

From *Silent Spring* to *An Inconvenient Truth*:
Framing Environmental Arguments for the Public Sphere

by

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To Dr. Herbeck:
For his dedication and encouragement

To my friends:
For their enthusiastic support

To my parents:
For their unconditional faith in me

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CHAPTER ONE: SPHERES OF ARGUMENT AND ENVIRONMENTAL RHETORIC

There once was a wetland in Western America that stretched as far as the eye could see. Meandering through the marshes was a small stream originating from the glaciers miles away in the mountaintops. The stream casually wound its way through the grasses and reeds for miles before widening and quickening its pace to the distant ocean. This wetland was a place of which naturalists dream.

Millions of migratory birds stopped to rest at the rich marshes every year. In the thick grasses they were safe from predators and food was abundant. Fish swam so thick one could catch them with bare hands. Grasshoppers and crickets were so loud they almost drowned out the sound of the nesting birds. These birds squawked and cawed anytime another creature came near their nest, which was constantly in such a busy nursery.

People came from across the planet to see this natural wonder, but slowly things began to change. Only the devout visitors noticed at first: the wetland was shrinking. Water was being taken from the stream at an alarming rate to irrigate crops in nearby desert land. These were not just any crops: farmers were trying to grow cotton, an extremely water-needy plant, in a desert. As the water level of the stream decreased, so too did the fish population. Fish that fed not only the millions of birds, but also the native peoples of the area. As the stream continued to drop it became choked with sediments and the insects had nowhere to live. The grasses were dying and there were no longer safe places for nesting birds to hide from predators.

Many of the birds only nested in this one wetland and their populations began to decline rapidly. Downstream, millions of people relied on this stream for drinking water. Over time the population was increasing and more and more water was being taken for drinking. The wetlands eventually disappeared all together.

Then the glaciers began to recede. There was a constant struggle between agriculture and the downstream population. The glacial streams that once flowed rapidly in the springtime slowed to a mere trickle. The agriculture industry collapsed; there was simply not enough water. Less and less water was coming from the mountains, and without the wetlands to filter it, it was not clean. It could not be drunk, and the millions of people dependent on the stream became desperate.

They drilled deep into underground aquifers, but at an unsustainable pace. Within a few years the underground water source was gone forever. The coastal area that once boasted over 10 million residents slowly faded away. Years later, it was nothing more than a ghost town.

This story did not actually take place in any one area of the world, but it easily could have. Every one of these quiet disasters has taken place somewhere on our planet, but people have not seemed to take notice. Just as the people in the fictional coastal area did not realize their impending water crisis until it was too late, we are using our water at an unsustainable and irresponsible pace.

Water is one of the most basic building blocks of life. It is what sets our planet apart from the rest of the solar system. Without water, there is no hope for sustaining any sort of life. Water is seen as a renewable resource, yet we are using our supply of freshwater in a manner that will not last. To maintain health, humans are supposed to

drink between 1.5 and 2.5 liters of water a day (Pimentel, 2004). Already over one billion people do not have adequate clean drinking water and with the population estimated to reach 9.4 billion people by 2050, freshwater will be an even more precious commodity (Pimentel, 2004). Adequate water is necessary for maintaining an adequate food supply and food shortages already reflect the lack of water in certain areas of the world. There are more than 3 billion malnourished people in the world, and the two most serious malnutrition problems: iron deficiency and protein or calorie deficiency, result in approximately 8 million deaths each year (Pimentel, 2004).

The impending water crisis stems from a combination of many factors. First and foremost is the increase in the global population. Never before has there been this many people living on our planet, and in order to provide clean freshwater to all, old water allocation practices must be updated. The majority of the world's freshwater is stored in glaciers, permanent snow and groundwater aquifers (Pimentel, 2004).

Another factor adding stress to the water supply is the melting of glaciers and ice caps. Approximately half of the world's population depends on the water stored in the Himalayan mountain range for water, and as those glaciers begin to recede, the Intergovernmental Panel on Climate Change (IPCC) has predicted that major rivers will not flow year round. This threatens the availability of water to over 500 million in the Indian subcontinent and an additional 250 million in China (Smith, 2008).

Misuse of groundwater aquifers threatens to be another factor in the water crisis. The groundwater present in these underground reservoirs has accumulated over millions of years. It is much simpler and more sustainable to use surface water, but when intense water shortages loom, people start to dig. Building wells decreases

human dependence on rain, but when groundwater is gone, “it is often gone for good” (Specter, 2006, p.1). Today in India there are 23 million wells, whereas 30 years ago there were only 2 million (Specter, 2006, p.2). As the aquifers are depleted, wells must be dug deeper. In Beijing the water table has fallen almost 200 feet in the past 20 years, and the deeper the wells are forced, the more risk there is that saltwater enters into the water table, ruining the aquifer permanently. These practices of groundwater use are clearly not sustainable, and as the population increases and the demand for food increases, they will only be more damaging to our water supply.

It is not simply misuse of water and a rise in the global population that threatens our global supply. Current freshwater withdraws, including irrigation, total about 5500 liters per person per day. Globally, the average withdrawal per day is 1970 liters per person per day. For personal uses, Americans use about 400 liters of water per day, while the rest of the world averages below 100 liters of water per day. Of the water withdrawn from freshwater supplies worldwide, approximately 70% is nonrecoverable (Pimental, 2004).

While the worldwide water shortage threatens to be the most serious environmental issue of this century, it is not very well known, especially to Americans. In the 2006 American Environmental Values Survey approximately three-quarters of Americans claimed to be concerned about the environment in general, but when compared to other issues such as the war in Iraq, illegal immigration, rising gas prices and taxes the “environment does not rank among their top 20 concerns” (EcoAmerica, 2006). Some environmental issues enter the public consciousness and others do not. The reason for this phenomenon is the framing of the argument.

Environmental arguments often originate in the scientific community and their complicated nature tends to be isolating. Persuasive arguments are made only when they are transformed into something tangible and accessible to the general public. The argument must move from the scientific realm into the public eye to gain widespread support, and doing so may require a more simplified approach to the problem. The struggle to ban dangerous pesticides used the symbolic image of the bald eagle, global warming has attempted to use the image of the desperate polar bear searching for solid ice, but what poignant image can the water shortage problem utilize? In order to understand how best to frame the water shortage issue, we must examine how previous environmental issues have made the transition from the scientific community to the public stage. In order to do this, G. Thomas Goodnight's theory of the spheres of argument will be explored. By carefully analyzing different types of arguments and their relationships, it will be more clear as to how environmental arguments can be transformed in order to gain recognition and spur action. After an explanation of Goodnight's theory, two environmental case studies will be introduced and analyzed using the spheres of argument. From these two case studies, this paper will extrapolate how best to go about framing an environmental movement in order to best garner public support.

Spheres of Argument

Fields of Argument

To fully understand Goodnight's theory of the spheres of argument, we must first start with Stephen Toulmin's theory of the fields of argument. Toulmin acknowledges that arguments are produced for a variety of purposes, but focuses on arguments that defend certain assertions. In his essay *Fields of Argument and Modals* he explores how one produces an argument in defense of the original assertion as well as how one decides the manner in which to assess arguments, in particular how the manner of assessment changes from one type of argument to the next (Toulmin, 1958).

According to Toulmin, "just what sort of facts we point to, and just what sort of argument we produce, will... depend on the nature of the case" (Toulmin, 1958, p.13). Toulmin focuses on more formal arguments. He notes the differences between arguments over a mathematical proof, an argument in a court of law and the method in which a biologist defends a thesis. To fairly assess such different arguments the standards and procedures used must be examined and standardized. Toulmin's solution to this problem is the fields of argument.

According to Toulmin, two arguments are in the same field when the "data and conclusions" come from "the same logical type" (Toulmin, 1958, p. 14). Various fields may have differing degrees of formality in their structure. A discussion over coffee would not have the same formality as an argument in the court of law. There

may also be various degrees of precision in the argument. For example an argument made in a chemistry laboratory must have much more mathematical precision than an argument over the merits of a piece of artwork (Toulmin, 1979). These are just a few examples of how field of argument may differ and they show the difficulty in finding methods of assessment that can be used as common standards. Although the aforementioned examples of the mathematical proof, the argument in a court of law and a biologist's defense of a thesis are all academic and formal in nature, they would all fall under different fields of argument. There may be standards for assessing arguments that are common to all fields, but within each field there are strict guidelines for analysis that must be followed.

Toulmin creates a system in which there are countless fields of argument and countless standards for analyzing arguments. The number of fields makes it difficult to assess arguments in comparison to one another. For example, Toulmin discusses arguments inside the law; even within the court of law there are different fields for criminal prosecution, civil cases where one claims damages, or cases where the court is asked for an injunction (Toulmin, 1958). All of these arguments seem extremely similar in nature, but by analyzing them under separate fields it would be difficult to find commonalities in their successes and weaknesses. Another criticism of Toulmin's method for analyzing arguments is that only formal arguments are included. Nowhere in Toulmin's fields of arguments is there room for the analysis of a casual discussion between friends over which movie to watch. Also, the merits of a public debate in which many people are included are difficult to analyze using fields, especially if the argument spans over several different fields. In order to compare

arguments and find common threads a more general classification system must be used, and G. Thomas Goodnight provides such a system.

Description of Spheres

The spheres of argument are a theory proposed by G. Thomas Goodnight. The term spheres represents the branches of argument that activities are based upon and to which arguers appeal (Goodnight, 1982). The three spheres, personal, public and technical, all possess their own standards and rules, and the boundaries are clearly defined by a variety of privacy laws as well as common courtesies. These spheres can be seen as a framework from which one can discuss or explain the workings of public deliberation (Batt, 2003). The personal sphere covers private discussions in a familiar setting and is invoked “when one tries to show ‘consubstantiality’ with another” (Goodnight, 1982, p. 217). Public discourse and debate fall under the category of the public sphere of argument, and arguments that are invoked by one’s identification with a profession or specialized field that requires particular knowledge are included in the technical sphere of argument. An argument belonging to a specific sphere of argument is subject to change as the argument evolves; however, the spheres cannot be thought of as merely a point of view. Spheres possess definite boundaries and do not change; it is the argument that changes to fit the sphere. The three spheres incorporate very different areas of discussion and the interaction of the spheres is of prime importance to the understanding of the evolution of an argument.

Personal arguments are informal by nature, require little to no documentation and are typically brief (Boyd, 2002). Any private discussion where people relate to each other without invoking rigid debate standards or outside characters qualifies as an argument in the personal sphere. A discussion between spouses, a quarrel between roommates and an overly enthusiastic conversation between bar patrons would all fall under the category of a personal argument. In a personal argument there is no judge or mediator giving rules as to whose turn it is to speak or what subjects are off-limits. These arguments tend to channel a feeling of home and intimacy and involve private dealings, but they can take place in very public settings (Warner, 2002). A discussion between two friends taking place in a crowded shopping mall over which movie they were to see that evening would still qualify as a discussion in the personal sphere. This is the most informal of the spheres of argument and requires little to no background expertise.

Technical arguments involve highly specialized terminology and generally take place in a professional community. The structure of these arguments must be adhered to and is rigid in nature. A mathematical proof is a good example of a technical argument as only certain explanations can be used and strict rules must be followed to reach the conclusion. A legal argument in a court of law is another example. Each attorney has a chance to make an opening statement, call upon witnesses and make a closing statement. Within each of these arguments there are specific guidelines to what can and cannot be said. Because of the technical, or scientific, sphere's specific dialogue guidelines it is the least accessible sphere to the

average person. The strict rules and guidelines make it the most rigid of the three spheres of argument.

According to Goodnight the public sphere's primary functions are mediating conflicting interests, forming common experiences and structure in order to enable public action, and deliberating (Phillips, 1996). They are a place where "people come together to communicate, to exchange and consider ideas" (Gilman-Opalsky, 2008, p. xi). Three qualities that characterize this sphere are that all people must have access to the discussion, the discussion must be openly debated and the argument must involve matters of general interest (Asen and Brouwer, 2001). The public sphere extends the argument beyond both the private needs and the needs of the specialized professions to the needs of the entire community. The arguments in this sphere are for general audiences and so a common language must be established so that the argument can be debated to the satisfaction of all included. People's opinions cannot be ignored from this sphere due to lack of subject-area expertise. In many ways the American government functions in the public sphere. Throughout the presidential election, candidates make speeches directed at the general public. From their speeches, as well as the media coverage of such events, every American is able to understand the political platform of the various candidates. This allows for open public discourse accessible to all. After debating the merits of each candidate, all registered voters come together and elect a new president.

Transitioning from the Technical to Public Sphere

While an argument can only belong to one sphere of argument at any given time, it is possible for the argument to move from one sphere to another. For example, before anti-smoking campaigns became prevalent in society, the risks of smoking were discussed in the technical sphere. Once scientists realized the discussion should be taking place on a grander scale, the argument was simplified and brought into the public forum. The same transition can take place from the personal sphere into the public sphere. Upon evolution into the public sphere of argument, ideally the personal and technical “dimensions of the disagreement become relevant only insofar as they are made congruent with the practices of public forums” (Goodnight, 1982, p. 219). The argument can no longer be as informal as it was in the personal sphere or as complicated and scientific as it was in the technical sphere, as it must incorporate a more general audience.

Because of the scientific background of most environmental arguments, they tend to start out in the technical sphere. However, because of the inaccessibility of technical arguments to the general public, in order to gain widespread support the argument must grow and shift its focus in order to enter into the public sphere. The public sphere is inclusive of all opinions and levels of expertise, and it does not have the rigidity that eliminates public discourse that is present in the technical sphere. In this sphere, no one has an advantage over another (Holub, 1991). In order for a complicated scientific problem to be supported by an average person, it must be understood, explained and argued at an accessible level. It is the transition from the

technical sphere to the public sphere that is essential to the livelihood of environmental arguments, and it is this transition that needs to be closely examined.

While in the technical sphere, environmental arguments are shaped with the intention of narrowing the range of “permissible subject matter while requiring more specialized forms of reasoning” (Goodnight, 1982, p. 220). Because of the scientific and subject specific nature of the sphere, there are strict rules for permissible evidence, presentation and judgment. Only professionals from the field are involved in the technical sphere, so there is no need to translate the issue into common, non-scientific jargon. The arguments are specified to the point where the majority of the public would not be capable of participating, but it is essential for the longevity of the argument for it to be properly and effectively translated into the public sphere in order that the community as a whole is able to take part in the discussion.

Because of the scientific terminology necessary in many environmental arguments, the distinction between the technical and public spheres can be blurred. Once in the public sphere, the environmental issue is generally simplified to a point where it would not overwhelm an average, non-scientific person. Scientific terminology may still be utilized to an extent, but the argument will have been generalized to include the entire population. Instead of focusing on minute scientific details, arguments in the public sphere focus on the bigger picture. Public sphere debates take place over issues that will affect a large number of people. They also include only issues that the general audience will understand and appreciate. An argument to save an endangered species of beetle may never leave the technical

sphere and reach the public sphere, but the argument to save the bald eagle from extinction was effective enough to garner public support.

In order for an environmental issue to be popularized, it must be accessible to the general community. Professional communities can heavily influence the public sphere, but because of its non-exclusivity, the argument cannot be solely based on the opinion of informed professionals. This sphere recognizes that some arguments transcend the needs of both the personal and the technical sphere and it provides a setting and boundaries in which the argument can take place. The redefinition of the argument in the public sphere takes away the mystery that surrounds the technical arguments and allows other people to take part in the discussion. It acts as a meeting place for scientists, politicians and non-professionals to come together in a common forum to discuss the issue (Sobnosky, 1995). Because of the fragmentation of society it is important to have a venue where people can come together to discuss issues pertinent to all (Phillips, 1996).

The public sphere is closely associated with the concept of activism and is a place where people transcend their individual concerns for the good of the public. The issues discussed are deliberative in nature, and all members of the public must be able to speak freely either for themselves or through representatives (Sobnosky, 1995). It is an extremely important sphere of argument because by nature it is inclusive of all, making it capable of influencing other spheres. The basis for the public sphere is the maintenance of consensus (Phillips, 1996). It is a place where the community can “gain a collective sense of reality and establish their opinion” (Phillips, 1996, p. 236).

The sphere gives a common framework for people to formulate their individual arguments.

Because public spheres are made by a group of people, they usually “implicate some kind of collective identity” (Gilman-Opalsky, 2008, p. xv). It is clear that the entire public does not have the same opinion on any given issue, and so the concept of ‘subaltern counterpublics’ has been proposed in which minority groups raise their opinions on a larger scale (Sobnosky, 1995). This concept is especially important as it relates to environmental arguments because many times environmental issues begin with a small counter-culture group. It is this small ‘counterpublic’ that must flesh out the argument and make it a common concern. This group is responsible for the introduction and definition of the environmental argument. It is their efforts, which are often seen as radical and against the dominant social paradigm, that forward an environmental argument. The counterpublic’s argument can popularize an issue and with the correct framing move the environmental argument into the public sphere where it is accessible and debated by a larger group, the societal norm.

Counterpublics and the Public Sphere

Counterpublics are publics “defined by their tension with a larger public” (Warner, 2002, p. 56). Generally, they disagree to some extent with particular norms of their social environment and they are known to be excluded from channels of political discourse as well as their lack of political power (Asen and Brouwer, 2001).

At some level, these counterpublics are aware of their subordinate stature, but despite their stereotypically anti-establishment views, counterpublics are necessary to facilitate open exchange of ideas and opinions (Warner, 2002). Their most recognizable form of argument is in the formation of protest groups or social movements (Asen and Brouwer, 2001). These public groups are small in size, but they serve the important function of bringing together isolated members of a community that share similar beliefs. Once they are formed, members of a counterpublic are able to come together “beyond the supervision of dominant groups” (Asen and Brouwer, 2001, p. 7). For example, the women’s suffrage movement would never have been successful if women across the United States remained isolated in their homes. The counterpublic women’s movement brought women together across the country. They succeeded in voicing their opinions, and by advocating women’s rights they eventually changed government policy by gaining the right to vote. It is important to note that a counterpublic does not just go against the general public sentiment, but the dominant paradigm. They do not simply voice an opinion that is different from the norm, but one that could be seen with hostility from the dominant ideology (Warner, 2002). Counterpublics cannot simply address their arguments to ordinary people for many will hear them with disdain. Counterpublics are aware that they must struggle to have their message understood on a more widespread arena, and they are constantly trying to expand their range of acceptability within the dominant public. These groups try to spread new ways of thinking about old ideas and they succeed, as the women’s suffrage movement did, once their beliefs become the dominant ideology.

In order to spread their arguments, counterpublics use out-law discourse, or resistance to established norms of argument, to address everyday concerns. In many cases, they are responsible for the transformation and redefinition of the argument from the technical sphere into the public sphere (Boyd, 2002). Two key elements of out-law discourse that can be effective in proving the superiority of the minority's argument are objection and counter-analysis. Objection questions the opposing views as well as the "legitimacy of the processes through which a decision will be reached" (Boyd, 2002, p.95). It has the advantage of being able to prove an argument faulty by questioning its motives and methods instead of its conclusion. Counter-analysis is simply a check on scientific conclusions and methods that can be done without expensive scientific techniques or evidence (Boyd, 2002). Activists in the counterpublics must be aware of key argumentative strategies as well as familiarize themselves with the scientific terminology used in the technical sphere. In order to gain support of the public they must be prepared to clearly summarize any scientific argument in layman's terms (Sobnosky, 1995).

One difficulty that counterpublics face when attempting to introduce new ideas into the public sphere is the rationality of the argument. When counterpublics introduce new issues for debate, the critique of the argument will always invoke the reasoning of the dominant public. If the general public becomes confident in the superiority of the new argument, the ideology of the dominant public will evolve and the argument will become the new norm. However, because the dominant public is in control of determining the better argument, there is a natural tendency toward conservative resistance to change (Phillips, 1996). New ideas that challenge the

beliefs of the dominant group are considered irrational without solid proof and sound wording. The argument must be strong enough to transform the minds of the community as a whole to be successful in the public sphere. The counterpublic introducing the topic must be certain that the argument is strong enough to win over supporters before its introduction, or they may face an immediate label of irrational.

The most important issue in the framing of an environmental argument is the ability to move the issue from the technical sphere into the public sphere. Proper framing can popularize the argument and with the support of the masses, political change can be made. In order for the move from the technical to the public sphere to take place, some group must be behind the mobilization of the issue. Many times in environmental issues, this is the counterpublic. This counterpublic starts with an argument that is a minority opinion and through their efforts and use of out-law discourse and counter-analysis, they can change the opinion of the dominant public and allow previously radical notions to become societal norms. As we will begin to notice in the case studies, counterpublics are critical to any environmental movement.

The idea of environmental arguments has already been studied in relation to the transformation of argument grounding. Goodnight suggests that various public environmental movements of the early 20th century influenced the technical sphere (Goodnight, 1982). Arguments that were first popular in public interest groups, such as the preservation of pristine America, were formalized to fit within the technical realm and in turn certain laws of protection were passed. Goodnight also suggests that the environment was a public issue, but the specific problems could only be solved by technical arguments.

This paper will examine the movement of environmental arguments in the opposite direction, from the technical sphere into the public sphere using two case studies. The second chapter will follow the case study of Rachel Carson's novel *Silent Spring* and how it was able to raise awareness about the rampant pesticide problems, leading to the ban of DDT. This case study was chosen because it is one of the most successful environmental movements of our time. Not only did Rachel Carson succeed in silencing the major chemical companies that produced this dangerous pesticide, she overcame the dominant ideology that pesticides are always good. More importantly, she planted the notion that "the control of nature" is an antiquated idea, thereby beginning the modern environmental movement (Carson, 1962, p. 297). The third chapter will follow the case study of Al Gore's film *An Inconvenient Truth* in its attempt to popularize the global climate change issue. This case study was chosen because it is a work in progress. The scope of this environmental issue is much larger than that of Rachel Carson's fight against pesticides, but this is arguably the most important environmental issue facing our planet today. Climate change is the subject of both national and international policy. Part of the reason the United States has been so slow to act in regulation of greenhouse gases is because of the framing of the environmental argument. Closely analyzing Gore's film may help understand the strengths and weaknesses of his specific argument and will help discover better ways for future framing of the climate change issue. Examining these two case studies will help to determine what elements an argument must possess in order to move from the technical sphere to the public sphere. Close attention will be paid to how the argument is introduced by a counterpublic group and eventually becomes the

dominant ideology. The final chapter will apply the findings of how best to frame an environmental argument to move it from the technical sphere into the public sphere to the water shortage case study in the hope of beginning the mobilization of a new environmental movement.

CHAPTER TWO: RACHEL CARSON'S *SILENT SPRING* AND THE BEGINNING OF THE MODERN ENVIRONMENTAL MOVEMENT

Rachel Carson was born in 1907 in the rural town of Springdale, Pennsylvania. Growing up she learned the wonders of the natural world from her mother, Maria, a dedicated nature lover. She later earned a scholarship to Pennsylvania College for Women where she majored in biology. After she graduated magna cum laude she earned a scholarship to complete her master's degree at John Hopkins University. Already she was unusual among women; not many women had the opportunity to attend college, let alone graduate school, and studying science was not a common field. In the mid-30s she began work at the U.S. Bureau of Fisheries Educational Division where she started writing. Her first book, *Under the Sea Wind*, was published in 1941, but was largely ignored due to the outbreak of World War Two. Carson took a job at the Fish and Wildlife Services, but in the meantime she continued her nature writing.

In 1948 she published her first best seller, *The Sea Around Us*. This book increased her publicity and gave her a variety of reviews. Many raved about the brilliance of her writing, but her work also provoked sexist criticism about the merits of female writers. One bonus of her best seller was that it allowed her financial independence and she was able to quit her job at the Fish and Wildlife Services and focus more on her research and writing. Carson received a fellowship to write her third book, *The Edge of the Sea*, which was an ecological guide to the seashore. This

book was published in 1955 and she was on her way to writing another book about the sea when in 1958 she received a letter from a concerned friend Olga Huckins. Huckins was witness to the cruel death of dozens of birds after an aerial spraying of DDT and Carson, being a concerned nature lover with many scientific connections, began to investigate (Lytle, 2007).

Carson already had some familiarity with the pesticide. She first became aware of the chemical DDT in the early 1940s when she started working for the Fish and Wildlife Services. In 1945 she wrote a short letter to the *Reader's Digest* asking if they would have interest in an article about DDT experiments that were happening in Maryland; *Reader's Digest* did not oblige her request so she continued to write about the sea (Brooks, 1972). By the 1950s an increasing number of scientists were concerned about the deleterious effects of DDT, however the success of the pesticide in protecting American troops in World War Two was so popularized that the sale of the pesticide continued to skyrocket.

After further research, Carson knew someone needed to sound the alarm, but she first tried to find others to do the writing. When she struggled to find other equally concerned and motivated authors, Carson accepted that it was her calling to write this story. Many, including Carson, questioned if she could write on such a technical and dull subject after writing a trilogy on the sea, but she took on the challenge. She not only wanted to warn citizens of the dangers of pesticides, but she also wanted to address the issue of controlling the environment. Her dedication to Albert Schweitzer who said: "Man has lost the capacity to foresee and to forestall. He will end by destroying the earth" sums up her main point (Carson, 1962). She also

foreshadows her main argument regarding the control of nature in the epigraph when she quotes E.B. White who said “our approach to nature is to beat it into submission” (Carson, 1962).

Carson was successful in forwarding her environmental argument and shifting it from the scientific sphere into the public sphere. Because she was already a well-known nature writer her book was immediately in demand. She raised awareness of pesticides and sparked a public debate over the costs versus the benefits. After much debate in the public sphere, on December 31, 1972 the Environmental Protection Agency (EPA) banned DDT. Carson’s book brought the argument to the attention of the public and by doing so, she led to the ban of DDT and changed how humanity views its relationship with the environment.

This chapter will follow the story of the pesticide DDT and Carson’s work to have it banned. First, the background of the pesticide will be discussed in order to understand why it was so dangerous and for what reason people were not aware of the dangers. Next, Carson’s research and work leading up to the publication of *Silent Spring* will be discussed in order to fully understand how she can be seen as leading a counterpublic group to popularize the issue. Carson’s research took information out of the technical sphere and by publishing a novel, moved it into the public sphere of argument. Next, the transition of the argument will be analyzed in further detail before summarizing the successes of Carson’s work.

Background on DDT

Ever since the inception of monoculture agriculture, mankind has been struggling to control insect populations. Prior to the agricultural revolution, insects were a nuisance to crops, but after with vast monocultures a single infestation could cause billions of dollars in damages (Whorton, 1974). Organic pesticides became popular in the United States with the introduction of pyrethrum powder in the mid-nineteenth century. By the end of the nineteenth century, inorganic concoctions were becoming available to farmers, arsenic being the most popular until DDT was released for commercial use after World War Two (Whorton, 1974).

During World War Two American soldiers needed to be protected from malaria and other insect-borne illnesses. In order to combat these miniscule enemies scientists experimented with pesticides until they discovered dichlorodiphenyltrichloroethane, more commonly known as DDT. A Swiss chemist, Paul Muller, discovered that mixing monochlorobenzene and chloral hydrate in the presence of sulfuric acid forms this white powder and his company offered it to the American Army (Whorton, 1974). At first military scientists were skeptical, but eventually the pesticide was recognized as one of the best things to come out of the war (Leary, Fishbein and Salter, 1946). DDT is an insecticide and from its inception it was known that it would “kill not only insects but other cold-blooded and warm-blooded forms of life” (Leary, Fishbein and Salter, 1946, p. 1). The military purpose of the insecticide was to keep soldiers safe from mosquitoes and lice; the environment was of no concern. The two characteristics that set DDT apart from other insecticides

are that the effects are long lasting, as long as several months, and that it has two-way action. Two-way action means that it kills insects when it is consumed and also merely through contact. Another important characteristic of DDT is that it kills at extremely minute doses, so less pesticide is necessary.

During World War Two the United States had the first “louse-ridden army in history” (Leary, Fishbein and Salter, 1946, p. 62). The soldiers were all given rations of DDT powder to put onto their clothing, and after its success, plans were made for the pesticide back on the home front. When it was first discovered, there were ideas to use crop-dusting techniques already being used for agriculture nationwide on major cities, as well as to include it in paints, soap powders and floor waxes (Leary, Fishbein and Salter, 1946). Some scientists believed that this insecticide could take the place of flyswatters and window screens. There were a few scientists that questioned the safety of DDT, but they were generally disregarded and consensus was that it was a good pesticide that was perfectly safe for consumer use.

Because the insecticide was discovered and originally utilized during wartime, there was not time to determine all the possible side effects. It was more important that the pesticide was helping save lives on the battlefield. When it first came to the United States after the war, the Public Health Service tested samples, but the experiments only lasted a few months. While this may not have been enough time to make any decisions on the chronic toxicity of the new pesticide, it was clear to government scientists that use of the pesticide was not an immediate threat to humans (Whorton, 1974).

Because of the inadequate testing procedures in the 1940s, DDT was released because it was in high demand even though scientists were not certain what the effects on beneficial pollinating insects, plants, the soil, field crops, forests, other animals or even humans would be. The cost effectiveness of the pesticide was even uncertain. Despite the lack of scientific certainty, the product was clearly killing targeted insects and in less than two years the American DDT production jumped from “nothing to 3,000,000 pounds a month” (Leary, Fisbein and Salter, 1946, p. 2). While the product was in its first years on shelves in America, scientists attempted to find answers to the questions on DDT, and many findings were quite relaxed.

Scientists that supported DDT generally made arguments that followed one of two patterns: either they showed that DDT is no worse than any other pesticide, or they downplayed negative side effects and attempted to spin them in a positive light. Regarding DDT toxicity in the soil, a publication of the U.S. Department of Agriculture from August 1945 stated DDT retarded the growth of plants and that the “rate of decomposition in the soil [had] not yet been determined,” but the commentary on the report was that “it is more important to kill the insects and have a plant left than to retard its growth a little” (Leary, Fishbein and Salter, 1946, p. 6). A similar report from March 1945 stated that “on some apple trees...there has been some yellowing and dropping of foliage, but an increase in mite abundance has been largely, if not wholly, responsible” (Leary, Fishbein and Salter, 1946, p. 7). It was generally understood that DDT was extremely harmful to beneficial and predatory insects, but that should not be a concern because DDT would simply wipe out the harmful insects that they consumed. A 1945 report by the U.S Department of

Agriculture stated that bees and other pollinators were safe from harm so long as the pesticides were properly applied. It was established in a series of laboratory tests published in *Science* in 1945 that fish and marine creatures were extremely susceptible to DDT poisoning and eating DDT-inflicted insects could kill birds, but these conclusions were widely ignored. The United States Department of Agriculture countered by stating that no “injurious effects” of DDT application for mosquito larvae had been seen in warm-blooded animals (Leary, Fishbein and Salter, 1946, p. 16).

All reports acknowledged the severity of the effects on the insect population, but they avoided addressing the issue of destroying part of the ecosystem. Instead, proponents of the pesticide stressed that the cost from insect damage, both from destroying crops and costs of malaria prevention, was so high that there should be little concern for wiping out an entire sector of the ecosystem. Overall, it was widely accepted that when compared to other pesticides, DDT was superior because of its effectiveness of killing insects, its relative inexpensiveness and because when used properly it is “less poisonous than most” (Leary, Fishbein and Salter, 1946, p. 27).

There was some concern and some studies were conducted on the effect of the pesticide on warm-blooded animals, specifically humans. A study conducted by U.S. Food and Drug Administration scientists that was published in *Science* in August 1945 showed the fat affinity of the pesticide in dogs, meaning that it was stored in fat cells. Lactating dogs were found to have the pesticide in their milk, but this was assumed to not be a problem with humans. Leary, Fishbein and Salter summed up the results of several studies conducted by the U.S. Public Health Service that show no

toxic effects of DDT on humans and predicted that there would be no harm caused to humans unless there was severe negligence because the dose required to be harmful was rather high. It was generally thought that the concentrations used would be so low there would be negligible secondary effects. The dangers were especially disregarded by framing the pesticide as the great savior of the human race from insect-borne diseases such as malaria, yellow fever, dengue and the plague. In 1945 the British Medical Journal stated the general consensus of the scientific community when the pesticide was first introduced: “DDT used with discretion does not constitute a hazard to human health” (Whorton, 1974, p. 250). Using this information, in 1950 a congressional committee held hearings about the dangers of DDT, but recommended that no new policy was necessary (Leary, Fishbein and Salter, 1946).

Despite the overwhelming confidence in DDT, there was a select group of people that began to voice concern over the abundant use of the pesticide. Some scientists had always been hesitant over the safety of the pesticide and as it became used more frequently, side effects were starting to be noticed. Most importantly, non-professionals were starting to take note. Bird watchers were among the first to wonder if there was a connection between aerial spraying of DDT and the hundreds of bird deaths they were witnessing. These nature lovers eventually started voicing concerns over the withering of crops and plants, the loss of birds and other wildlife and the safety of aerial spraying the pesticide. This was a very small group of people, but they were vocal, writing editorials and contacting local authorities. It was this small group or counterpublic that spoke out against the use of pesticides. They even went so far as to join together and file lawsuits to put an end to aerial spraying on private property.

Carson took note of this group after receiving a concerned letter from a friend and after following their Long Island court case. It was their struggle that eventually changed the dominant ideology from one of conquering nature and killing all insects, to a more cautious ideology that recognized the dangers of chemical use and no longer had a blind faith in science and technology.

Background on the Technical Argument

On July 15, 1945 when Rachel Carson first wrote to *Reader's Digest* to suggest an article on the experiments being conducted on DDT, their response was apathetic at best. To increase awareness about the possible dangers of this pesticide was clearly going to be an uphill battle. Other scientists were aware of the potential problem, even this early in the argument. The American Association of Economic Entomologists issued a statement in December of 1944 saying, "because of its toxicity to a wide variety of insects, its large scale use might create problems which do not now exist" (Brooks, 1972, p. 230). After the War Production Board agreed to release DDT for use by civilians, the president of the New York Entomological Society stated that a pesticide as "indiscriminate as DDT...can upset the economy of nature as much as a revolution upsets social economy" (Brooks, 1972, 230-231). A friend of Carson's wrote a letter to the editor of the *Boston Herald* in January 1958 about the horrible consequences of a blanket aerial spraying of DDT over a bird sanctuary. The spraying caused the immediate death of many songbirds as well as the delayed death of many more birds. There was also a strange lack of bees,

grasshoppers and other beneficial insects, but mosquitoes were still present. After reading this letter Carson knew the issue needed further inquiry.

Although an increasing number of people were beginning to realize the dangers of DDT, the dominant ideology supported its use. Four magazines, *Reader's Digest*, *Ladies' Home Journal*, *Woman's Home Companion* and *Good Housekeeping*, all rejected Carson's idea for an article about the potential harm caused by pesticides, partially for fear of losing advertising (Brooks, 1972; Brooks, 2000). Their dismissal of such an article reflected the popular feeling regarding DDT and *Reader's Digest* even went so far as to denounce the "fantastic myths [which] have been built up concerning DDT's...deadliness to men and women, to children, to pets" (Whorton, 1974, p. 250). The sentiment regarding DDT was that it was a debate between scientists. These magazines' claim that such an article would not be interesting to their public and would not be fully understood, leading to "unwarranted fear", led Carson to realize that instead of an article, she would have to write a book (Brooks, 1972, p. 235).

In the 1950s there were two well-publicized battles over pesticides that caught Carson's attention. The first, the US Department of Agriculture's (USDA) fire ant eradication project, took place in the southern farmlands during 1957. Then, in 1958 there was a well-publicized court case regarding the blanket spraying of DDT on Long Island where notable birders, specifically Dr. Robert Cushman Murphy, curator of birds at the American Museum of Natural History in New York, took residence (Brooks, 2000). The fire ant came to the United States from Brazil, and similar in nature to the McCarthy era witch-hunts, the government took extreme measures to

completely eradicate it. The government sprayed 20-30 million acres of farmland with chlorinated hydrocarbons that took a form even more deadly than DDT. The resulting public relations campaigns pitted the conservation groups against the USDA and the entire measure ended as “biological and a political fiasco” (Lytle, 2007, 123-124).

The Long Island court case started over the blanket spraying of DDT that was taking place to eradicate the gypsy moth population. Citizens objected on a variety of political, social and moral grounds and the case made it to the Supreme Court, however they declined to hear it (Lytle, 2007). Many believed that at the time there simply was not enough factual information on the dangers of DDT, but Carson knew otherwise. Within professional circles, the facts were evident, but the general ideology was still that humans have the right to use these dangerous pesticides in whatever way they choose. The judge threw out 75 findings of fact in the case on DDT spraying and Carson was well aware that the decision for the Supreme Court to decline hearing the case was not made on the argument in the case, but on a legal technicality (Brooks, 1972). In fact, the research conducted for that trial became the original core information for Carson’s book (Waddell, 2000).

After the court case was thrown out, Carson began researching extensively for her book. Part of the challenge that Carson faced was that even within the technical sphere there were disagreements as to the dangers of DDT. Although an increasing amount of data showed the potential dangers of such attempts at controlling nature, there were still a fair number of scientists who would not feel comfortable saying with certainty that DDT is a harmful pesticide. Because the side effects that Carson

was concerned about were long-term effects a connection could not be drawn with certainty. While Carson and many other scientists followed the precautionary principle and were able to correctly predict that DDT would have more negative side-effects than originally anticipated, there were many scientists who still believed the scientific uncertainty was too great to officially determine that DDT should not be used. Carson's stance on the issue was growing in popularity within the scientific circle, but it is clear that she was still in the minority. Her beliefs were that of a counterpublic, and with the help of fellow scientists and researchers, she was able to compile enough information that she successfully argued that the cumulative and long-term effects of DDT would be disastrous for the environment and humanity.

Carson signed a contract with her publisher Houghton Mifflin in 1958 and spent the next 4 years of her life ardently researching and contacting other experts. Throughout her entire writing process there were people trying to stop her book from publication. Representatives of the chemical industry from companies such as Monsanto and the National Agricultural Chemical Association, government officials, the Nutrition Foundation and so-called scientific experts were desperate to keep Carson from changing the dominant ideology (Kumar and Whitefield, 2006). When they failed at stopping publication, they instead tried to discredit Carson's work; even baby-food producers were against its message. The National Agricultural Chemical Association spent \$250,000 on press and television campaigns to discredit the book. They tried to send the message that the argument behind *Silent Spring* would lead to general destruction because if the counterpublic that Carson represented succeeded in changing the popular opinion of pesticides their industry would be in great jeopardy.

Carson had a lot to overcome and part of her ability to bring her counterpublic's ideology to the foreground rested in her passion. As she stated in a newspaper interview after the publication of *Silent Spring*:

The time had come when it must be written. We have already gone very far in our abuse of this planet. Some awareness of this problem has been in the air, but the ideas had to be crystallized, the facts had to be brought together in one place...knowing the facts as I did, I could not rest until I had brought them to public attention. (Brooks, 1972, 228).

Silent Spring

Carson's novel, *Silent Spring*, is organized into four main sections. Carson opens with a brief yet shocking chapter that tells a narrative and creates a visual for what our world would be like without stopping the unchecked use of pesticides. After setting the stage for the rest of the book, Carson begins to explore man's desire to control nature. This section of the book describes man's need for pesticides and the consequences, both intended and unintended. She explores how current pesticide application processes have led to pesticide infiltration of the soil, air and water. The next section of the book discusses the effects these pesticides have on humans. She discusses the dangers of long-term exposure, acute poisoning and the chemicals' effects on the reproductive system and as carcinogens. The final section of the book goes back to the idea of man controlling nature. The final section discusses how man is ruining the natural ecological systems that have been in place for millions of years and by doing so ruining our planet. The end of the novel is a plea to change the dominant social paradigm. Instead of attempting to control nature, Carson wants the reader to let the environment regulate itself.

The Pesticide Narrative

The novel starts with an extremely poignant chapter titled “A Fable for Tomorrow.” In two pages of writing, Carson is able to create an extremely powerful image of what the world could look like if pesticide use goes unchecked. She paints a picture of a charming small town in “the heart of America where all life seemed to live in harmony with its surroundings” (Carson, 1962, p. 1). After going into rich detail about the breathtaking scenery, the wide variety of plant life and the abundance of wildlife the story takes a dark turn. She goes onto describe an “evil spell” that had descended upon the town (Carson, 1962, p. 2). Farmers were losing their crops as well as their livestock, children were stricken by illness and many died suddenly without reason. A town once rich in bird life was suddenly silenced. Vegetation everywhere was brown and withered, and the streams too were devoid of life. Throughout the town there was residue from a white granular powder that had fallen from the sky weeks prior to the strange occurrences. Who was culpable for such damage? “The people had done it themselves” (Carson, 1962, p. 3).

This first chapter does not describe an actual town in America, but Carson makes it quite clear that each of these horrible occurrences had taken place somewhere across the country. The image she created was a worst-case scenario. If all the known side effects of pesticide dusting had taken place in one town something this potentially disastrous could have resulted. Many readers would have had first-hand experience with some of these symptoms of pesticide poisoning. Across the country there was a noticeable decline in bird life and the unattractive browning

vegetation was becoming increasingly common where DDT had been applied, however, the average person would not have connected the dots. As Carson states in the close of the first chapter: “a grim specter has crept upon us almost unnoticed...What has already silenced the voices of spring in countless towns in America? This book is an attempt to explain” (Carson, 1962, p. 3). This powerful image sets the stage for the rest of her novel. Carson never mentions pesticides or DDT by name in the first chapter, but after being introduced to the potential apocalyptic ending to the tale, the reader is fully prepared to become immersed in the subject and learn about what might cause such disastrous consequences.

Man’s Desire to Control Nature

After a powerful introduction, Carson transitions into the main theme of the novel: man’s desire to control nature. The present-day earth has evolved over millions of years, yet humanity finds it appropriate to radically alter the course of evolution by destroying insects with chemicals that have been very poorly studied. Carson questions the ethical nature of overusing chemicals whose effects, both intended and unintended, have not even been fully discovered. The book continues on to give a history and detailed description of the new breed of manmade chemical pesticides, specifically DDT. The description of a chemical compound is an extremely dry subject, yet Carson manages to describe a variety of insecticides and their side effects with remarkable clarity and without losing the audience’s attention. This description is extremely important because it is the first step towards transitioning the argument

from the scientific realm into the public sphere. Before this book, a layperson could not understand how such chemicals were made or what their effects were, but Carson simplifies it into language that is well understood.

After Carson introduces pesticides, their chemical composition and their intended effects, she moves on to describe their unintended consequences, starting with surface waters and underground seas. This transition is very important to the flow of the book. After describing the scientific makeup of the pesticides the average person would realize they are dealing with dangerous substances, but the total extent of the damages might not be apparent. Going right into a description of how these pesticides are poisoning our waterways is a very powerful transition. Water is a building block of life and Carson describes that humanity's careless use of chemicals in the war against insects is inadvertently backfiring and harming our life supply. Next she describes how the pesticides poison the soil. We are an agriculturally based society, so the poisoning of our soils is just as frightening as poisoning our water supply. Each of these chapters on various unintended consequences of pesticides goes into great detail with specific examples from various scientific studies conducted throughout the country. One of Carson's strengths in writing was that because she was previously a well-known and well-respected nature writer she was privy to a wealth of research from fellow scientists that would not have been accessible otherwise.

Carson continues by reminding the reader that man could not exist without plants that "harness the sun's energy and manufacture the basic foodstuffs he depends upon for life" (Carson, 1962, p. 63). Humans are dependent on plants for oxygen,

however we do not treat them with nearly as much respect as they deserve. Unless there is obvious utility, we have no qualms in destroying them for various purposes. Plants, bushes and trees across the country were dying because of careless application of pesticides. Many readers might have noticed the strange withering of their favorite roadside foliage, but before *Silent Spring*, many would not have realized what was causing the browning. The studies in this chapter show a direct causality between careless blanket spraying of pesticides and the death of non-target plant species.

Next the story focuses on non-target animal species that are being affected. Bird watchers were some of the first to express concern about pesticides' unintended effects because after a spraying, it was common to see dozens of birds lying dead on the ground. There was also a general disappearance of many bird species during the summer months. Towns were growing silent without the chirping of birds heralding the spring. The chapter "And No Birds Sing" follows many studies showing unintended side effects of pesticides including one conducted on Dutch elms that were sprayed to prevent Dutch elm disease. The spraying unintentionally killed the local robin population as well as other popular bird species. After discussing the robin at length, Carson moves into one of the most motivating case studies in the fight to ban DDT: the American bald eagle. Carson explores how the pesticide has the ability to weaken eggshells and lower reproductive rates of these great American birds. She discusses how the pesticide works its way up the food chain and into every branch of the web of life, and this adds to her argument of how the pesticides affect humans.

After discussing birds, Carson continues with the horrendous effects DDT has on aquatic life. Once the pesticide enters the waterways it affects everything it comes

in contact with. Rivers that flow through agricultural regions or forests pick up an immense amount of runoff with pesticide residues. Previously mentioned studies showed that pesticides in the water are particularly harmful to fish and other aquatic life, and across the country dead fish were washing up on riverbanks and shorelines. Our nation's fisheries are especially important commodities, yet our blanket application of pesticides is killing the fishes' food source as well as poisoning their homes. Carson poignantly states at the close of this chapter: "If we would divert to constructive research even a small fraction of the money spent each year on the development of ever more toxic sprays, we could find ways to use less dangerous materials and to keep poisons out of our waterways" (Carson, 1962, p. 152).

Pesticides' Effects on Humans

After analyzing the effects of pesticides on our waterways, Carson transitions into the next portion of the book: the effects pesticides have on humans. This section begins with a discussion of the dangers of the current application method: aerial spraying. Aerial spraying is given as a cause of many problems for animal and plant life, but its direct harm to humans had not yet been mentioned. In the chapter titled "Indiscriminately from the Skies," Carson starts by noting a shocking paradigm shift. At one point, we were extremely cautious about our use of poisons. They were kept in well-marked containers with the familiar skull and crossbones, well out of the reach of children. After World War Two and the creation of new organic insecticides "all this was forgotten" (Carson, 1962, p. 155). Today these poisons fall indiscriminately

from the skies, harming everything they touch. This chapter discusses two of the major pesticide campaigns that led Carson to write *Silent Spring*: the fire ant eradication of the southern United States, and the gypsy moth eradication program in Long Island. She discusses in detail the negative consequences of both of these campaigns and then makes an economic appeal. According to her research, the direct application of pesticides to fire ant mounds gives 90-95% control of the ants and costs only \$.23 an acre. The United States Department of Agriculture's solution was to spray aerially, costing "about \$3.50 an acre – the most expensive, the most damaging, and the least effective program of all" (Carson, 1962, p. 172).

After a powerful economic argument that would appeal even to those who support pesticide use, Carson moves onto the issue of small-scale human exposure. After discussing the enormous and apparent dangers of being present after an aerial application of pesticides, she moves to an issue that more people would be affected by, but that less people would consider. Again Carson conjures the image of the skull and crossbones. It used to be that poisons were acknowledged as such, but these new insecticides were housed in cheerful display cases with warnings in very fine print. Carson paints a powerful image when she shows how simple it would be for these chemicals to fall into the wrong hands: "Within easy reach of a child's exploring hands are chemicals in *glass* containers. If dropped to the floor by a child or careless adult everyone nearby could be splashed with the same chemical that has sent spraymen using it into convulsions" (Carson, 1962, p. 174). After reading that statement, every mother would think twice before taking her child through the insecticide aisle of the nearby grocery store.

The description of small-scale exposure continues by describing how people unknowingly come into contact with these pesticides every day. Pesticides have infiltrated every aspect of our lives, and the most frightening part is that we are not simply being exposed to a single known pesticide with a single known dosage, a person could come in contact with a laundry list of chemicals on a daily basis and the amounts are cumulative. A medical study cited said that people who lived and died before the era of DDT had no trace of the pesticides or similar chemicals in their tissues, but “samples of body fat collected from the general population between 1954 and 1956 averaged from 5.3 to 7.4 parts per million of DDT” (Carson, 1962, p. 178). By using these pesticides, we are poisoning ourselves. Many people assume the government would protect us from such risks, but Carson is quick to point out the Food and Drug Administration’s (FDA) weaknesses. First, the FDA only has authority over foods involved in interstate commerce. Second, they do not have nearly enough people to check all shipments; the FDA estimates that less than 1 percent of shipments can be examined with the current staff (Carson, 1962, p. 181). Finally, the method by which the FDA establishes tolerance levels has major faults. The amount of testing required gives false security to the consumer that the tolerance levels are correctly set. After addressing problems with the FDA’s solution, Carson proposes logical solutions: some chemicals are already set at no tolerance, this number should be increased to include more pesticides. The FDA also needs to ensure shipments do not skip inspection as this would encourage producers to be more cautious with their pesticide application, and finally non-chemical methods of pest control should be explored.

After discussing the overwhelming presence of pesticides in our everyday life, Carson asks the important question, what will happen to humanity? Obviously these pesticides can be lethal after application, but what of the cumulative effect of these chemicals in our bodies? When conducting research, the pesticides had not been around long enough for researchers to determine the long-term effects of small-scale exposure, but it is clear humanity needs to be prepared to deal with new diseases. In the past, infectious diseases were the main concern due to issues such as poor living conditions and sanitation problems, but today cancers are growing at a rapid rate and these new poisons are opening up the door to a whole slew of nervous system diseases.

Carson next describes a detailed biological process that the majority of humans would not otherwise understand. After introducing the new diseases we are subjecting ourselves to, she discusses the basic cellular functions that humans depend on for life. The life-energy cycle that creates ATP, “the universal currency of energy,” is embedded into our cells. Many chemicals, including DDT, are known to freeze ATP in its non-energy rich phase, ADP (Carson, 1962, p. 202). Because the reproductive system requires a generous supply of ATP, DDT’s ability to interfere with life’s energy cycle is extremely frightening. In order to fulfill their functions, both the egg and sperm need to be provided with a large amount of ATP, and DDT may be the reason for the reproductive failings of species such as the American bald eagle. Besides for their ability to interfere with the cellular level of life, Carson points out that these chemicals may also have the potential to alter genes, thereby creating new genetic diseases and interfering with the process of evolution. However,

chemical manufacturers are not required to test for genetic effects of their products, so they do not. The results are not clear, but have the potential to be devastating.

Carson makes another strong argument regarding the carcinogenic properties of these pesticides. While it is extremely hard to prove causality in cancer cases, an extremely high percentage of animals that are being exposed to pesticides in controlled laboratory settings eventually have some form of cancer. This evidence is circumstantial, but when juxtaposed with countless tales of adults and children that have recently died of leukemia, like two young boys that had the task of unloading sacks of an insecticide who both died within a year of acute leukemia, the reader can immediately jump to Carson's desired conclusion. Exposure to pesticides comes from many sources, and some scientists would say it would be more valuable to find a cure for cancer instead of preventing it in the first place, but what good would it be to cure a child of cancer if they would simply be exposed to the same carcinogens the very next day? Carson does not negate the importance of searching for a cure, however she stresses that prevention of cancer by reducing exposure to the carcinogenic chemicals that are present in our food, water and air is vital to our species' continued health.

Deleterious Effects of Man Controlling Nature

The argument for prevention ends the segment of *Silent Spring* that revolves around the effects felt by humans. After, Carson returns to her argument against man's desire to control nature. Built into the natural web of life are checks and balances on certain species. Harmful insects are naturally kept in check by predatory

insects and other species, but by disrupting the food chain with pesticides, we are effectively destroying these checks and balances and making the insect problem worse. An example on a larger scale that Carson gives is the quest to reduce the coyote population has led to an increase in their food source, the field mouse. 70-80% of the earth's species are insects and "the vast majority of these insects are held in check by natural forces, without any intervention by man" (Carson, 1962, p. 249). By trying to play God, humans are exacerbating the problem. The fire ant eradication program is an example of when humans have accidentally led to an increase in the insect problem. After spraying the sugarcane fields to kill the fire ant, the sugarcane borer caused an extreme amount of damage because its natural enemies had been killed by the pesticides. Carson ends this chapter with a positive example of a scientist who follows a program in his fields that utilizes a maximum amount of natural controls and a minimal amount of insecticides. This method has been extremely successful with much lower costs than traditional pesticide applications. More importantly the system does not overpower the natural balance. The system follows the philosophy of a Canadian entomologist G.C. Ulyyett:

We must change our philosophy, abandon our attitude of human superiority and admit that in many cases in natural environments we find ways and means of limiting populations of organisms in a more economical way than we can do it ourselves. (Carson, 1962, 261).

The dominant social paradigm of human superiority over nature is throwing off the natural system that has reigned for millions of years. Our pesticide use is changing the populations of many different species. There is also another unintended and frightening consequence of our pesticide use. By Darwin's theory of natural selection or the survival of the fittest, pesticides are killing off the weaker members of

the insect populations and creating new super breeds that are resistant to chemicals. This is a serious problem both to the agricultural industry and to public health. At the time of publication, countless studies had shown that insects were becoming resistant to certain levels of DDT. Either the percentage of DDT in the solution had to be increased, or an even more deadly chemical needed to be used. Carson is careful to clear up the misconception that perhaps humans too could become resistant to chemicals. Resistance develops through many generations and because the life cycle of insects is so short, they would be the first of any species to develop resistance to certain chemicals. It would take hundreds or thousands of years for humans to build the same resistance. Just as today we are told not to overuse antibiotics for fear they will no longer be useful, it would be sensible to use pesticides only in dire circumstances. Instead, the Department of Agriculture encouraged more applications and greater quantities for adequate insect control.

The concluding chapter opens with a reference to Robert Frost's famous poem. Humanity is situated at a place where two roads diverge. The familiar road we have been traveling on is "deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster" and the other is "our last, our only chance to reach a destination that assures the preservation of our earth" (Carson, 1962, p. 277). We have the choice of which road to choose, and Carson describes a number of alternatives to the current pesticides. From a variety of techniques that induce male-sterilization, to bacterial infection by microbes and biological control using natural enemies it is clear alternatives are available and more will arise with further research. The book ends with an appeal to our dominant ideology of

superiority over nature. Carson reminds us that we are dealing with life and that our control may not be the best thing for the earth's balance. The closing paragraph of *Silent Spring* is a stern warning against our notion of superiority that has played a major role in the creation of the modern environmental movement:

The 'control of nature' is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth (Carson, 1962, p. 297).

Public Opinion After Publication

The outcry after the publication of *Silent Spring* was widespread, immediate and effective. In the first three months the book sold 106,000 copies. The paperback edition came out in January 1963 and sales soon reached half a million (MacGillivray, 2004). Important to note is that the readership was not just upper class intellectuals, average middle class families across the country were reading and discussing Carson's controversial work. As Al Gore states in his introduction to a recent edition of *Silent Spring*, "it was one of the books we read at home at my mother's insistence and then discussed around the dinner table" (Gore, 1994, p. xviii). In the year following publication it was even the subject of many popular cartoon strips. Charles Schulz was particularly fond of Carson, including her in many cartoon plots including one where Linus complains that Lucy is obsessed with talking about Rachel Carson and she responds, "We girls need our heroines!" (Shulz, 1963).

Carson's work was especially popular with the younger generation. Her environmentalist views and her radical attack on the dominant social paradigm gave the rebellious youth a cause to rally around and fight for. The older generations had been indoctrinated with the dominant ideology that man deserved to control nature. The younger generation was open to new ideas and especially concerned about the effects of pesticides that were being noticed throughout the country. The 1960s were a time of social unrest in the United States and the young rebellious generation was challenging the status quo. Carson's organized thinking and rational arguments gave the young environmentalists a rallying cause.

The United States government was also noticing Carson's work. Before the book was even published she was receiving attention from the White House. After several notable politicians received advanced copies of *Silent Spring*, Kennedy's special science adviser, Dr. Jerome B. Wiesner convened an internal meeting of bureau chiefs to discuss the portions of the book that had been published in *The New Yorker* (MacGillivray, 2004). The meeting resulted in a special interagency panel that was instructed to report back to president Kennedy on the findings in Carson's novel. On August 29th, approximately one month before publication, Kennedy had referred to "Miss Carson's book" in a press conference, increasing public awareness of both the book and the severity of the issue addressed.

The media also caught wind of the issues Carson was raising. Before publication *CBS Reports* announced its interest in doing a special on *Silent Spring*. Book clubs were choosing it as the book of the month before it was even officially

released and a consumer advocacy organization, Consumer's Union, offered to buy 40,000 copies for resale to its members (MacGillivray, 2004, p. 62).

Not all attention received was positive. Before the official release date of September 27, 1962 a chemical company, Vesicol, threatened legal action against the book and attempted to persuade the public into believing that Carson was a part of “a Communist plot to disrupt U.S. food supplies” (MacGillivray, 2004, p. 63). Vesicol insisted that chemicals were necessary to continue to enjoy “the most abundant and purest foods ever enjoyed by any country of this word” and they argued that the message of *Silent Spring* was nothing more than “sinister influences” (Lytle, 2007, p. 165). They argued that the intention of Carson was to make society believe that all industry is “grasping and immoral” and that reducing pesticide use in agriculture would only reduce our supply of food to “east-curtain parity” (Lytle, 2007, p. 165).

Silent Spring was published in an era when anti-establishment thinking was not only controversial, but also potentially suicidal. While McCarthy's influence peaked in the mid-1950s, in the early 1960s conservatism was still an important part of the American ideology. There was a strong sentiment of anti-Communism and the dominant ideology encouraged “social and political conformity, respect for governmental and community authority, uncritical patriotism, religious faith and a commitment to a vague notion of an American way of life” (Lytle, 2007, p. 134). People were wary of anti-establishment ideas, and because the chemical industry was representative of American progress it was an especially dangerous industry to criticize. Carson was cautious in her attack on the chemical industry. She never mentioned companies or brands by name so as to avoid risk of libel lawsuits from the

litigious chemical corporations. Instead, the pesticide manufactures spent at least \$250,000 on a campaign to discredit both Carson and her research. Monsanto published a brochure parodying the book called “The Desolate Year” that described the wasteland of a world without pesticides, the National Pest Control Association wrote a song called “Rachel, Rachel” and the National Agricultural Chemicals Association wrote a refutation of *Silent Spring* called *Fact and Fancy* (MacGillivray, 2004, p. 66). Other media sources, including *Time* attacked Carson more personally referring to her book as a mere emotional rant. A senior board member of the Federal Pest Control Review Board called her a spinster, politicians questioned her interest in genetics and the government attempted to appeal to the consumer when Agricultural Research Service member Ernest G. Moore said: “I don’t know of a housewife today who will buy the type of wormy apples we had before pesticides” (MacGillivray, 2004, p. 67).

During the book’s counterattack Carson was too ill with cancer to defend herself, but many environmentalists, including Roland Clement of the National Audubon Society were willing to step in on her behalf. Her most effective argument however, took place on a very public stage. In November of 1963, Carson finally agreed to appear on a segment of *CBS Reports*, but she was so ill it had to be taped in her home. Despite her pale and sickly demeanor, her calm self-assurance and mastery of the facts made the program a success (Lytle, 2007, p. 179). In April 1963 she appeared again on the show with Dr. Robert White-Stevens, the chief industry spokesmen for the chemical companies. Carson was concerned that with the scheduled guests the show was weighed in favor of industry, but 10-15 million people

watched White-Stevens and government officials appear overbearing and ill informed while Carson acted with maturity, dignity and control. She assured the audience she was not there to alarm them, but simply to make sure “they had the facts needed to make informed decisions” (Lytle, 2007, 182). The officials attempt to rebut her arguments backfired and actually bolstered Carson’s statements on pesticide use. Carson concluded the program with the following words: “I think we’re challenged, as mankind has never been challenged before, to prove our maturity and our mastery not of nature but of ourselves” (MacGillvray, 2004, p. 71).

Carson’s appeal to the viewers was successful; the very next day Senator Abraham Ribicoff began setting up a congressional committee to investigate pesticides. Ribicoff stated that “last night’s CBS telecast clearly showed there is an appalling lack of information on the entire field of environmental hazards” (Lytle, 2007, 183). The president had already asked the President’s Science Advisory Committee to investigate pesticide use, which Carson had met with. By the end of 1962, there had already been 40 bills introduced by state legislators to regulate pesticides in some form. In May 1963 the President’s Science Advisory Committee released its report that was critical of both the pesticide industry and the government pest-control programs. The report recommended reductions of pesticide use, but did not specify a method by which they could be regulated. It also acknowledged Carson’s work and dedication toward the issue by saying that “until the publication of *Silent Spring*, people were generally unaware of the toxicity of pesticides” (MacGillvray, 2004, 73).

Soon after, Carson testified in front of the Ribicoff investigatory committee. In her testimony, she stressed the importance for the need to end aerial spraying as well as the need to reduce and eventually eliminate many of the persistent pesticides. She spoke of the need for a government bureau to regulate the testing of pesticides and control of pest control programs and she stressed the citizens' right to keep their homes safe from pesticide poisoning. The committee was impressed by Carson's knowledge and demeanor and they agreed with many of her arguments. In the two years following publication Carson received countless awards including the Cullum Medal from the American Geographical Society, the Paul Bartsch Award, the National Audubon Society Medal and an induction into the American Academy of Arts and Letters (Lytle, 2007, p. 188-189).

Continuous press coverage of Carson's work reinforced her message. On November 18, 1963 there was a horrendous fish kill in the lower Mississippi River in which 5 million fish died, including the catfish, a species of dietary importance to the local residents. The most recent technology allowed public health officials to identify the pesticide endrin as the culprit and trace it back to a single Memphis chemical plant owned by Velsicol, an active protestor against the publication of *Silent Spring*. Unfortunately less than two years after publication the environmentalist cause lost their leader when on April 14, 1964 Carson passed away with metastatic cancer. Her work though had clearly left a mark, and the American view on pesticides, the chemical industry and the government regulation was forever changed.

After Carson's death, the pesticide issue stalled in Washington D.C. The sale of pesticides continued to increase and Congress denied a bill that would allow for the

inspection of pesticide plants. In the Vietnam War the US military continued to use new toxic herbicides, Agents Blue, White and Orange, and aerial spraying of DDT continued. In 1966 a Long Islander concerned about a fish kill caused by a DDT application created the Environmental Defense Fund and filed a lawsuit against Suffolk County. The suit lost in court, but there was enough evidence to order a halt to the aerial application of DDT. The Environmental Defense Fund continued to bring cases against DDT and other pesticides and was generally very successful. In 1969 Michigan officially became the first state to ban the sale of DDT (MacGillivray, 2004, p. 81).

Research on the pesticide continued. Its effect of thinning the eggshells of birds was first noted, and the pesticidal residue was found in Antarctica as well as the Arctic food chain. The chemical industry continued to wage its counterattack and now directed it against the Environmental Defense Fund. Environmental groups including The Sierra Club, the National Wildlife Federation and the National Audubon Society all continued going to court to stop the use of DDT and once levels of DDT were found in “human breast milk that were seven times higher than that permitted in cow’s milk” it seemed inevitable that the anti-DDT movement would be successful.

The civil and women’s rights movements brought about a new spirit of activism in the United States and in the 1960s a series of domestic environmental disasters including the burning of the Cuyahoga River, the Santa Barbara Oil Spill and a study that said only one major river in the entire country was unpolluted led to the increase in environmental activism (Lytle, 2007). On April 22, 1970 the first Earth

Day took place with 10 million people around the country taking part in environmentally centered activities. Membership in environmental groups increased dramatically. The Sierra Club had 16,000 members in 1960, 33,000 by 1965 and by the time of the first earth day it had 114,000 members (MacGillivray, 2004, p. 90). Lobbying increased and in 1970 Nixon's administration created the Environmental Protection Agency (EPA) under the Reorganization Plan No. 3. The Clean Air Act of 1970 and the Clean Water Act of 1972 decreased pollution throughout the country. In 1971 the head of the EPA William Ruckelshaus examined cases for the banning of DDT, but denied that DDT was causing an immediate health threat. Environmentalists throughout the country were outraged and their large-scale protest demanded that Ruckelshaus reconsider his statement. On June 14, 1972, 10 years after the publication of *Silent Spring*, Ruckelshaus announced a ban on all domestic uses of DDT except in emergency disease and pest-control applications (MacGillivray, 2004, p. 94).

Carson's book was extremely controversial and extremely powerful. There is no doubt that it has been one of the most influential books of the century. Time magazine named Carson one of the 100 most important people of the 20th century and both the Boston Public Libraries and New York Public Libraries consider *Silent Spring* to be one of the 100 most influential books of the 20th century. It is true that today there are more pesticides used than in the 1960s and that regulation of the pesticide industry is still not as stringent as it could be, but Carson succeeded in awakening thought in the American people. No longer do we have a naïve faith in science and technology. We do not blindly misuse chemicals and pollutants without

having some concept of their consequences. Carson started the modern environmental movement. She alerted humanity to the irresponsibility of attempting to control nature. While her quest to stop the introduction of synthetic chemicals into the environment is ongoing and may never be won, she is still heralded as a success. Without her work it might have been too late to save our national symbol, the American bald eagle. Without her many more children would have died from the effects of aerial spraying. Carson took a risk in writing and publishing a book with such a controversial message, but she knew it had to be done. Her message changed the dominant ideology about our relationship with nature. By analyzing her success, it may be possible to uncover methods that could help today in furthering the fight for environmental protection.

Carson's Success in Transitioning the Argument

Before the publication of *Silent Spring* there was very little knowledge of the dangers of DDT and other pesticides. Questioning scientific technology was virtually unheard of and American citizens had a blind faith in the chemical industry after their successes in World War Two. There was however a few concerned scientists and citizens that were growing concerned about the chemicals' effect on the environment. Aerial spraying was leaving behind horrifying side effects: massive fish kills, dying birds and mysterious illnesses. Carson became the leader of a small counterpublic group whose goal was to inform Americans of the dangerous chemicals they were putting into the environment.

Carson was fighting an uphill battle. During the 1950s America was in a paranoid delusion that subversives were everywhere. Anti-establishment viewpoints were seen as dangerous and conformity was encouraged. Not only was Carson's counterpublic opinion against the dominant social paradigm of blind faith in science and technology, but also her lifestyle went against societal conventions. The typical female role at the time period was that of a suburban housewife who was dedicated to her husband's career, her home and her children. Carson was an unmarried scientist who provided for herself and her family and had an intimate relationship with another woman (Lytle, 2007). She was fighting against an overwhelmingly powerful group of industry executives, lobbyists and government bureaucrats with an unlimited amount of resources. She succeeded partially because the timing was right for the message. There was an increase in concern over chemicals and public activism was increasing with the civil rights and women's rights movements of the 1960s. The youth of the nation was ready to rebel and Carson gave them a cause to rally around, but timing was not everything. Without an effective message, the changes in the rest of society would not have mattered.

Carson succeeded in making the counterpublic ideology the dominant ideology because of proper and effective framing of the argument. She moved an extremely technical and dry argument about chemicals and their side effects into the public eye. By stressing the controversial nature of the chemicals and their generous applications Carson increased awareness of their consequences. She made the public aware that this problem was widespread and had the potential to affect everyone and by doing so created enough concern that her argument moved out of the minority. In

order to create this transition from the scientific into the public realm Carson used many techniques. She relied heavily on narrative arguments, effective language and explanations, she cited countless studies to increase her credibility, she used visuals and symbolism, she successfully argued within her opposition's framework by using the technique of objection, and she utilized emotional appeals. After transitioning the argument to the public sphere her work was done. The book raised enough awareness of the issue that the public took over in encouraging the government to make changes to stop the misuse of pesticides and to increase regulation.

Narrative

Although the argument was extremely scientific by nature, Carson opened the book with a narrative. Her mythical town in heartland America brought the argument close to home. Readers imagined their own towns and the evil spell that wreaked havoc on the mythical town suddenly seemed more like reality than myth. Carson pointed out that this is a fictional town and that no known town had accumulated that many negative side effects of pesticide use, but it was not difficult for the reader to understand that the potential for disaster was too great to continue to ignore the chemical use. The argument by narrative was the perfect type of argument to open the novel as it helped the reader relate to the issue, but a solely story-based argument could have easily been torn apart by the opponents of the book. Carson needed solid factual evidence to continue to prove her point, but she needed to explain it in a manner in which the general readership could understand yet still maintain interest.

Language and Explanations

In order to introduce the technical argument Carson carefully choose her language in order to describe DDT's chemical makeup. The detailed background on DDT including its lethality and toxicity make the reader aware of how dangerous of a chemical this pesticide is. There had been no previous attempt to explain the basic science of the chemical to a general audience. Carson described the pesticide in very scientific terms, giving credibility to her argument, yet her prose writing style did not exclude the layman. Generally in the technical sphere, only field-specific professionals can understand the argument, but with her comprehensive explanations Carson moved the argument into the public sphere and wrote about pesticides in a fashion in which a wider audience could understand.

Establishing Credibility

Another important aspect of her technical argument is Carson's constant reference to scientific studies. She already had ethos and credibility as a nature writer, but in the past all she had written about were lighter subjects involving the sea. She needed to ensure her credibility in the field of pesticides and she did this through constant reference to scientific studies. After describing the basic chemistry and dangers of the pesticide, Carson immediately began to discuss how ubiquitous the pesticide is in nature already. Simply stating the chemical dangers is powerful, but for the readership to truly appreciate how big a problem they are dealing with they need

to be told exactly where the pesticide is turning up in the environment. Carson starts with the poisoning of the water and soil, two basic building blocks of life. She states that the pesticides are infiltrating our nations' waterways as well as the soil we grow our food in, and her detailed examples and citations give the argument scientific credibility. It is extremely important that Carson uses so many scientific citations. Without them her book would appear to be an unfounded rant against pesticides, but with scientific data to back up her arguments were more credible.

Visuals and Symbolism

Making constant, specific references also gives Carson another argumentative technique: visual. Carson's book has no images, but her detailed description of events that are taking place across the country allow the reader to visualize the side effects that Carson describes. Carson creates vivid images with her words to which her readers can relate. She also plays on the assumption that many readers have witnessed first-hand the destruction caused by pesticides, but they have not understood what caused it. The brown, withering roadside vegetation is a powerful image for any reader, but for those who have seen this happen in their town it is even more clear. For the reader that was not a part of the counterpublic group and had no background information of the effects of pesticides, these types of arguments are extremely powerful. This reader would have acknowledged the destruction of local vegetation, and by connecting the cause with the effect their opinions on rampant pesticide use would slowly begin to change.

The fisheries were also a powerful image. Aquatic species were dramatically affected by the application of pesticides, leading to a large number of fish kills. The images of hundreds of thousands of fish washing up on riverbanks were so powerful that the media had been quick to cover them. An image of thousands of dead fish is unforgettable, and by causally and logically linking these dramatic deaths to pesticide use, Carson succeeded in converting even more of the public to her argument.

These common visual images lead to another of Carson's techniques: symbolism. Carson constantly referenced DDT's effect on bird species. Bird lovers were some of the first to question the use of pesticides. It was apparent that bird populations were plummeting and while many did not follow the problem back to pesticide use, Carson very carefully explained the causality of the issue. An important case study Carson references in this chapter is the plight of the American bald eagle. While many bird populations were suffering the same fate as the bald eagle, the average non-scientific person probably did not know or care what an osprey or egret was. The bald eagle however is our nation's symbol. Carson described how these pesticides affect birds and explained that rampant misuse was killing our nation's symbol. Birds are not generally seen as the type of charismatic creature that people attach themselves to, but Carson succeeded in gaining support by focusing on the powerful symbolism tied to the American bald eagle.

When discussing the dangers of aerial spraying Carson references another important symbol: the skull and crossbones. She discusses the recent paradigm shift in the use of chemicals. Before the war dangerous chemicals were clearly marked with the skull and crossbones symbol. They were used carefully and only when

absolutely necessary. After the war, chemicals with the same, if not more deadly, properties were being dropped from airplanes over entire towns. By connecting the menacing skull and crossbones symbol with the chemicals that were falling from the skies, the reader makes the association that the pesticide companies were trying to avoid: these pesticides are not as safe as the chemical industry leads you to believe.

Arguing the Opposition Through Objection

The chapter on aerial spraying makes another type of argument. The chemical companies had been arguing the cost effectiveness of their product. Using the pesticides for agricultural purposes creates more productive crops. Using them to combat public health risks like malaria is significantly cheaper than attempting to combat the disease once contracted. However, Carson is quick to point out that the most dangerous form of pesticide application, aerial spraying, is not cost effective. She uses a popular technique of the counterpublic, objection, and argues within the framework of the opposition. She proves that in the case of the fire ant eradication program, dumping pesticides from the skies was more expensive than the spot method of application. While some readers may not have been persuaded by counterpublic arguments, this specifically negates the argument of the dominant paradigm. If their arguments are faulty, then one must appeal to the argument of the counterpublic.

Emotional Appeals

Carson varies the types of arguments she uses in order to maximize her emotional appeal. She appeals to nature lovers when discussing the effects of the pesticides on non-target species. She appeals to parents when she stresses the increased danger of pesticides to children. The ease for children to access dangerous chemicals kept in glass bottles by simply walking through the grocery store is an especially powerful image. Her economic argument appeals to those who value the cost effectiveness of the product. Her arguments regarding carcinogenic properties of the pesticides appeal to those who are more concerned with short-term and long-term effects on humans than any other aspect of the environment. Carson ends with another powerful argument. Carson states that the continued use of pesticides will lead to an increased need for increasingly toxic chemicals. Subjecting ourselves to increasingly toxic chemicals is a strong emotional appeal for any reader.

Carson's Successful Transition

Carson uses an assortment of techniques to ensure the proper transition of her argument from the scientific sphere into the public sphere. Most important for her transitioning the counterpublic argument was her use of narrative, carefully chosen language, visuals, symbolic and emotional appeals, reference to scientific studies and her objection to the dominant public's ideology. These techniques all made a very scientific argument accessible to the general public. These types of argument led to

the reframing of the pesticide issue. Previously, pesticides had been discussed in scientific circles with limited consequences. The infiltration of the pesticides into our waterways, air and soil was a powerful argument for many, but Carson linked this to other issues. She used the symbolic bald eagle to show the unintended consequences on wildlife and she laid out the causal link between pesticide use and direct effects on humans. The combination of Carson's argumentative techniques reframed the issue into the bigger picture of man's control over nature. By doing so Carson was able to allow for the full transition of the counterpublic ideology into the dominant ideology.

Carson clearly moved the pesticide argument from the technical sphere into the public sphere. Before publication the issue was only discussed in a few scientific circles between concerned scientists and nature enthusiasts. After publication pesticides were discussed widely in the media, in congressional committees and around dinner tables across the country. By moving the argument into the public sphere Carson opened up the discussion to a new group of people. The argument was no longer the belief of a small counterpublic. *Silent Spring* changed the attitudes of Americans. The dominant ideology was no longer a blind faith in chemicals and the chemical industry; Americans began to question the use of toxic chemicals and the government procedures for protecting consumers. For the first time, the belief in man's control over nature began to diminish. Carson was responsible for the shift of the counterpublic belief into the belief of the majority. Her emotional appeals coupled with relevant data and her expert framing of the arguments were responsible for the beginning of the modern environmental movement and for the way humanity views the environment today.

CHAPTER THREE: AL GORE'S *AN INCONVENIENT TRUTH* AND THE BATTLE TO REGULATE CLIMATE CHANGE

When Al Gore Jr. was born on March 31, 1948 his father, Albert Sr., was a respected member of the House of Representatives. He was a senior member of the Banking and Commerce Committee and the chairman of the subcommittee that oversaw the Atomic Energy Commission (Cockburn and St. Clair, 2000, p. 10). Gore Jr. grew up in the public spotlight of politics. Although he summered in his hometown in the countryside of Tennessee, he grew accustomed to the fast-paced political world of Washington D.C. He attended St. Albans school where he was described as “well behaved” and one who never wanted “to make an unhappy noise” (Cockburn and St. Clair, 2000, p. 12). After St. Albans, Gore Jr. attended Harvard University where he majored in political science. When he graduated in 1969 the Vietnam War was in the forefront of American politics, and after much deliberation, Gore Jr. enlisted himself in the United States Army, and was sent to Vietnam in 1971.

In 1976 Gore Jr. began his own political career by running for a seat once held by his father in the House of Representatives. Gore was in the House of Representatives from 1976 until 1984, after which he was in the Senate until 1993. Gore Jr. made an unsuccessful bid for the Democratic Party nomination for president in 1988 and eventually became running mate to Bill Clinton in the 1992 presidential election. He served as vice president until 2000, when he again ran for president, this time losing to George W. Bush.

Throughout his political career, Gore supported the environment. When in the House of Representatives he held the first congressional hearings on climate change and he also took interest on the issue of toxic waste. In 1992 he published his first book titled *Earth in the Balance: Ecology and the Human Spirit*. This book discussed a range of ecological issues and gave a variety of proposed policies that would deal with the most pressing environmental challenges. The book became the first by a senator since John F. Kennedy's to reach the New York Times bestseller list, but it did not have nearly the impact of his second book, *An Inconvenient Truth*.

Throughout his political career Gore had a special interest in climate change. A college professor introduced him to the potential effects of a rise in atmospheric carbon dioxide and ever since Gore tried to learn more. *An Inconvenient Truth*, Gore's second environmental book, focused on the issue of climate change and it is most recognized by its documentary film adaptation released in 2006. The film immediately received rave reviews and became one of the highest grossing documentaries in American history. While the issue of climate change had been on the American public's radar for years, this film exposed many people to the real consequences of climate change for the first time. The documentary won an Academy Award in 2007 for Documentary Feature and that same year Al Gore won a Nobel Peace Prize for his efforts to draw the world's attention to this pressing environmental issue.

This chapter will follow the story of climate change and its perception by the American public. First, background on the scientific issue of climate change will be discussed in order to fully understand the problem to which Gore was calling

attention. The scientific nature of the argument will also be discussed in order to see how Gore changed the argument from one in the scientific sphere to one in the public sphere. The transition of the argument will be analyzed in further detail, including a look at the specific techniques Gore uses in *An Inconvenient Truth*. Finally, the public reaction to the film will be examined before summarizing the successes of Gore's work.

Background on Climate Change

Climate change is easily the most pressing environmental issue of our time. The merits of the scientific argument have been debated over for years, but the most recent scientific reports are saying with certainty that human-induced climate change is a real threat. In a 2008 report titled "The Effects of Climate Change on Agriculture, Land Resources, Water Resources and Biodiversity in the United States," the United States Climate Change Science Program references the Fourth Assessment Report of the Intergovernmental Panel on Climate Change which states with "very high confidence that human activities, such as fossil fuel burning and deforestation have altered the global climate" (Backlund, Janetos and Schimel, 2008, p. 2).

The most basic scientific process relating to climate change is the greenhouse effect. French physicist Joseph Fourier was the first to realize in the 1820s that in order for us to enjoy the fairly constant temperature of earth, not all of the energy that reached Earth via sunlight could return to space. Fourier was not sure of the exact mechanism, but he was the first to recognize that some of the reflected solar energy

must be recaptured by the atmosphere (Henson, 2006, p. 19). Eventually, this scientific mechanism became known as the greenhouse effect. When solar radiation hits the earth, some of it is absorbed, and the rest reflects back into space. Some of the outgoing radiation is in turn absorbed by clouds and greenhouse gases and radiated back down to Earth. This continuous cycle is necessary to keep earth at an inhabitable temperature, however, as the concentration of greenhouse gases increases in the atmosphere, more radiation is trapped and reflected back to earth, causing an average global temperature increase.

Since the Industrial Revolution, humans have been putting an increasing amount of greenhouse gases into the atmosphere. The most important to the concept of global warming and climate change is carbon dioxide. Carbon dioxide is the product of burning fossil fuels, which we rely on to run practically every aspect of our economy. Another major source of carbon dioxide is deforestation, which generally occurs for agricultural purposes (Singer, 1989, p. 1). Currently, studies that calculate indirect carbon dioxide atmospheric concentrations are using concentrations of airtight bubbles in glacial ice core samples (Maslin, 2009). These samples date back to the pre-industrial age and show that the atmospheric level of carbon dioxide was fairly steady at between 265 and 290 parts per million for centuries before the Industrial Revolution (Cotton and Pielke, 1995, p. 161). Since the Industrial Revolution however, the atmospheric concentration of carbon dioxide has been steadily rising (Henson, 2006, p. 25). The Scripps Institution of Oceanography NOAA Earth System Research Laboratory, which has been taking the official atmospheric carbon dioxide readings at Mauna Loa Observatory since the 1960s

shows that the atmospheric concentration of carbon dioxide is above 380 parts per million (Tans, 2009).

Other important greenhouse gases that are not quite as prevalent as carbon dioxide but are equally, if not more damaging are methane, ozone, water vapor, chlorofluorocarbons (CFCs) and nitrous oxide. Methane is especially important to note as one molecule absorbs and reflects back to earth 20-25 times more energy than a molecule of carbon dioxide (Henson, 2006, p. 25). It naturally is released from swamps, and more recently its concentrations have been increasing in the atmosphere because of an increase in rice paddies and cattle farming (Singer, 1989, p. 3).

When the Industrial Revolution began, no one suspected the immense burning of coal and eventually other fossil fuels such as oil would lead to the destruction of our natural climate. It was widely understood that large scale climate changes had taken place before, the most notable being the Ice Ages that covered most of North America and Europe in ice sheets, but the scientific mechanism behind the changes in climate were largely unknown. In the mid-1890s Swedish scientist Svante Arrhenius became the first to postulate that carbon dioxide levels might be responsible for the ice ages. He included the mechanism of greenhouse gas feedback, and calculated that if there were to be a doubling of carbon dioxide in the atmosphere due to increased industrial emissions there would be a global warming of about five degrees Celsius (Henson, 2006, p. 28). Today, there are more detailed and accurate computer models have been created to estimate what range of temperature changes can be expected from an increase in carbon dioxide concentration. Current models predict that a doubling of carbon dioxide concentrations would warm the globe by between 1.5 and

4.5 degrees Celsius. Arrhenius' calculations were not very far off. At the time however, Arrhenius was focused on greenhouse gas levels as they affect ice ages and glaciation; he had no real concern for the anthropogenic sources of greenhouse gases (Cotton and Pielke, 1995, p. 161). It was impossible to predict the rapid pace of global development of the 20th century, and no one could imagine how quickly humans would increase the increase in percentage of carbon dioxide in the atmosphere.

More recently, the issue of climate change has become increasingly scientific and political. In the 1990s, the argument divided the scientific community. A battle ensued between the skeptics who questioned the scientific accuracy of the data, and those who believed an increase in anthropogenic greenhouse gas emissions is causing global climate change. Climate skeptics rallied around the idea that the current warming trends were no different than the natural variability of climate change (Cotton and Pielke, 1995). The polarized political community supported whichever set of scientists had results that supported their beliefs. If politicians agreed that greenhouse gas emissions were causing climate change then they would be compelled to do something. Policies necessary to combat greenhouse gas emissions would not be particularly popular with most politicians. For the most part there would be immediate expenses and results would be long term, not short term. Politicians are not in office long enough to be concerned with long term results; they want to endorse a popular movement that will help them win their next reelection campaign.

This was the problem that Gore faced when creating his film *An Inconvenient Truth*. Up until this point the argument was largely in the scientific realm and

entering the political. Climate change was a concept of the elite environmentalists and it was not commonly discussed around the dinner table. Because the climate skeptics were well funded and able to raise doubt surrounding the scientific accuracy of climate change studies, average citizens were easily confused by conflicting findings and left the argument to the scientists and politicians. Politicians resisted taking action because enacting policies that put an immediate stress on the economy or specific industries would make them unpopular, even if it would help the planet in the long run. The prevailing view was that climate change was too complicated of an issue to be discussed by anyone other than scientists and politicians. Climate skeptics raised enough questions to counter those who believed humans were causing global warming, and without constituent support the politicians avoided taking action. There was a small counterpublic of active citizens in the United States who believed climate change is an issue that should be discussed on a wider specter, and on a global scale this American counterpublic could be considered closer to the dominant ideology. While climate skeptics succeeded in delaying the acceptance of the climate change argument by United States citizens, the rest of the world was beginning to attempt action.

Because climate change is an international problem that needs an international solution, the United States' action is only part of the problem. In 1994 the United Nations Framework Convention on Climate Change (UNFCCC) went into effect (Brown, 2009). 189 countries were party to the UNFCCC, including the United States. The UNFCCC included a nonbinding commitment to reduce greenhouse gas emissions to 1990 levels by 2000, but the United States failed to achieve this goal.

The UNFCCC also incorporated a statement saying that scientific uncertainty could not be used as “the basis for delaying action in regard to ... emissions obligations,” yet the United States government has delayed action because of scientific uncertainty (Brown, 2009, p. 253). Parties to the UNFCCC agreed that this would simply be a framework and that in the future there would be a need for more specific global warming reduction commitments.

The United States is party to the UNFCCC, yet under the Bush Administration the United States refused to participate in the more specific Kyoto Protocol because of scientific uncertainty, the cost to the United States economy and the failure of the developing world to be forced into greenhouse gas reducing commitments. While the United States has been making real efforts to increase energy efficiency in order to reduce greenhouse gas emissions, total increase in energy consumption is supposed to upset the advances in technology and continue an increase in the United States’ total emissions (Brown, 2000, p. 252). The United States is responsible for more carbon dioxide emissions than any other country in the world. It should be taking leadership in the efforts to combat climate change, but instead it has remained dormant. In the past decade, the reason for stagnation is based in the conservative government administration, but the lack of public support for the issue is another reason for lack of action.

The exact mechanisms of climate change are extremely scientific by nature and very complicated. There are many feedback cycles that factor into climate change calculations including, but not limited to, water vapor feedbacks, surface snow and ice coverage, ocean feedbacks, cloud feedbacks and vegetation feedbacks (Cotton and

Pielke, 1995). A somewhat simple explanation of the vegetation feedback cycle is that vegetation absorbs more energy that comes to earth than either desert or tundra. If the climate were to cool and a forest turned into tundra, more of the sun's energy would be reflected back into space, further cooling the planet (Archer, 2007, p.4). There are such a large number of similar feedback cycles that scientists are not even certain of what will result, so it is impossible to ask the average person to fully grasp the concept.

The results of carbon dioxide increases in the atmosphere are even more complicated. Complex computer models cannot predict with one hundred percent certainty what will result from an increase in carbon dioxide concentrations. Possible effects of an average global temperature increase include melting glaciers and polar ice caps that lead to an increase in global sea levels. Large-scale weather patterns will also be affected, as will ocean temperature and salinity. This will increase the intensity of storms in some areas, while leading to intense droughts and desertification in other areas of the globe. It is important to note, however, that climate change is not responsible for single weather events such as a specific hurricane, instead it is responsible for "broad perspective quantities such as regional average temperature" or general intensity or frequency of storms (Covey, 1989, p. 11). Changes in regional climate and weather patterns could also have an affect on growing seasons and growing zones, which will have important affects to worldwide food production (Kellogg, 1989, p. 48). Because of the change in ocean temperatures and salinity along with regional climate changes, general global biodiversity will also

be reduced. The effects of climate change are widespread, and it is difficult to understand their connection to an increase in greenhouse gas concentrations.

The complicated nature of the climate change argument makes it more difficult for the average person to understand. The argument is scientific in nature, and if scientists are arguing the validity of certain feedback cycles then it is impossible for a person with no scientific background to try and make sense of the long-winded climate change findings. This was another issue Gore faced when creating his film. He had to incorporate enough scientific data so that his film would withstand scientific scrutiny, but he had to simplify and organize the argument enough that non-scientists could understand and follow. Gore's last challenge involved overcoming the political nature of the argument in the United States and making climate change a bipartisan issue.

In the United States in particular, the argument behind climate change is extremely politicized. The Republican Party, specifically the Bush Administration, has endorsed climate skeptics and supported a policy of inaction. American citizens have been led to believe that climate change is a political issue brought into light by extreme liberals and environmentalists, while that is not in fact the case. Because of the technicality of the issue, at the turn of the last century climate change was not a public argument. Instead, it was a debate between scientists and politicians. In order to incorporate the public the argument needed to be transformed. The technical scientific nature of the overall argument needed to be made accessible to a wider public and the polarizing political arguments needed to be rationalized so that political parties were taken out of the argument. Gore's documentary film, *An*

Inconvenient Truth, came at a pivotal time in American politics. The United States was lagging behind the rest of the world in its effort to reduce greenhouse gas emissions. This film was an attempt to mobilize the American public to encourage change in greenhouse gas policies and climate change regulation, as well as increase awareness for the need for an increased focus on sustainability.

An Inconvenient Truth

The film *An Inconvenient Truth* can be divided into four main sections. The first section is the basic lecture, in which Gore describes the basic science and background knowledge necessary to understand the climate change argument. In the second section Gore introduces the climate change thesis and why we as humans should be concerned about the earth's climate changing. In the third section Gore defends his argument against the critics and clears up major misconceptions that the climate change skeptics have introduced into the public sphere. The closing section is Gore's argument for action. These are the basic segments of the film and within each can be found various techniques that Gore uses to transition the scientific argument into the public sphere including visuals, narrative, ethos, examples and emotional appeals.

Science and General Background

The lecture section of the film begins with a peaceful river scene. Gore's calm, soothing voice tells a narrative of what it feels like to be in the presence of such natural beauty. This river scene ends up being a point of familiarity; throughout the film Gore returns to this river. This image, along with the series of images of planet earth tie together common themes, and make the film fit together more so than a simple documentary. The series of images of planet earth were taken from space. The first picture of earth ever taken from space is shown as the viewing audience is introduced to the film audience. Throughout the film, Gore is seen giving lectures, but he is not lecturing at the camera, he is lecturing at an on camera audience. Many lectures across the globe are shown, but there is one main audience and one main lecture to which is continuously returned. Within the first five minutes of the film, Gore has shown three important images that become the stable center for the rest of the film.

The introduction continues with campaign footage of Gore from previous years that tell the story of his past. He jokingly introduces himself as a man that "used to be the next president" (Gore, 2006). His overlaying narrative discusses the difficulties he has faced in his political career trying to get politicians to see the negative consequences of climate change. Dramatic images flash in front of the screen of melting ice sheets, desertification, billowing smoke stacks, computer models of hurricanes and finally the aftermath of Hurricane Katrina. With dramatic background music Gore turns the argument from one of political will and scientific

understanding to one of ethics. He states that many politicians refuse to see this connection because then the moral imperative to do something is inescapable.

Gore returns back to the picture of earth taken from space. The image, known as earthrise, led to dramatic changes in the way we see the earth. For the first time the fragility, and minute size of our planet was visible. Soon after this picture was taken the modern environmental movement took hold in Congress and changes in legislation including the Clean Air Act and the Clean Water Act were made. Various images of the earth are shown; one, taken on Apollo 17 is the most published photograph in all of history and it is the only picture we have where the earth is fully lit. The earth is seen in time-lapse rotation and another image is shown that is a digital compilation of 3000 satellite pictures that make for a cloud free view of all the earth's landmasses. Gore shows these images early in the film to show the audience what it is we are dealing with. This is our home, planet earth.

Next, Gore begins his first set of stories. Narratives are important in this film. Gore uses them to connect with the audience and to make his speech seem more personal. A speech on climate change could sound scientific and dull, but Gore's filming techniques in this documentary make it seem more real. His first set of stories is about two of his teachers. The first teacher was from grade school and taught geography. He had a classmate once who asked if South American and Africa ever fit together and the teacher replied that was absolutely absurd because, at the time, that was the scientific consensus. Gore uses this story as an opportunity to compare an old scientific belief to global warming. Some people today think the earth is so big that we cannot have a lasting harmful impact on it, but that simply is not the case. He also

uses this story to take the first of many digs at conservatives and in particular the Bush administration. He mentions that that teacher went onto become the science advisor in “the current administration” (Gore, 2006).

After his first narrative Gore moves into the most scientific portion of his speech. He begins by discussing the fragility of the atmosphere. In order to do so he conjures a great image. He tells the audience that if you painted a layer of varnish on a globe, the thickness of that varnish in comparison to the globe is about the same as how the thickness of our atmosphere compares to our planet. He discusses the fragility of the atmosphere and describes how it plays a central role in making our planet habitable. The description of the scientific mechanism behind the greenhouse effect is very brief, but with his effective diagrams and computer simulations it is quite clear how the atmosphere traps an increasing amount of outgoing infrared radiation when the atmosphere thickens due to greenhouse gases. To lighten the mood after his scientific explanation, Gore plays a short cartoon clip titled “Global Warming...or: None Like it Hot!” The information presented in the cartoon is unnecessary and comical, but it provides a welcome reality check and ensures that the viewer is not turned off by the prior scientific description.

Gore continues by finishing his two-part narrative about his teachers. The next story he tells is about a college professor, Roger Revelle, who first introduced Gore to the connection between rising carbon dioxide concentrations and increase in global temperature. Revelle was on the team that started taking atmospheric carbon dioxide readings at Mauna Loa. The resulting graph is shown to the lecture audience in a very dramatic fashion. Instead of a typical scientific chart with labeled axes and plotted

points, the graph is a thick red line on a black background. Gore tells his personal timeline in conjunction with the graph. The readings started in 1958. He went to Congress in the mid-1970s and held the first hearings on global warming with professor Revelle as the lead off witness. In 1984 he held more science round tables in the Senate and wrote his first book. In 1992 he worked to pass a version of a carbon tax. In 1997 he went to Kyoto to make a treaty that has been very controversial in the U.S. He takes another shot at former President Bush when he mentions losing the 2000 presidential race to a candidate who pledged to regulate carbon dioxide, but failed to honor his promise. Throughout the entire timeline the graph keeps rising in a consistent manner. The visual consequences of the rising levels of carbon dioxide are shown with comparison pictures of glaciers around the world. The almost extinct glaciers of Kilimanjaro are juxtaposed to a picture taken in the early 1900s. The Columbia Glacier in Alaska is shown calving icebergs into the ocean. Glaciers throughout the Alps and South America are shown receding throughout time. The glaciers of the Himalayans, which supply 40% of the world's population with water are shown slowly receding up the mountain range.

Gore uses these images of melting glaciers to transition into the next portion of his documentary. He previously showed a graph of rising carbon dioxide levels from the past 50 years, but skeptics are quick to point out that this could fit into the large scheme natural cycle. For thousands of years the world has been going in and out of ice ages, so how would you prove that humans are causing this current warming phase? Gore begins talking about the scientists that take ice core samplings to determine the atmospheric carbon dioxide concentration as well as the temperature

from previous centuries, but he puts a name to the scientists. Instead of simply discussing an abstract group of people that study glaciers, he refers to his friend, Lonnie Thomson, a glaciologist, by name. This is important as it turns a detailed description of a scientific experiment into a narrative. Glacial ice is similar to tree rings, there is a distinct layer from each year. Scientists can drill into the ice and measure the carbon dioxide and oxygen isotopes in tiny air bubbles to determine atmospheric carbon dioxide concentrations and temperature. Mountain glaciers can go back 1000 years and this proves the skeptics argument wrong. Past warm periods are nothing compared to our current warming trend.

In Antarctica, ice core samplings can provide information for as much as 650,000 years in the past. When this graph comes on the screen, it seems to be very cyclical. In this time period there have been six ice ages with periods of significant warming in between, and the carbon concentration in the atmosphere matches exactly with the temperature graph. There is a clear relationship between an increase in carbon in the atmosphere and an increase in temperature. Important to note, however, is that in the past 650,000 years the concentration of carbon dioxide in the atmosphere has never gone above 300 parts per million. When the carbon dioxide concentration today is added onto the graph, it rises significantly above the rest of the graph. The concentration is visually higher than it has ever been in 650,000 years. Gore explains the projections of how much carbon will be released into the atmosphere in the next 50 years if the world does not change its patterns. To show where the carbon dioxide concentration would be on the graph he has to get on a cherry picker and rise himself above the audience. The data point is literally off the chart. In the last 100 years the

graph is a vertical line. This graph is a very powerful image of how different the global atmospheric concentration is today versus the past 650,000 years. Once again Gore returns to one of his main theme. This is not a political issue; it is a moral one. It would be unethical for us to allow this increase in carbon dioxide concentrations to continue.

The film takes a slight turn from the graphical representations. Footage of Gore as a younger man in Congress is shown as the dramatic music and a voice over describes Gore's struggle to change Congress' reaction. He then tells another personal story. On April 3, 1989 Gore son was hit by a car and almost died. Dramatic shots of hospitals are shown as Gore describes how this event changed his outlook on life. He ties the story into his quest to stop global warming as the image goes back to the original river scene from the very beginning of the film and he discusses how he gained the ability to understand that what we take for granted might not be here for our children.

Gore's Climate Change Thesis

After this brief dramatic interlude, Gore transitions into the next major section of the film. After a thorough explanation of the science behind climate change he begins discussing his climate change thesis. This next section explains why we should be concerned about global warming. First Gore describes how the ten hottest years on record have taken place in the last fourteen years. He discusses the summer heat waves across the globe and the estimated death tolls. He transitions the discussion

about heat into the rising temperature of the oceans. Powerful images show that the current range of actual ocean temperatures is completely out of the natural range of ocean variability. Warmer waters translate to stronger storms. The recent hurricane season with the first ever hurricane in the South Atlantic and a record number of typhoons in Japan is compared to the all time record for tornados in the United States. The summer of 2005 was a famous hurricane season. The damage done to the oil industry after Hurricane Dennis provided powerful visuals, but none could compare to the footage of Hurricane Katrina.

Before beginning the discussion of damage caused by Hurricane Katrina, Gore stresses an association that many viewers might not have made: Hurricane Katrina was only a Category One storm when it hit Florida, but as it crossed the extremely warm waters of the Gulf of Mexico the wind velocity increased, the moisture content of the storm increased and it turned into the monstrosity that landed in New Orleans. Gore makes the association between warmer water temperatures and stronger storms clear before moving onto a dramatic segment with powerfully moving visuals from the aftermath of Hurricane Katrina. Gore ends this segment by quoting Winston Churchill: “The era of procrastination, of half-measures, of soothing and baffling expedients, of delays, is coming to its close. In its place we are entering a period of consequences” (Gore, 2006). Because of the potential consequences of climate change, we no longer have the luxury of making mistakes.

The next segment of the film begins by returning to scenes from Gore’s political career. This portion revolves around the 2000 presidential election. Television new coverage clips are shown giving the state of Florida to Gore, then to

Bush, then announcing it was too close to call. Shots of the recount process are shown, as is the final decision by the Supreme Court. Clips of Gore's speech after the court decision are heard as Bush is sworn into office at the presidential inauguration. The film shows footage of Gore at Bush's inauguration while the background narrative describes how tough of a loss the election was. Fortunately, the loss allowed Gore to once again focus on his mission and start giving his slideshow on climate change.

The scene returns to the familiar lecture hall and Gore continues to discuss how climate change is leading to more precipitation in big storm events. Charts are shown of the number of major floods in Europe, India and China. Such strange weather patterns are taking place in these areas that Gore refers to it as taking a "nature hike through the book of Revelations" (Gore, 2006). He then juxtaposes the image of intense flooding in China with one of drought. Climate change not only causes more flooding, but also more droughts. On a global map, it is clearly seen that many areas of the world are seeing a severe increase in precipitation while other are seeing a severe decrease. An example of the negative effects from a decrease in precipitation is Lake Chad in Darfur and Niger. The severe drought has exacerbated an already war-torn area of the world. The rising temperatures are literally sucking moisture out of the soil. This has the potential to be devastating to the agricultural regions of the United States.

The film transitions into another Gore narrative. This time he takes us back to his family's farm in Carthage, Tennessee. On the drive to the farm he goes by a spot on the road that he points out as the location where he totaled the family car at age

fourteen. He points out the Black Angus Bull sign at the end of their driveway and launches into a story about how his family's history with the Black Angus breed. His father was breeder of the month once and continued to raise cattle throughout his time in the Senate. Gore spent four months of every year of his childhood on the farm where he had a dog and a pony. At his farm he could shoot his rifle, swim in the river and lay in the grass. He briefly mentions that even the weather patterns on his farm are starting to change before launching into another narrative.

The next main point Gore makes in the documentary is about two canaries in the coal mine: the Arctic ice cap and Antarctica. Gore starts by describing the Arctic as a warning factor for global climate change. In the Arctic Ocean the largest ice shelf just cracked in half. The permafrost is thawing and images of so-called drunken trees are shown. They no longer grow straight because the root system was embedded in the frozen ground and now they are not stable. Images of collapsed buildings and houses that were built on the permafrost are shown, as well as the all-important Alaskan pipeline. Structural damage is occurring because of the thawing permafrost, and trucks cannot drive on the tundra for as long as they used to because of the shorter winter season. A shot of a nuclear submarine surfacing at the North Pole is the background for the description of how the polar ice cap has diminished by 40% in the past 40 years. It is estimated that in the next 50 years the ice will be completely gone in the summer.

The mechanism that speeds up the melting of the ice is another feedback cycle. 90% of the incoming sunlight bounces off the ice, but as the surrounding water warms and the ice begins to melt, the incoming radiation is absorbed by the ocean,

increasing the build up of heat and causing the ice to melt even quicker. A computer simulation of a polar bear swimming through the open ocean desperately searching for ice makes this scientific description feel more real. Gore continues to explain that if the average global temperature increases by five degrees, it will mean only a one degree increase at the equator, but more than twelve degrees at the poles. This adds to the rapidly melting ice cap as well as changes wind and ocean current patterns that are designed to redistribute heat. The Gulf Stream is one such ocean current that could be affected. The Gulf Stream brings heat from the equator to Europe. Fargo, North Dakota has latitude of 47 degrees north and London lies at 51 degrees north. London has a more pleasant climate because of the Gulf Stream. In the North Atlantic when the Gulf Stream cools off, the water becomes denser and sinks. This is only a part of the globally connected ocean conveyor belt that is responsible for heating and cooling our planet.

At the end of the last ice age a freshwater pool formed where the Great Lakes are located today. At one point, the ice dam holding back the pool burst sending a large amount of freshwater into the ocean, diluting the salty water and stopping it from sinking. The ocean conveyor shut down, the heat transfer stopped and Europe went into an ice age for 900 to 1000 years. This change took place in as little as 10 years. Gore uses this example to prove that this could happen again. His first canary in the coal mine, the Arctic ice cap, is melting. If the Greenland ice sheet were to melt it would put enough freshwater into the North Atlantic that Europe could sink into an ice age.

The documentary goes back once again to political clips of past presidents discussing the environment. This portion pits the environmentalists against the non-environmentalists. The famous line from Senator James Inhofe, a Republican from Oklahoma is given: that global warming could be the “greatest hoax ever perpetrated on the American people” (Gore, 2006). Gore makes it clear that unless an issue is important to the constituents, the politicians will not care. He continues to list reasons why global warming should be an issue that the general public cares about. Many people are concerned about the invasion of exotic species such as the pine beetle. Studies have been conducted that show these exotic species are increasing rapidly in number because the number of days with frost is decreasing. The same is true of problem insects such as the mosquito. Cities that were once safe from mosquitoes are now in danger of infestation because of warming temperatures. This also affects other disease carrying vectors and explains for the new diseases of the past century as well as the resurgence of old diseases such as the Avian Flu and West Nile Virus. When people see a more direct connection to human problems there is an increasing amount of concern.

Gore returns to his original train of thought and discusses the second canary in the coalmine: Antarctica. Already the Antarctic Peninsula has seen the break up of many ice shelves. He shows images of the Larsen B ice shelf, which started to accumulate pools of water on top as the ice slowly began to melt. These pools of water caused a surprising problem. Starting on January 31st 2002 the 700-foot tall ice shelf began to break up and within 35 days the entire shelf, both the floating ice and the land-based ice, was gone. This released the ice that was on the down slope of the

mountains, which also began to fall into the ocean. If land based ice melts, it will raise the sea level. The pools caused the rapidity of the melting because the water flowed straight down through the ice creating patterns similar to Swiss cheese. As the water reached the bottom, instead of refreezing, it formed a lubricant, assisting the break up of the ice. If the West Antarctic ice sheet completely melts the sea level worldwide could raise by 20 feet. This area is considered much more stable than Greenland, however, where these same pools have already been developing. If Greenland melts completely the sea could also rise by 20 feet. Tony Blair's scientific advisor has said that if Greenland goes the maps of the world will have to be redrawn. It will be even worse if Antarctica goes as well.

The next series of images show the powerful effect of a rise in sea level. Current maps of specific cities, states or regions are shown contrasted with maps of the same areas after the projected rise in sea level. The maps chosen are particularly vulnerable to sea level changes and have high concentrations of people. From Florida, to San Francisco Bay people in the United States would be displaced. The Netherlands is already dependent on dikes and would be completely underwater. Beijing and Shanghai are each home to millions of people and would be greatly affected by sea level changes. In the areas of Calcutta and Bangladesh 60 million people would be displaced. The dramatic music accompanying these images reaches a crescendo as the image changes to Manhattan. While the effects of the sea level rise would not displace as many people in New York City as in India, the site of the World Trade Center Memorial would be underwater. We pledged to never forget 9/11, but by ignoring climate change we could lose the memorial site. Gore again

makes a political attack against the Bush administration by saying we as a country should be preparing for threats other than simply terrorists.

Next Gore gives a list of the three things that are exacerbating the climate change situation. The first is the population. It is predicted that in one generation the global population will go from 2 billion to over 9.1 billion. There have never been this many people on our planet and most are in developing nations. This puts pressure on food demand and makes natural resources very vulnerable. The second is the scientific and technological revolution has happened so quickly that we are not yet able to responsibly consider all the consequences. An example of this is nuclear warfare. Technology advanced so rapidly that we as humans must be extremely cautious in how we approach war today. Old habits with new technology lead to dramatically altered consequences. The third reason is our general way of thinking. A great example Gore gives is a frog jumping into a boiling pot of water. If the pot is already boiling the frog will immediately jump out, but if the water is slowly brought to a boil while the frog is inside, the frog will not move until someone rescues it. We need a sudden jolt so that we do not sit there like the frog, unresponsive to the gradual, yet significant change.

Gore returns to his narrative by telling another story about his family's farm. As long as he could remember they grew tobacco. In 1964 the Surgeon General reported that there was strong evidence linking smoking tobacco to lung cancer, but his family kept growing tobacco. Emotional music begins as Gore goes on to discuss his sister Nancy who started smoking when she was a teenager. She eventually died of lung cancer and from that moment on his family stopped growing tobacco. They

were aware of the dangers of smoking tobacco, but it is human nature to take time to connect the dots. Gore says there will be a day of reckoning when we will wish we could have connected the dots more rapidly

Defense of His Argument

After a very lengthy description of the possible outcomes of climate change Gore moves into the next major section: the defense of his argument. In this portion he refutes possible attacks that the opposition could make to his arguments and he also clears up common misconceptions that the public might have about global warming. Gore starts this section by giving the three main misconceptions of global warming so that he can refute them. The first is that there is a disagreement between scientists over whether climate change is happening. A survey of peer-reviewed articles was undertaken and in a representative study of 928 studies, not one disagreed with global warming. A small group of people decided it was in their best interest to reposition global warming as theory rather than fact, and they have succeeded. In the popular media, 53% of the reports say they are unsure of whether global warming is a real threat. At this point a dramatically staged phone conversation takes place between Gore and an unknown person. Only Gore's end of the conversation can be heard, but it seems clear that he is discussing how a Bush aid edited climate change reports and was defending Exxon. Old footage is shown of Gore questioning scientists during congressional hearings. The problem is scientists are being attacked because their findings are not always what certain groups want to hear. Gore says,

“I’ve seen scientists who were persecuted, ridiculed, deprived of jobs, income, simply because the facts they discovered led them to an inconvenient truth that they insisted on telling” (Gore, 2006). A prime example of this took place when Philip Cooney, Bush’s head of environmental policy who had worked for the American Petroleum Institute and had no scientific training, overruled the scientists at the EPA and changed a report warning about global warming. When this was discovered Cooney had to resign before he went to work at Exxon Mobil.

The second misconception Gore clears up is if we have to choose between the economy and the environment. According to Gore the Bush administration perpetrated this myth and he shows their image of a scale balancing gold bars and the entire planet. He makes fun of this image for a while saying if we do not have a planet, what good will the gold bars be? Doing the right thing will create wealth and jobs. Society does not have to choose between a good economy and good environmental policy. An example of a bad way to balance the economy is the American auto industry. The American auto industry is lagging behind other countries, yet we have the most lax auto mileage standards. Even China has better mileage standards than ours; we could not actually sell our cars in China. California is trying to increase the mileage standard, but they are being sued by automakers. It is a fact that the companies with the more efficient cars are the ones that are in better financial standings today.

The final misconception Gore addresses is that global warming is not too big of a problem to fix. Many people go directly from denial to despair, but we already have the tools to solve this problem. By using more efficient electric appliances, other

end-use efficient products, higher mileage cars, making other forms of transport more efficient, investing in renewables and using carbon capture and sequestration our country could be below our 1970 emissions level. To reach this point we will need general political will, but as Gore says: “in America, political will is a renewable resource” (Gore, 2006).

A Call for Action

After defending his position, Gore moves into perhaps the most important part of the film: his call for action. As a politician, Gore is used to giving motivating speeches and this section is no different. After explaining the science of global warming, the dangers of global warming and why his argument is the correct one, Gore tells the audience what they can do. This portion of the film does begin to sound a bit like he is campaigning. He loudly and enthusiastically announces that “we have the ability to do this!” before launching into examples of what we can do to reduce our carbon emissions (Gore, 2006). The list of the countries that have ratified Kyoto is put up on the screen, with Australia and the United States highlighted as the only major countries to not do so. Instead individual states in the U.S. have announced their support of Kyoto, as have a long list of cities. Gore next asks: “are we as Americans capable of doing great things even though they are difficult? Are we capable of rising above ourselves and history? The record indicates we do have that capacity” (Gore, 2006). He then lists famous patriotic moments in American history starting with the Revolutionary War. Images of the emancipation proclamation,

women's suffrage, the defeat of Hitler, the desegregation of schools, the cure for polio, men landing on the moon and the fall of communism race by as Gore describes that we have made revolutionary changes in the past. We have even taken the lead on an international environmental issue, the hole in the ozone layer, and by initiating the removal of CFCs from the market we have solved the problem. However, climate change is a very different issue: "we have to have a different perspective on this one, it's different from any problem we have ever faced before" (Gore, 2006).

Gore takes this opportunity to return to the image of planet earth. This is our only planet. The image of earth slowly grows smaller as he describes a space voyage that took a shuttle four billion miles from earth at which point it turned its cameras around and instead of taking pictures of distant galaxies it took a picture of earth. From that far away the earth was simply a tiny blue dot: "Everything that has ever happened in all of human history has happened on that pixel, all the triumphs and all the tragedies, all the wars all the famines, all the major advances, it's our only home, and that is what is at stake, our ability to live on planet earth, to have a future as a civilization" (Gore, 2006). The original shot of earth comes back on the screen as Gore once again repeats this is a moral issue and we humans have the responsibility to secure our future.

The documentary ends with the same image with which it began. The familiar, peaceful, soothing river scene is shown again, but this time Gore poses questions that future generations will someday ask: What were our parents thing? Why didn't they wake up when they had the change? It will be too late for future generations who feel the consequences of climate change to do anything to stop it. We have the

opportunity to reverse change if we so choose. The final song by Melissa Ethridge begins as the closing credits start. The credits begin by asking are you ready to change the way you live? Throughout the credits tips for reducing carbon emissions are listed with inspirational statements that are supposed to inspire change such as the following: “Tell your parents not to ruin the world that you will live in; if you are a parent, join with your children to save the world they will live in” (Gore, 2006). The tips become more political as the credits roll on and the movie closes with the request to encourage people to see the movie, to learn as much as possible about climate change and to put their knowledge into action.

Public Reaction to the Film

When Gore’s film was released it was the center of attention. Millions flocked to see the documentary and the generally positive feedback from film critics helped Gore’s efforts. Larry King called it “one of the most important films ever” and Roger Ebert wrote “in 39 years, I have never written these words in a movie review, but here they are: you owe it to yourself to see this film” (About the DVD). Word of mouth helped popularize the film, and it eventually became one of the highest grossing documentary films in the United States. The film won countless awards for Best Documentary in smaller film critics’ awards festivals, culminating with a 2007 Academy Award for Documentary Feature and Best Original Song. Also in 2007, for his widespread efforts to draw attention to the issue of global warming including the

film *An Inconvenient Truth*, Al Gore, along with the Intergovernmental Panel on Climate Change (IPCC) won the Nobel Peace Prize.

Not all reaction to the film was positive, however. Some film critics questioned the science behind the film and many conservatives rallied behind this point to stress that Gore greatly exaggerated the risks of global warming. Other critics questioned the intent behind the message. They questioned whether he was preparing for another presidential run due to the sometimes highly politicized nature of the film clips. Internationally, the film was well received by the governments who have publicly supported the Kyoto Protocol, but the response from the United States and Australian governments was negative at best. Both George Bush and John Howard said they would not see the film or allow it to affect their environmental policymaking. In the United States the National Science Teachers Association (NSTA) was offered 50,000 free DVDs to use in their classrooms, but they declined. They later stated that they saw no benefit in accepting the films and were concerned over politically endorsing the film. They also felt it would place unnecessary risk on their capital campaign, specifically referring to a few targeted supporters. One of these supporters they refer to is Exxon Mobil Corporation, a company that has funded many climate skeptic studies.

While there was certainly a vocal group trying to discredit Gore's film, at least everyone was talking about it. The film succeeded in raising awareness of global warming. After this film, *An Inconvenient Truth* and global warming became household terms. Gore clearly succeeded in bringing the argument into the public sphere. What once was an issue debated only by scientists and politicians was now

openly discussed at all levels of society. Gore's goal was not just to start the conversation on global warming; he wanted actual change, and since the film was released, there has been little.

In 2007, the Labor Party, led by Kevin Rudd, won the Australian federal election. After taking office, Kevin Rudd took the popular move of signing the Kyoto Protocol, leaving the United States as the only major nation not to take part. To date, the Kyoto Protocol has not been the great success that was hoped for, but it is a work in progress. On a global scale, greenhouse gas emissions continue to rise, despite attempts to reduce emissions, but people are working together across the planet to change that. The European Union has entered into a carbon cap and trade system, but many have deemed it unsuccessful. Certain nations have taken steps toward reducing emissions. Denmark is leading the world in producing energy through windmills and Costa Rica gets over 95% of its energy from renewables including hydro-electric, wind and geothermal. Developing nations such as China, India and Brazil have growing middle classes that are significantly increasing their energy needs and the United States, the world's worst polluter, has yet to join international accords to reduce greenhouse gas emissions. Citizens of the world are increasingly concerned about climate change, and slowly things are being done to curb the deleterious effects of climate change.

In the United States, many cities and states have been taking the lead in reducing greenhouse gas emissions. A group of 17 states, led by California, petitioned the federal government for a Clean Air Act waiver to set stricter air quality standards than the federal government. California had been previously granted over 50 such

waivers, and this was the first to be denied. The waiver would have forced automakers to reduce emissions on new cars and light trucks beginning with 2009 models. It took the federal government two years to review the application and in late 2007 the Environmental Protection Agency stated the proposed rules were preempted by federal authority and irrelevant due to Bush's new energy bill. The California waiver would have acknowledged carbon dioxide as a pollutant, and forced automakers to meet approximately 43 miles per gallon standards by 2016. The new energy bill calls for an increase to 35 miles per gallon by 2020 and does not address carbon dioxide emissions. Automakers supported the federal government's move because allowing the waivers would have created a patchwork of nationwide fuel standards. The states announced they planned to sue to have the Environmental Protection Agency's ruling to be overturned.

A similar issue made it to the Supreme Court in the case *Massachusetts v. EPA* and for the first time the justices were forced to make a ruling on the global warming issue. In a 5-4 decision the Supreme Court ruled that the Environmental Protection Agency has the authority, under the Clean Air Act, to regulate the emissions of carbon dioxide and other greenhouse gases from cars. The central argument for the dissent was over the issue of whether greenhouse gases pose an imminent harm. The three main questions the court addressed were if the states have standing to sue the EPA in challenging their decision, if the Clean Air Act gives the EPA the authority to regulate tailpipe emissions of greenhouse gases and finally if the EPA has the discretion not to regulate those emissions. The court ruled that the states did have standing and that the EPA has the authority to regulate tailpipe emissions of

greenhouse gases, but that the EPA needs to reexamine their reasoning behind no regulation. They have a list of reasons why they are avoiding regulation, but they need to be more closely linked to the Clean Air Act.

This court case has set the stage for future regulation of greenhouse gases, but in the meantime the northeastern states have gone further and begun the Regional Greenhouse Gas Initiative (RGGI). Following in the European Union's footsteps ten states have joined forces to create the first carbon cap and trade system in the United States. The ultimate goal is to reduce emissions from northeastern power plants by 10% by 2019. The first auction was held in September 2008 and RGGI officially went into effect on January 1st, 2009. The cap comes in two phases: between 2009 and 2014 the goal is to stabilize greenhouse gas emissions and from 2015 to 2018 there will be a 2.5% reduction per year. While this program only addresses power plants and does not have major reductions in emissions, it is significant as it is the first such trade system to take place in the United States. If this system proves successful it may become the model for future carbon trading schemes. Already a similar initiative is in the works for the Western states. The Western Climate Initiative is being discussed between governors of Arizona, California, New Mexico, Oregon, Washington and the premier of British Columbia (Engel and Miller, 2009).

On an international scale, in December 2007 the United States entered into the Bali international climate talks. Emotions ran high and tension mounted as the United States continued to refuse consensus because they wanted developing countries to have a more active role in reducing greenhouse emissions. When the United States delegate, Undersecretary of State, Paula Dobriansky announced the US could not

accept the current formulation she was met with a loud chorus of boos from the angry delegates. The Papua New Guinea delegate, Kevin Conrad, responded to the United States: “we seek your leadership... but if for some reason you are not willing to lead, leave it to the rest of us. Please, get out of the way” (Fuller and Revkin, 2007). Other countries followed suit, attacking the United States’ viewpoint and none of the traditional American allies stepped in to argue their defense. Upon realization of the risk of complete isolation and alienation from the rest of the world, Dobriansky announced that “we believe we have a shared vision and we want to move that forward, we want a success here in Bali. We will go forward and join the consensus” (Fuller and Revkin, 2007). The next set of negotiations is set to take place in Copenhagen in 2009 and the protocol that results from this meeting will replace the Kyoto Protocol.

On April 17, 2009 Lisa Jackson, the administrator of the Environmental Protection Agency, after being ordered to review whether greenhouse gases are harmful in the *Massachusetts v. EPA* court case announced that greenhouse gases “endanger public health and welfare” (EPA, 2009). Six specific greenhouse gases, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride have been identified as gases that endanger public health and welfare within the context of the Clean Air Act. The report also declared that impacts of climate change include increased drought, increased flooding, more frequent and intense heat waves and wildfires, a rise in sea level, more intense storms and harm to natural resources, wildlife, and agriculture. Lisa Jackson was also careful to note the disproportionate impact climate change has on certain population segments such as

the poor, the young, the elderly and the infirm. This announcement was a major step for the United States' efforts to curb climate change. The United States has yet to take major action to reduce greenhouse gases, but it is clear to maintain any international allies it will have to do such. The Environmental Protection Agency has taken the first step toward nationally regulating greenhouse gases by officially announcing that these gases can be regulated as pollutants under the Clean Air Act because they are deleterious to public health and welfare.

Gore's Transitioning of the Argument

While Gore does a complete job of transitioning the argument from the scientific sphere into the public sphere, his transition is not quite as successful as Carson's because there have been no changes in policy. However, it is too soon to determine whether change will take place in the form of legislation; there was a ten-year period of public debate after the publication of *Silent Spring* and the banning of DDT by Congress. Unfortunately, Gore's use of politics in his film has led to the isolation of conservatives and the polarization of the issue of climate change. While the film tries to be non-biased in its explanation of the argument, underlying tones and Gore himself make the film appear to be a product of liberal propaganda. The continuous references to his history in Washington, his presidential campaigns, and his attacks on the Republican Party and the Bush Administration further politicized the issue and took away from his overall goal. The issue needs to separate itself from politics to be fully resolved because unless Americans can work together to

encourage the regulation of greenhouse gases, the issue will stall in Washington.

Despite the underlying political tones, Gore has been extremely successful in bringing the climate change issue into public light and has made it the center of many political debates. The issue is no longer hidden in the scientific sphere. Gore successfully transitioned the argument into the public sphere by using the following techniques: visual argument, narrative, ethos, examples and emotional appeals

Visual Argument

Gore's first successfully utilized technique was visuals. Throughout the film there are powerful images shown such as billowing smoke stacks, the aftermath of Hurricane Katrina and instances of severe flooding and severe drought. It is one thing to simply discuss the effects of climate change and another to see it firsthand. By showing visuals of how much the sea level could rise in the next 100 years people understand what is at stake. Simply saying the sea level could rise a few feet is not enough for people to fully realize the consequences, but the maps show what valuable land would be lost to the sea. The same is true with the glaciers. It is one thing to hear that glaciers across the planet are rapidly receding, but showing images of the same glacier today and fifty years ago is a powerful reminder that we are already having an effect on the environment. The footage of Hurricane Katrina is among the most powerful in the film. Gore uses clips of satellite images, local news coverage of the actual storm and its immediate aftermath, as well as the citizens of New Orleans that were affected. When he discusses the issue of impending drought, the images of

drought stricken China as well as the disappearance of Lake Chad in the Darfur and Niger region help the audience understand just how severe the consequences could be. This is not a yearlong decrease in rainfall. The only thing that could cause large lakes to completely dry up, creating social and political issues, would be intense climate change events. The visual images of the breakup of the Larsen B ice shelf in Antarctica added a new dimension to the discussion of melting ice caps. Discussing the melting of glaciers and ice sheets seems to be a long term process, but when the audience sees how much ice was lost in a period of 35 days it makes the issue of global warming seem to be much more of an imminent threat instead of a problem our children's generation will have to address.

Another type of visual that Gore frequently employs is graphics. While describing the mechanism behind the greenhouse effect Gore uses very precise diagrams and computer simulations. These visualizations help the audience understand the process and are much more effective than a verbal explanation. He uses an excellent graph of carbon dioxide readings taken at Mauna Loa to show the increase in atmospheric carbon dioxide in the past fifty years and uses a similar graph of atmospheric carbon dioxide readings taken from ice core samples first over a thousand year time period, and then over a 650,000 year time period. These graphs are powerful images that help Gore disprove the skeptics' view that the current increase in atmospheric carbon dioxide may simply be part of a natural cycle. It is visually clear that never in 650,000 years has the amount of atmospheric carbon dioxide risen above 300 parts per million, and when Gore adds the current carbon dioxide concentration along with the projected concentration for the next fifty years

he has to get onto a cherry picker to demonstrate how far off the graph the readings will be. This is an extremely effective use of graphics that clearly shows the audience how much of an effect humans have had on the levels of carbon dioxide in our atmosphere. Another effective graphic was the graph that showed the current range of ocean temperatures and the natural range of ocean variability. This graph shows that ocean temperatures are much higher than they should be and Gore segues nicely from this image to his explanation of how warmer ocean temperatures can lead to stronger and more violent hurricanes. The graphic that describes the feedback cycle that speeds up the melting of the ice at the poles is another example of a well-utilized graphic. The computer simulation makes the audience understand why the temperature change affects the poles more rapidly than other parts of the world.

Narrative

Narratives are another important aspect of Gore's film and he uses three different levels of narrative: he tells his personal story, his own story on the effects of climate change, and the story of global warming. These narratives are especially important as they allow the audience to relate and make the message seem more personal. Included in his personal stories are the set of stories about a teacher he had in elementary school and one he had in college. These stories introduce the relation between an increase in atmospheric carbon dioxide and an increase in temperature. If Gore had started with the graph, while it is still a visually powerful image, there would not have been the same amount of interest among the audience. Stories make

the scientific data seem more real. His story about spending his childhood summers on their farm in Carthage, Tennessee make Gore seem more accessible to the average American. He wants to stress that he is not another elitist politician trying to tell the audience how they should live their lives. He grew up as a farm boy. This story helps stress the point that environmentalism is not just an elitist movement, but is something that every American, regardless of their background, should be concerned about. The story about his family farm historically growing tobacco and his sister who died of lung cancer provides a great narrative for why someday we might regret not connecting the dots between carbon emissions and climate change in a more timely fashion.

His narrative of his personal experience with climate change is interwoven throughout the film. Gore had specific images that he returned to that tied everything in his story together. The first was the opening scene of the river. This image is a soothing, calming picture of natural beauty and a reminder of why we should be concerned about climate change. By constantly returning to this scene the audience had something familiar to focus the story around. Another constant in the film was the main lecture hall. Gore continuously returned to a single lecture audience. By doing so he took the focus off the audience and the surroundings and on to the actual narrative covered. If there were a different location for each lecture clip the viewer would be trying to keep up with the change of scenery instead of listening to Gore's information. The final image he continues to return to is the image of the earth as seen from outer space. This image sums up Gore's personal narrative with climate

change: we have one small planet and the image helps put into perspective the severity of climate change.

In the final type of narrative Gore explains the science behind climate change. The scientific portion of the film is not easy to understand. The mechanisms behind climate change are complex and extensive computer modeling still cannot perfectly predict what will come from an increase in atmospheric carbon dioxide. Gore uses excellent explanations and metaphors to tell a story that helps the audience understand these scientific mechanisms. For example, when discussing the fragility of the atmosphere instead of giving an absolute number of how thick the atmosphere is in miles, he tells the audience that it is the same as painting a layer of varnish onto a globe. The visualization that comes from the narrative helps the audience understand exactly how fragile of an atmosphere we have.

Ethos

Gore also uses his stories to help demonstrate his ethos. His more personal stories regarding his past not only allow the audience to relate to Gore, but they also help the audience understand why he is making this film and why he is a credible source. His attempt at establishing ethos includes listing his previous political experience as well as his lifelong interest in the environment and his pursuit of environmental policy changes. One story he tells in this line of reasoning is about his son almost being killed by a car. The story makes Gore seem more real to the audience, and he also uses it to explain that from this incident he gained the ability to

understand not to take things for granted. He applied this to his fight to end climate change and save our planet for our children's generation. Gore lists his political endeavors as an attempt to add credibility to his argument. He wants to explain to the audience that he has been interested in this issue for more than a few years. He has led congressional hearings and attempted to bring the issue into the White House during his presidential run. These political parts do allow the audience to understand why he can be considered an authority on the subject, but they also detract from his bipartisan goals.

Gore also uses many political clips from his past. While some may help establish his ethos, others seem superfluous. There is an entire segment dedicated to the 2000 presidential election in which the outcome of Florida decided the fate of the election. In the beginning of the film he introduces himself as the man that used to be the next president and shows campaign footage from previous years to help tell his background. When showing the graph from the Mauna Loa carbon dioxide readings Gore discusses the various things he was doing during this time period in Congress to try and introduce the topic of climate change into the popular debate including holding congressional hearings and attending the meetings at Kyoto. His discussion of how hard he tried to change the opinions in Congress came off as an appeal to electing a more liberal Congress. While many of these clips may seem unnecessary, they help to establish Gore's credibility as a speaker. Constantly referencing his political past helps the audience understand why Gore can be seen as an authority on the subject of political action related to climate change.

Examples

The fourth valuable technique Gore utilizes is examples. When describing the first canary in the coal mine: the Arctic ice cap, he does not simply say it is melting rapidly and give information of how much ice is being lost. He gives examples as to why this would concern the audience. He shows the image of the drunken trees to explain the melting permafrost and to relate this to humans he shows how the same melting permafrost is collapsing houses, and buildings as well as the Alaskan pipeline. These examples make the melting Arctic ice cap seem like a much more real problem. Another powerful example involves the melting of the Greenland ice sheet. Gore describes how the Gulf Stream stopped after the last ice age when a large body of freshwater flowed into the North Atlantic. He gives the example that Greenland has enough freshwater to cause a similar stoppage of the Gulf Stream and put Europe into an ice age. This gives the problem of the melting ice sheet a more real consequence to which humans, and especially Europeans, can relate. Gore gives another example when he tries to describe humanity's general way of thinking. He compares our thought process to that of a frog jumping into a boiling pot of water. If the pot is already boiling the frog will immediately jump out, but if the water is slowly brought to a boil while the frog is inside it will not move until someone rescues it. This is a wonderful example of how the human mind works: we need a sudden jolt to take action and are not responsive to gradual yet significant change.

Showing the effects that climate change will have directly on humans is another successful method Gore used to transform the argument. He does not simply

discuss the rising sea level; he shows what cities will be affected and how many people will be displaced. He does not only describe why the ocean temperatures are rising, but he also explains how this will lead to more damaging hurricanes. He shows that an increase in global temperatures will increase the range of disease carrying insects. Some exotic species that have already invaded the United States will prosper with less days of frost, and insects such as mosquitoes will expand their range. Many cities around the world were built just above the mosquito line, but with warming temperatures millions across the planet will be subject to diseases such as malaria, the West Nile Virus and the Avian Flu.

Emotional Appeals

Finally, Gore appeals to the emotions of the audience. Gore uses an appeal to patriotism when he discusses the danger Manhattan could face with rising sea levels. In all other examples he shows images of how much land will be lost and gives numbers of how many people will be displaced, but in the image of Manhattan he singles out the location of the World Trade Center Memorial. Manhattan is not in nearly as much danger as low land regions of Florida, the Netherlands and China, but many viewers might not have an intense level of attachment to these global regions. Even Americans who do not live in Manhattan however understand the importance of protecting this important American site. Gore states that we pledged to never forget September 11th, but that if we ignore climate change we risk losing the memorial site.

Gore uses this appeal to patriotism to attack the Bush administration and say that as a country we should be preparing for threats other than just terrorism. There are several other such attacks throughout the film. When he tells the story about his elementary school teacher he jokes that this ignorant teacher went on to become the scientific advisor of the Bush administration. When discussing his past history in Congress regarding climate change issues he states that he lost the 2000 presidential election to a candidate who failed to honor his promise to regulate carbon dioxide. The issue of a Bush White House aide editing climate change reports is significant to the understanding of why the government has failed to take action, yet the framing of this in the film was more of an attack than was necessary. Gore staged an unnecessarily dramatic phone call in which the audience could only hear his side of the conversation, but was led to believe that the Bush administration was editing important climate change documents to their advantage and in defense of Exxon. Later Gore discussed what actually happened: Philip Cooney, Bush's head of environmental policy who had worked for the American Petroleum Institute and had no scientific training had to resign when he was found changing an EPA report about global warming. The entire dramatic telephone scene could have been cut out of the film and it would have provided a more unbiased reading of the event.

The entire end of the film is remarkably similar to a campaign speech. Gore enthusiastically announces, "We have the ability to do this!" and continues to make reference to American patriotism by listing famous moments in American history that we have succeeded against the odds (Gore, 2006). Revolutionary changes of the past include the Revolutionary War, the emancipation proclamation, women's suffrage,

the defeat of Hitler, men landing on the moon and the fall of communism. While this does give inspiration to Americans who question whether we can tackle the climate change issue, it also comes across as extremely campaign-like. Gore is known as a politician who has taken many runs at the presidency, and with a presidential election only two years off he should have been more cautious in his use of overt political references. The ending of the film seems more like Gore preaching at the audience then giving unbiased information regarding climate change.

Throughout the entire film Gore's use of visuals also helps with his emotional appeal. The images of smokestacks, droughts and floods all appeal to the emotions of the audience. The main message of the film is that we have an ethical responsibility to limit greenhouse gas emissions in an attempt to reverse climate change. We are responsible for providing future generations with a livable environment. This powerful emotional appeal is constantly present throughout the entire film and is very effective.

Gore's Successful Transition

Despite his use of political clips and images Gore does importantly try to establish the argument as one of ethics. He tries to dispel the notion that this argument is about political will or scientific understanding and attempts to prove to the audience that this is simply an issue of doing what is right. If you understand the connection between carbon emissions and climate change then there is a moral imperative to do something about it. While he is trying to establish the argument as an

ethical one, he contradicts himself by saying that political will is necessary. He explains that unless the issue is important to constituents the politicians will not care. Much of the film revolves around his battle in Congress to enact legislation and by including so much of this political aspect he takes away from his attempt to pull the argument out of the sphere of politics and into that of ethics.

Gore uses many extremely successful techniques to transform the argument surrounding climate change into the public sphere. The visuals add to the severity of the effects of climate change, the narratives allow the audience to relate to Gore as well as make explaining the science behind climate change and the climate change argument easier to understand. By building ethos the entire argument seems more credible, using examples helps the audience fully comprehend the dangers of climate change and by appeal to the audiences' emotions Gore solidifies their support. All of these techniques allowed for the argument to escape the scientific sphere and be discussed openly in the public sphere. It was no longer a counterpublic argument of a few liberal politicians or scientists, climate change was recognized as a global issue, and with the simplification of the problem and its effects the entire world was able to join the debate. However, Gore did not fully separate the issue from politics, nor did he have a bipartisan following. His constant attacks on the Bush administration alienated conservatives and his repeated political clips made the issue seem centered in politics rather than ethics. Finally, the overly patriotic campaign-like ending of the film made Gore's intentions unclear. Although Gore wanted to make the issue one of morality, after the film it was still an issue of conservatives versus liberals. The film alienated the Republican Party and by doing so Gore lost support and credibility for

his climate change argument. However, overall, the film succeeded in bringing the argument from the scientific into the public sphere as well as expanding it from a counterpublic argument to an argument necessitating general participation.

CHAPTER FOUR: TRANSITIONING ENVIRONMENTAL ARGUMENTS FROM THE SCIENTIFIC SPHERE TO THE PUBLIC SPHERE

Both Rachel Carson and Al Gore successfully transitioned their respective arguments from the scientific sphere into the public sphere. Before Carson, haphazard applications of dangerous pesticides were the norm. Her novel, *Silent Spring*, allowed a small counterpublic to voice their opinion and change the dominant ideology. Not only did her work lead to the banning of DDT within a decade, but it also changed how man views nature. People no longer believed that man's job was to control every aspect of nature. People began to respect the natural order of the environment. Before Gore, climate change was an issue only discussed among scientists and politicians. The average citizen could not access the argument because of its complex scientific nature, but Gore changed that. His film allowed regular people to understand the complexities and dangers of climate change. He rebutted the critics' arguments and his call for action led to the widespread acknowledgement of climate change. Although his film was too political at times and no legislation has been passed to curb greenhouse gas emissions in the United States, his transitioning of the argument changed the way we view climate change. The political process is not quick enough for us to have seen major legislative changes since *An Inconvenient Truth* was released. The EPA has taken the first step toward regulation by announcing that greenhouse gases can be regulated under the Clean Air Act because they threaten the safety and welfare of the public.

Both Carson and Gore successfully transitioned their arguments using similar techniques. This chapter will review the techniques used by both Carson and Gore. The similarities and differences in the tactics used by the two will be reviewed in order to understand what a successful transition between the scientific and public sphere requires. Finally, the necessary elements will be applied to the water case study mentioned in the opening chapter.

Transitioning Techniques

Carson's Techniques

According to Aristotle there are three main forms of argument: logos, ethos and pathos. Logos is the most common to the scientific world of argument because it is based on logic and rationality. Ethos is an argument surrounding the credibility of the arguer. It involves virtue, good will and practical wisdom. The last form of argument, pathos, is an emotional argument. Originally, the argument against DDT was set in the scientific sphere and was solely based on logos. In order to successfully transition the argument Carson had to change that. She manipulated the logos into an argument more suitable and for the public sphere and she added arguments of both ethos and pathos.

Carson's argument still maintained a basis in logos. She utilized the more formal and expected argument as well as refutation when disproving the counterpoint's argument. The opposition's main argument was for the cost-effectiveness of using pesticides for agricultural and public health reasons. Carson

went within their framework and objected to their argument by showing that in reality, aerial spraying of pesticides is not cost-effective. By finding fault in the opponent's main argument Carson was able to garner more support for her counterpublic's argument. She also used traditional logic when citing countless scientific studies. She wanted to ensure that her argument was logical and that she had proof to support her claim.

An important addition to her logical argument that began to differentiate her argument from the scientific sphere was her addition of narrative and visuals. Narrative was extremely important as it allowed the reader to become immersed in the story. By simply describing the science behind the pesticides and the potential effects Carson would have lost the interest of her readers. The moving story of the first chapter as well as her prose style narratives allowed the reader to take interest in an otherwise dreary subject. Although the book had no images, Carson's superior writing skills allowed her to paint images in the minds of her readers. The opening chapter is a prime example of a scene that the reader can vividly picture. Other images Carson refers to include the widespread fish kills and bird deaths. In many cases the reader has experienced these events first hand and by referencing them the reader has a clear image in their mind. These two techniques were very important to Carson's transition from the purely logical scientific sphere into the public realm.

Another key difference between the original argument against DDT and Carson's book was her addition of the ethical argument. Carson utilized ethos in three ways: through examples, accessible language and establishing her credibility and good will. Throughout the entire novel Carson constantly gave examples of the harms

of pesticides. These examples provided practical wisdom for the audience. Instead of simply citing scientific studies or describing the chemical make-up of the pesticide, Carson used real examples in order to fully explain her argument.

Another important technique Carson used in her ethical argument was her choice of accessible language. By using layman's terms and avoiding scientific jargon Carson was able to write a very scientific book in a manner that interested the average person. She also used very detailed explanations to allow the audience to fully understand the argument. A purely scientific argument would have glossed over many items and would have left Carson's intended audience confused.

Establishing her credibility and good will was also very important to Carson's transition from the scientific to the public sphere. Carson was already a very well known and well-respected nature writer, but her previous work only extended to a more soft science: the sea. In order to prove her credibility in the more chemical matter of pesticides Carson cites studies throughout the entire novel. Because of her previous credibility as a scientist she was able to access valuable studies from other scientists and add to the overall credibility of her novel. By providing full transparency as to why she wrote the book, Carson showed her good will. Carson had no ulterior motives besides alerting the world to the dangers of pesticides and she made that quite clear in her novel, adding to her ethos.

The final aspect that Carson incorporates to fully transition the pesticide argument is pathos. Her use of symbolism was very important to her appeal to emotions. Carson references symbols such as the skull and crossbones because they allow for an emotional response by the reader. She appeals to parents by constantly

referencing the dangers that are even more extreme with children including how easy it is for children to accidentally stumble upon these poisons. She also uses the appeal of animals to help her pathetic argument. Many humans have an emotional connection to animals and by playing up the harm caused to animals such as the American bald eagle, Carson adds to her argument of pathos.

Carson incorporated all three of Aristotle's forms of argument in her novel. What was most important for her transition from the scientific to the public sphere was her addition of ethos and pathos. The scientific argument was solely based on logos and in order for the public to take interest it needed to appeal to their emotions, and the virtue and good will of the argument had to be apparent. Carson not only added these two elements, but she also recognized the need to transform the argument within logos. Simply leaving logos as argument and refutation would not have maintained the reader's interest, but by adding narrative and visual to logos Carson was able to fully transition her argument.

Gore's Techniques

The techniques Gore used to transition the climate change argument from the scientific into the public sphere can also be analyzed using Aristotle's three forms of argument. He too recognized the need to add an ethical and pathetic element to his argument in order to access the general public, and he also transformed the logical argument into something more understandable.

Gore did maintain the traditional logical argument in *An Inconvenient Truth*. He spent time following the basic structure of argument and refutation when he gave counterpoints to all of the main arguments of the opposition. It is important to maintain this basic part of logos because it gives the audience reasons for why his argument is correct and the opposition's is false. Gore also adds to the logos of the film with his use of visuals and narrative.

His use of visuals is apparent throughout the film, as film is a visual form of media. Gore used an assortment of powerfully moving images. Many times he showed the image of earth from space to stress the fragility of our world. He showed footage of the horrendous aftermath of Hurricane Katrina in order to show the damage that could be caused by more intense hurricanes. He also used extremely effective graphics that were essential in understanding the key points of the basic scientific argument behind climate change. These images and graphics were necessary to the message of the film.

Gore's use of narrative allowed him to relate to his audience. His personal stories make him seem more human and his narratives surrounding the science of climate change allowed the audience to understand a very scientifically complex issue. Also, Gore turns his entire climate change thesis into a story. Throughout the entire film his argument for why climate change is happening and why it is bad for the planet is told in story form, making it more accessible to the viewing audience. By adding this basic narrative as well as the visuals to the logical argument Gore begins the transition from the scientific sphere into the public sphere and makes it more accessible to his intended audience.

Adding ethos was especially important for Gore. Gore is a well-known politician, but many viewers might not have seen why he is the appropriate person to be telling a story about climate change. By discussing his past, both political and personal, and especially his long-term dedication to the environment the audience understands that this is not a cause with which he recently became involved. Gore has spent the majority of his life learning about climate change and is therefore a reputable source for making this film. By stressing his credibility on the subject matter, Gore adds credibility to his film. It is also important for the audience to understand why Gore is making the film. He did not make this film because he wanted to gain political salience; Gore stresses that he gave those lectures and made this film because he wanted people to pay attention to the climate change issue.

Another way Gore gains ethos is by using examples and accessible language. Because climate change is such a complex subject, simply stating the potential consequences is not enough. Instead of saying that storms could potentially be stronger with rising temperatures, Gore gives examples of how the past few years have birthed stronger hurricanes than ever before. He does the same by describing the disastrous heat waves, floods and droughts that have been occurring recently throughout the world. By giving an actual example rather than just stating facts, Gore is able to reach out to the audience and ensure that his point is understood. These examples give practical wisdom to the audience. They may not have understood the purely scientific argument, but real life examples are more accessible and were important to his transition away from the scientific sphere.

Gore's appeal to emotions adds pathos to his overall argument. Throughout the entire film Gore shows images such as the aftermath of Hurricane Katrina, disastrous floods in Asia and droughts in Africa. By seeing the realities of the human conditions that are being caused by climate change Gore appeals to the basic human emotions of the audience. For some, these images from distant countries might not hit close enough to home. Gore appeals to patriotism when he discusses the horrors of allowing sea levels to rise enough that the World Trade Center Memorial would be underwater. He also mentions a list of revolutionary moments in American history. By referencing what we have done in the past Gore appeals to our emotions and makes the audience believe that this issue can also be solved. The final segment of the film stresses the importance of doing something about climate change. Gore stresses that our inaction will cause harm to our children's generation. He makes it very clear that this is no longer an issue of science, but an issue of ethics. We must do something about climate change or future generations will be forced to suffer.

Elements of Environmental Arguments

Carson and Gore's arguments have many similarities. Most importantly, they both incorporated ethos and pathos into purely logical arguments. When their arguments were in the scientific sphere, the main argumentative technique was citing basic facts and refuting the opposition. Carson and Gore kept this element, but both added to the logos by incorporating narrative and visuals. Including narrative was important to transitioning the scientific argument into the public sphere. What makes

an argument inaccessible to the general public when it is within the scientific sphere is the language of the argument. By changing the scientific rhetoric into a story, the audience can understand the argument as well as relate to the argument. When the argument is closer to home, the audience is more likely to respond.

The use of visuals by both Carson and Gore was a very important addition to the logical argument, but the two incorporated visuals in very different ways. Carson's novel, published in the 1960s, had no images, but her vivid writing style allowed the reader to have clear images in their mind. Gore had written a book previously regarding the environment, but it received little recognition. Today, Carson's book might not be adequate to gain the attention of a large number of people. Gore used visuals in a different sense: he completely changed the media in which his message was delivered. Films are visual by nature, and Gore correctly predicted that it would take this type of media to move an argument from the counterpublic to the dominant ideology. It was important for Gore to use the type of visual that he did because without the constant images and visuals he would have lost the interest of the viewing audience. The visuals of both added to the logical argument in the public sphere. In the scientific sphere the visuals would not have been necessary to fully comprehend the argument, but in the public sphere they were of utmost importance to the understanding of the message.

Besides transitioning the logical argument, both Carson and Gore added ethos. In order for the audience to have a more comprehensive understanding of the arguments Carson and Gore both provided practical wisdom through examples and the use of accessible language. Both give many detailed examples to explain the

consequences of their respective environmental problems. Gore does not simply say that global warming will heat the world's oceans and cause problems, he describes in detail how the intensity of storms will increase and gives specific examples. Carson does not simply state that pesticides will cause harm to humans, she gives specific examples of the potential side effects and cites specific cases when children have died due to pesticide exposure. These examples are extremely important to both cases because they allow the audience to fully understand the severity of the consequences. Their choice of language is also important to their ethical argument as it helps explaining gain credibility by relating to the audience on a basic level.

The establishment of credibility as a speaker and the good will of their motives were also important to the ethos of the argument. Carson was a well-known scientist and her name already had credibility in the field, but she continuously cited outside studies in order to increase the overall credibility of the argument. She also made it quite clear that her motive in writing the book was simply to make people aware of the dangers of DDT and perhaps led to some political action. Gore was a well-known politician and credible public speaker, but the audience could have questioned his relation to the environmental field without the background information he provided. His extensive background also allowed the audience to understand why he was making this film. He had a long-standing interest in the environment, specifically climate change, and that was why he made the film. To add to his ethos Gore had to stress that his only political motivation was to enact change in climate change legislation, not to further his personal agenda.

Finally, both Gore and Carson added pathos to their arguments. Carson appeals to the emotions of mothers and nature lovers when she describes the dangers to children and wildlife. Gore makes similar appeals to human emotions with the intense visuals he uses throughout the entire film. Both also appeal to the American sense of patriotism. Carson references the plight of the American bald eagle and Gore describes the revolutionary accomplishments Americans have made in the past. Most importantly, both make the argument that these environmental issues are no longer about personal choices, but about our responsibility to preserve the world for future generations. Carson describes the dangers of controlling nature and how it will be even more harmful with the continued use of pesticides. Gore stresses the importance of taking action now to prevent inescapable harm for future generations. These emotional appeals round out the pathetic argument and are essential for transitioning the environmental argument from something purely scientific into something accessible to all.

Water Shortage Case Study

It is evident through the analysis of Carson and Gore's works that certain aspects are required for an environmental argument to transition out of the obscurity of the scientific sphere and into the spotlight of the public sphere. For the water shortage issue to become relevant today it is essential that there is more to the argument than logos. Strong logos is important for the scientific argument, but without other elements it will not be of interest to the general public.

The facts of the water shortage issue are shocking. Humans need between 1.5 and 2.5 liters of clean drinking water a day and with the growing population this will inevitably become a problem. An increasing number of wells are using up all the groundwater aquifers' supplies and climate change is melting the glaciers and ice caps that store freshwater for a large percentage of the world's population. However, while these may be basic logical arguments, there needs to be more. The water shortage issue needs a narrative and there is great potential. Following a poor family in India as they struggle daily to find enough water for their family to survive would provide a poignant and unforgettable narrative for the water shortage. Visuals are also essential to the logical argument. It is one thing to read or hear that parts of the world are experiencing droughts, but seeing images of receding lakes, empty rivers and unclean water would help the audience better realize the issue.

An important thing to add is that while Carson was successful in raising awareness of pesticides with a novel, today a novel would not be sufficient. Gore wrote a novel before making *An Inconvenient Truth*, but most people have never heard of it. The water shortage issue needs a similar visual media in order to gain the attention of people in today's world. On April 21, 2009 PBS Frontline released a documentary titled "Poisoned Waters." This documentary focused on the dangerous chemicals coming from average consumer items such as medicines and household cleaners that are infiltrating our nation's waterways. A similar such documentary, either a television mini-series or a large-scale motion picture needs to be made in order to publicize the water shortage issue.

In order for the argument to be successful in the public sphere elements of both ethos and pathos need to be added. In order to establish ethos, there must be credibility established for the person or group that is making the argument. A movie star might be an attractive option to headline the water shortage campaign, but in order for the argument to be successful there must be a connection between the actor and the environmental issue. The audience must understand the good will behind the argument. There can be no ulterior political or public relations motive behind the message. The argument must be made for the environment's sake only. Using accessible language and examples would help gain ethos for the argument. Both language choice and examples would add to practical wisdom and allow the audience to relate to and understand what is being argued.

Finally, in order for the water shortage issue to gain salience there must be an appeal to emotions. A factual argument will never escape the scientific sphere and never grab public interest. Especially successful emotional appeals include safety of children, the welfare of animals and appeals to patriotism. In order for the water shortage issue to grab mainstream attention the audience must find a part of the argument with which they empathize. Most importantly, the argument must be framed as an ethical responsibility to future generations. Stressing that inaction today will harm our children is especially important. By continuing to abuse water allocation rights today it could be impossible to live in regions such as the American southwest or farm in areas such as California in the future. Appealing to emotions and stressing the responsibility we have as stewards of this planet is necessary to gain the full attention of the general public.

By transitioning the logical argument and adding elements of ethos and pathos, the argument surrounding water shortage issues will be heard. Narratives and visual media are essential to making the transition from traditional scientific logos to logos that would interest the public sphere. By following the examples of Rachel Carson and Al Gore those concerned over the impending global water shortage have the potential to connect with millions of people and create actual change.

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