; Full Committee Hearing on Emergency Response and Recovery: Central Takeaways from the Unprecedented 2017 Hurricane Season,” *Washington Newsmaker Transcript Database 2* (November 2017): 14.

⁶⁴ *Ibid*, 15.

⁶⁵ *Ibid*, 15.

⁶⁶ *Ibid*, 3.

⁶⁷ *Ibid*, 16-17.

⁶⁸ *Ibid*, 18.

million cubic yards of debris in the U.S. Virgin Islands and 6 million cubic yards of debris throughout Puerto Rico.⁶⁹ The Corps installed over 400 temporary emergency power generators in Puerto Rico, which completely lost power during Hurricane Maria, compared to the 307 it installed after Hurricane Katrina. Within a week of receiving its mission assignment, the Corps required \$150 million worth of critical material, 60,000 electric poles of different kinds, and 6,100 miles of transmission wire to begin to restore energy services to the region.⁷⁰ In total, Hurricane Harvey resulted in 83 deaths (82 deaths in the United States and 1 in Guyana) and damages of up to \$200 billion, Hurricane Irma resulted in 102 deaths (58 deaths in the United States) and damages of \$60-100 billion, and Hurricane Maria resulted in 68 deaths (25 deaths in the United States) and damages of up to \$85 billion.⁷¹ Furthermore, monsoons and flooding in 2017 left over 1,200 people dead and 40 million affected in India, Bangladesh, and Nepal, in addition to heavy rain and mudslides leaving over 1,000 people dead and over 3,000 people affected in Sierra Leone.⁷²

Global warming is also responsible for the relentless scorching that took place during California's 2017 wildfire season. According to the state government's California Fire website, 2017 brought 9,133 reported fires, burning more than 1,248,606 acres.⁷³ To put this into perspective, the five-year average for those same statistics based on past wildfire seasons is 4,835 fires and 202,786 acres burned. In an article appearing in *Time*, it was reported that the year's wildfire season would result in upwards of \$9 billion in damages, only being surpassed in

⁶⁹ Ibid, 19.

⁷⁰ Ibid, 28.

⁷¹ "A Season of Disasters," *America* no. 8 (2017): 14.

⁷² Ibid.

⁷³ "Incident Information: Number of Fires and Acres," CAL FIRE (January 2018).
http://cdfdata.fire.ca.gov/incidents/incidents_stats?year=2017

costs by the 1991 Oakland Hills fire, which totaled about \$2.7 billion.⁷⁴ According to California insurance commissioner Dave Jones, there were already about 45,000 insurance claims made for a total of \$11.79 billion by January 2018.⁷⁵ An even higher total cost of damage was estimated by Dr. Joel N. Meyers, the founder, president, and chairman of AccuWeather, being about \$180 billion including the loss and damaging of homes, school and business closings, jammed commutes, negative health effects from reduced air quality, fire-fighting and rehabilitation costs, lost profits for businesses, and lost work days.⁷⁶ The fires in this region resulted in the death of 46 American civilians and the injury of 199, the injury of 12 firefighters, the destruction or partial destruction of more than 18,000 homes, and damage to almost 2,300 business properties. According to an article for *Business Insider*, the fire danger level also broke historical records before the outbreak of the Thomas Fire as a 296 on the brush burning index.⁷⁷ The brush burning index is based on moisture levels, humidity levels, wind patterns, and other environmental factors, and a rating that surpasses 162 is categorized as representative of the most extreme fire risk. These environmental conditions, a significant portion of which were attributable to the effects of climate change, allowed the Thomas Fire to scorch an area greater than the size of New York City.⁷⁸ According to BBC News, the Thomas Fire burned 230,000 acres in one week and

⁷⁴ Jonathan Cooper, "October's Wine Country Fires Were the Costliest Ever," *Time* (December 7, 2017).

<http://time.com/money/5054103/octobers-wine-country-fires-were-the-costliest-ever/>

⁷⁵ "California Insurance Department reveals loss estimate on 2017 wildfires," *Property and Casualty* 360, (January 31, 2018) *Business Insights: Essentials*.

⁷⁶ "AccuWeather Predicts 2017 California Wildfire Season Cost to Rise to \$180 Billion," AccuWeather: News (December 2017).

<https://www.accuweather.com/en/weather-news/accuweather-predicts-2017-california-wildfire-season-cost-to-rise-to-180-billion/70003495>

⁷⁷ Jeremy Berke and Bryan Logan, "New Fires Break Out in Southern California as High Winds Continue to Lash the Region – Nearly 200,000 Have Evacuated," *Business Insider* (December 8, 2017).

<http://www.businessinsider.com/ventura-county-fire-news-updates-damage-in-los-angeles-california-2017-12>

⁷⁸ "California's Thomas Fire Scorches Area Larger than New York City," *BBC News* (December 11, 2017).

<http://www.bbc.com/news/world-us-canada-42303203>

50,000 acres in only one day, forcing about 200,000 people to evacuate and destroying about 800 buildings.⁷⁹

These wildfires resulted in even further devastation for the state of California, as its terrain was left stripped of the vegetation that normally holds it in place. Following the fires, severe mudslides began to occur in some regions of the state. According to a news article,

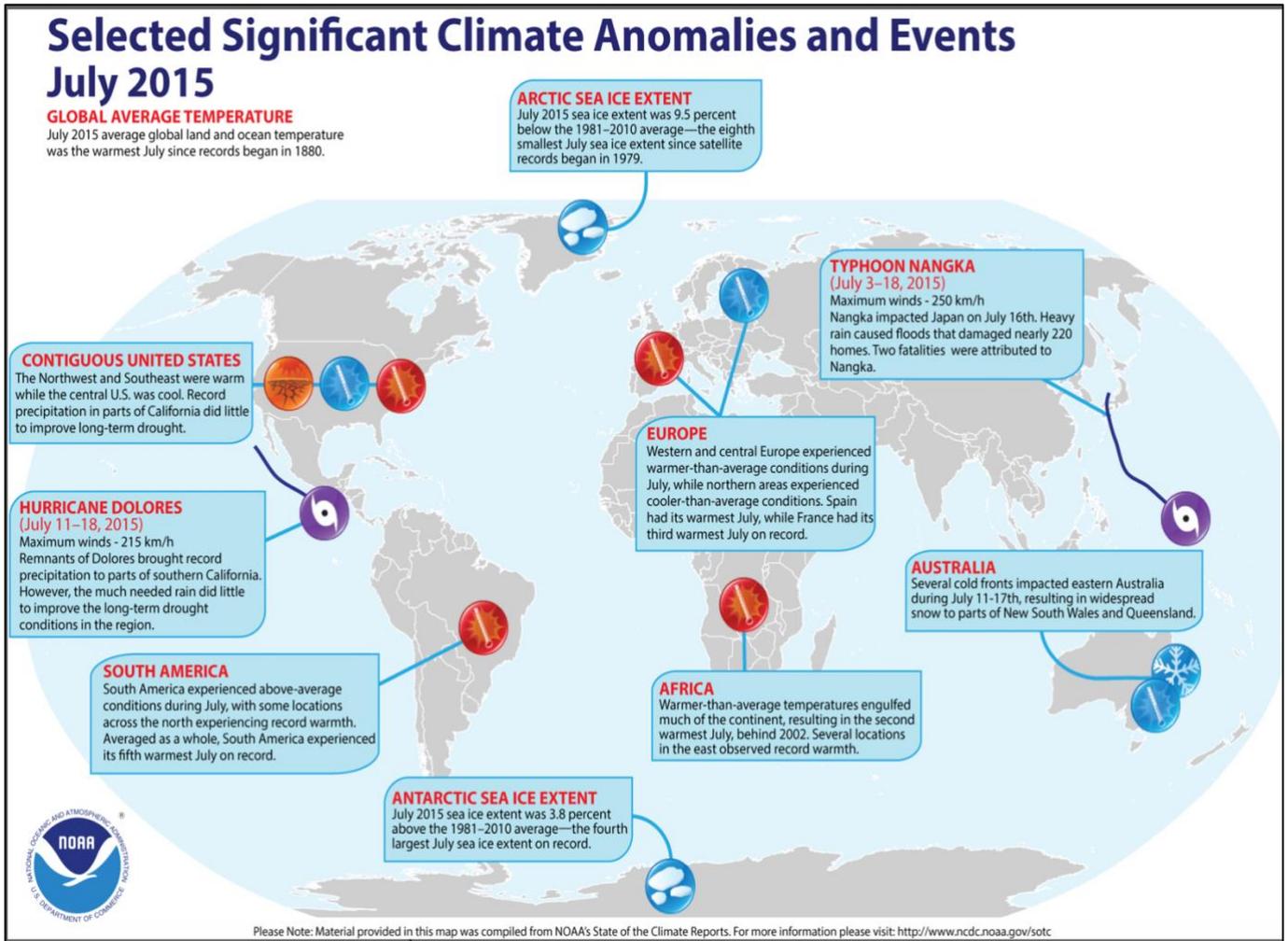


Figure 2: NOAA Map of Significant Climate Events in 2015. Source: <https://www.ncdc.noaa.gov/sotc/global/201507>

⁷⁹ Ibid.

Montecito, an area outside of the city of Santa Barbara, ended up under 12 feet of mud, water, and debris.⁸⁰ The mudslide risk in Montecito alone had about 10,000 people under a mandatory evacuation order.⁸¹ Unfortunately, these mudslides resulted in 21 deaths, 163 injuries, the destruction of 65 homes and damage of 462, and the destruction of 8 commercial buildings and damage of 20.⁸²

The shocking reality of the devastation 2017's disasters was witnessed by the whole world, not just in undeveloped or remote nations. The United States alone endured thousands of deaths and injuries, over 1 million Americans were turned into refugees, and millions more lost their homes, livelihoods, and sense of personal security. Additionally, Americans are now forced to burden the billions of dollars of destruction the disasters have generated. Any entity capable of withholding natural resources, displacing, injuring, and killing millions, destroying livelihoods and billions of dollars' worth of property, and drastically altering international politics, is a clear and present danger to both the domestic security of the United States and global security as a whole. Even the U.S. Department of Defense officially considers climate change as a national security issue, and has for years. In a 2015 Congressional report on its risks and consequences the Department writes, "The Department of Defense sees climate change as a present security threat, not strictly a long-term risk. We are already observing the impacts of climate change in shocks and stressors to vulnerable nations and communities, including in the United States..."⁸³

⁸⁰ Marissa Wenzke, "101 Freeway in Santa Barbara County Reopens After Being Blocked Following Deadly Mudslides," *KTLA5 News Tribune* (22 January 2018). <http://ktla.com/2018/01/21/101-freeway-in-santa-barbara-county-reopens-after-being-blocked-by-deadly-mudslides/>

⁸¹ Matt Gutman and Bill Hutchinson. "After California Mudslides Kill 19, Rescuers Scramble to Find Those Still Missing," *ABC News* (13 January 2018).

<http://abcnews.go.com/US/rescue-crews-scramble-find-missing-deadly-california-mudslides/story?id=52280888>

⁸² Ibid.

⁸³ United States Department of Defense, "National Security Implications of Climate-Related Risks and a Changing Climate," House Report no. 4870 (RefID: 8-6475571, May 2015): 14. <http://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery>

The report cites the global implications of climate change that boiled to the surface from 2008-2011 in northern Africa and the Middle East, as well as other disasters such as Hurricane Sandy, which devastated large areas of New York and New Jersey in 2012 and resulted in the deployment of over 24,000 Department of Defense personnel. The report concludes, “Although climate-related stress will disproportionately affect fragile and conflict-affected states, even resilient, well-developed countries are subject to the effects of climate change in significant and consequential ways.”⁸⁴ If nothing else, climate change must be considered as an imminent danger to Americans, and addressed as such by both Americans and the government structured to protect them, regardless of one’s indifference on the subject.

Chapter 6: The Legislative Future

This research primarily aims to provide an argument of substantial evidence for those that remain unconvinced of either the grave consequences or reality of anthropogenic climate change, especially for those with predominantly conservative or republican ideals and inclinations. By doing this, the paper hopes to point to possible policy recommendations, and well as recommendations for individuals and ground-up change. Both ends of future actions and directives, being both the top-down and the bottom-up, are essential to effectively discussing and addressing the environmental issues the world is facing.

In Chapter 1, the disciplines of the natural sciences, specifically environmental chemistry and ecology are used to present bipartisan quantitative and statistical data, sourced from established and credible scientists, scientific groups, and scientific publications. This is done in

⁸⁴ Ibid.

attempt to argue for climate policy from a purely fact-based perspective. Based on these conclusions, recommendations for the future can include the following:

1. Policies should be aimed at subsidizing environmental education in both primary and secondary schools, as knowledge and understanding of the subject are both essential for future developments and an individual environmentally-friendly lifestyle.
2. Policies should focus on some of the main IPCC-identified environmental issues, such as coral reef protection and sustainable fishery management.⁸⁵

Many Americans are not fully convinced by just data and statistics on the subject, therefore the paper moves on to a second angle. Chapter 2 draws from the disciplines of the social sciences, specifically environmental politics, and provides a political analysis of the historical partisan debate over climate policy and the environmental movement. The progression of the controversy is traced from its origins, where its initial framing as a left versus right issue, being a frame the subject cannot seem to shake, is identified and exposed as an arbitrary conception formed by a small group of self-interested actors. By explaining why supporting environmental issues is not an exclusively liberal or Democratic, but rather illustrated as such by the issue's original popularization, the paper attempts to show those on both the left and right sides of the debate that navigating around their initial defenses, which evolved from their political or ideological backgrounds and kick in when the subject comes up, does not make one a traitor or deserter to their party or principles. Based on these conclusions, recommendations for the future can include the following:

⁸⁵ IPCC, *Summary*, 2.

1. Generally, conservative/republican politicians must assume a leadership role within the subject of climate policy in order to cultivate public support for the movement.
2. Moderate amounts of funds might even be directed towards the cultivation of conservative climate support groups.

Moving forward, the paper presents an argument for those who are not convinced that climate change is a bipartisan issue. In Chapter 3, the research focuses in the disciplines of the social sciences, mainly environmental economics, and presents multiple economic theories and sources on conservative economic policy solutions that focus on solving environmental issues. Based on these conclusions, recommendations for the future can include the following:

1. Environmental regulations should be designed with reference to economic models such as the double-dividend hypothesis.⁸⁶
2. Individuals should be better informed of the potential financial benefits of investing in green technology, and embrace these economic opportunities as they apply to both business operations and personal/household decisions.

Because the economic argument may still prove to not be enough to convince one to support environmental policy, the paper moves onto its final perspective. In Chapter 4, the disciplines of the humanities and social sciences are incorporated, and the paper explains that the imminent danger of climate change, in addition to its devastating effects the world has already seen, clearly expose the national security threats climate change brings in tow. Based on these conclusions, recommendations for the future can include the following:

⁸⁶ Nerudova, "Double Dividend," 30.

1. Legislation should be drafted that includes increased funding for the Department of Defense and the Department of Homeland Security to effectively conduct relief efforts after disasters.
2. Legislation should be drafted that includes increased funding for the Department of Defense and the Department of Homeland Security for the restoration of infrastructure and equipment from both past and possible future damages of these entities' facilities and properties.
3. Policies should be aimed at combating the causes of climate change and environmental degradation, rather than end of the pipe solutions such as flood barriers or walls in coastal cities. While end of the pipe solutions are necessary to protect citizens from a danger that is already present, these efforts must be balanced with a focus on phasing out the drivers of climate-related disasters.

Gaining a relatively comprehensive grasp on the stark realities the planet faces due to environmental degradation can be quite intimidating. There are many complicated dimensions of the issue of climate change that make it difficult to understand, and subsequently even more difficult to undertake. Evidence such as that presented in this paper can be shocking, upsetting, and off-putting, but it shapes problems human intelligence and ingenuity are capable of tackling. Unfortunately, human intelligence and ingenuity can be limited by the human ego, the fear of change, and complacency. While intelligence and ingenuity must inform and direct more effective environmental policy, individuals are responsible for committing to change themselves. While effective leadership is absolutely essential, even the best top-down policies and directives will be undercut if individual efforts do not aim to meet them half way. Therefore, those in

leadership roles are tasked with getting citizens to truly believe in the necessity of environmental policy, as well as the possible calamitous consequences if it continues to be side-stepped.

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Appendix A:

Langan Engineering and Environmental Services, Inc. Perimeter Air Monitoring Proposal

21 June 2017

[REDACTED]
Project Manager

[REDACTED]
[REDACTED]

**Re: Perimeter Air Monitoring Proposal
Keamy Generating Station – Class H Substation and 230kV
Switchyard Projects
Keamy, New Jersey
Langan Project No.: 100218501**

Dear [REDACTED],

Langan Engineering and Environmental Services, Inc. (Langan) is pleased to provide Ferreira Construction Company, Inc. (Client) with this proposal to perform perimeter air monitoring to support the Public Service Electric and Gas Company (PSE&G) Class H Substation and 230kV Switchyard projects at the Keamy Generating Station in Keamy, New Jersey (Site).

SCOPE OF SERVICES

The Site is currently undergoing investigation and remediation through the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program under the purview of a Licensed Site Remediation Professional (LSRP). Langan had prepared the April 2017 "Perimeter Air Monitoring Plan, PSEG Keamy Generating Station, Switchyard and Substation Construction Projects" (PAMPI) to support PSE&G's multiple construction projects occurring at the Site. This proposal is specific to perimeter air monitoring associated with the Class H Substation and 230kV Switchyard projects component of PSE&G's construction projects. However, we also understand that the PAM would be used to support PSE&G's horizontal directional drilling (HDD) project as well.

Specifically, Langan will implement the PAMP during intrusive activities from the period July 5, 2017 through December 31, 2017. We will provide a full-time staff personnel during intrusive activities that will perform the following perimeter air monitoring activities:

- Real-time air monitoring for volatile organic compounds (VOCs) and dust;
- Assessment of action level alarm conditions;

- Collection and real-time analysis of confirmatory samples for benzene using Draeger tubes based on acute action level alarms
- Collection of confirmatory samples for VOCs and arsenic for laboratory analysis based on chronic action level alarms, as appropriate (note that we do not anticipate the need for collection of samples for polynuclear aromatic hydrocarbons (PAHs) or other metals because those chronic action levels exceed the acute action level); and,
- Odor assessments, as necessary.

Based on the monitoring plans presented in the PAMP, Langan will provide up to seven sets (plus one backup) of real-time air monitoring equipment with telemetry, which includes a photoionization detectors (PIDs) to monitor VOCs and particulate meters to monitor dust. The PIDs and particulate meters will have data logging capabilities. We will also provide one weather station. The specific number and locations will depend on the specific operations for that day. Background monitoring will occur prior to start of intrusive work to determine background conditions.

The real-time monitors will be set with alarms based on action levels in the PAMP. We will have on Site at all times Draeger pumps with benzene tubes to assess acute VOC alarm conditions. In addition, we will provide, based on a review of the real-time air monitoring data, Summa canisters for VOC laboratory analysis to assess chronic VOC alarm conditions and sampling pumps for arsenic laboratory analysis to assess chronic VOC and particulate alarm conditions. Note that Langan's review of the real-time data is under a separate purchase order with PSEG. Any laboratory analyses will be performed on a standard turnaround to assess chronic alarm conditions. If alarm conditions are identified, the perimeter air monitoring personnel will notify Ferreira personnel so that Ferreira can take mitigative measures, such as water spray or foam, to reduce VOCs, dust, or odors, as appropriate.

Our scope does not include any health and safety monitoring performed for the protection of contractor workers within the exclusion zone. We assume that Ferreira can provide space within a trailer to stage the air monitoring equipment for the duration of the project.

SCHEDULE AND FEE ESTIMATE

We understand that our scope is anticipated to go from July 5, 2017 through December 31, 2017 (8 months). We have assumed 10-hour days (based on an 8-hour construction day plus 1 hour for establishment of background and 1 hour travel) five days per week throughout the duration. We have assumed 12 confirmatory laboratory samples (two per month) will be collected for VOCs, PAHs, and arsenic over this duration.

The estimated fee for this scope of services is \$199,160. Langan proposes to complete the work on a unit rate basis as noted below.

Item	Quantity	Estimated Cost
Perimeter Air Monitoring Personnel at \$1,000/day	125 days	\$125,000
Perimeter Air Monitoring Personnel Beyond 10-Hour Days at \$100/hour	-	-
Field Vehicle at \$75/day	125 days	\$9,375
Real-Time Air Monitoring Equipment – 8 PIDs, 8 Duct Meter, 1 Weather Station, 1 Draeger Pump and Up to 2 Boxes of 10 Benzene Tubes at \$9,450/month	6.5 Months (Based on 4 weeks per month, 26 weeks)	\$61,425
Confirmatory Air Laboratory Sampling Equipment and Analyses – VOCs at \$223 each and Arsenic at \$57 each	12	\$3,380
TOTAL		\$199,180

CLOSURE

We are prepared to commence our services immediately upon receiving written authorization to proceed. If you have any questions, please contact [REDACTED] a e-mail at [REDACTED]. We look forward to working with you on this project. Thank you for considering us.

Sincerely,
Langan Engineering and Environmental Services, Inc.

[REDACTED]

[REDACTED], LSRP
Associate

[REDACTED]

[REDACTED], LSRP
Senior Principal

ELSmf/hc
Enclosure(s): Langan's General Terms and Conditions

AUTHORIZATION

Receipt of this Proposal, including the General Terms and Conditions annexed hereto, is hereby acknowledged and all of the terms and conditions contained therein are accepted.

[Redacted]
Project Manager
[Redacted]
[Redacted]
[Redacted]

RE: Langan Engineering and Environmental Services, Inc.
Perimeter Air Monitoring Proposal
Kearny Generating Station – Class H Substation and 230kV Switchyard
Projects
Kearny, New Jersey
Langan Project No.: 100218801

Company: _____ ("Client")

By/Title: _____
(Authorized representative)

Signature: _____

Date: _____