

## Environmental Pragmatism and its Application to Climate Change

### The Moral Obligations of Developed and Developing Nations to Avert Climate Change as viewed through Technological Pragmatism

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Many authors have posited moral arguments, as to why climate change should be combated, but most fail to provide a practical solution for both developed and developing countries. James Garvey's theory of equal burdens seeks to ensure that no country is unjustly penalized, and is currently the best theory on offer. This theory, though, falls short from a scientific perspective and leads to the philosophical objection is that there is no moral imperative to encourage developing countries to act and to develop responsibly, while providing no moral responsibility to future generations. Many authors have submitted that developed countries have historically used up an unfair majority of the world's carbon sink, thereby depriving developing nations of their share. Prior to 1950, there were no cleaner alternatives available for commercial power generation (until the advent of nuclear power plants) so there was no alternative path for developed nations to pursue without recent renewable energy developments.

It is important to note that current philosophers claim that developed countries are responsible for utilizing the carbon sink and should utilize alternative fuels but there is no mention of developing countries. Developing countries also have a moral obligation to develop responsibly and apply cleaner technology. The inherent flaw in the traditional argument that developing nations should be allowed to pollute and emit carbon, since current developed nations did so in the past, is inherently flawed.

Therefore, a new a new moral ideology is a proposed named technological pragmatism, which is a direct descendent of Environmental Pragmatism as posited by Andrew Light and Bryan Norton. The purpose of blending science with moral philosophy is that one cannot make educated policy decisions without considering both. To solve the moral obligation of developed and developing countries arguments will be made against traditional historical emissions for determining per capita emissions for CO<sub>2</sub>, as well as demonstrating that technological innovation has placed a moral requirement on developed as well as developing nations to do everything within their power to avert climate change.

Many authors have previously tackled the ethics of climate change. All of them have come to the same conclusion of action being morally imperative; although, their proposed suggestions for action have contained different yet strikingly similar solutions. It is commonly accepted that due to the temporal and spatial resolution of climate change, it is difficult to place specific blame on those who have broken the atmosphere (Garvey, 59-61. Singer, 27). There is consensus in the environmental ethics literature that failing to act when moral reasons are present is worse than being unconscious of them (Garvey, 41). Authors such as Garvey, Haller, and Singer all advocate action and claim that since we have been aware of climate change since the 1950s, no country can currently claim ignorance as an excuse for their inaction. As of 1990, the Intergovernmental Panel on Climate Change (IPCC) stated that no country can claim ignorance. What is holding countries like the United States, Australia, India, and China back from acting then?

To answer this question, it becomes necessary to analyze developed countries methodologies for running their government and what constitutes their overall general outlook. The prevailing outlook in most countries is

utilitarian, which may be one of the sources contributing to inaction. According to utilitarianism, moral rightness or wrongness only depends on the outcome of said actions; something is morally right if it increases the amount of utility in someone's life (Garvey, 46). With this viewpoint, nature is disposable and exists for the benefit of humanity...or is it? If the non-human world is within our realm of moral consideration, then utilitarianism demands maximizing good/pleasure not only for humans but also for the rest of nature (Garvey,46). If moral consideration is extended to nature, then humanity has a basic obligation to preserve nature not only for its own use, but to ensure the stability of the rest of the biosphere for future generations. This philosophy though can either be strictly anthropocentric or non-anthropocentric and is inadequate for establishing climate change policy. The main reason it is inadequate is that there is no moral mandate to ensure that all countries act to avert climate change. Without multilateral global action, one nation's offset will be another's ability to emit greenhouse gases. Since it is a form of moral monism, it will not necessarily resonate with all involved parties around the world. The criticism of any monistic doctrine is that

there will always be multiple conflicting views about how to solve climate change and who is responsible for fixing it. Any monistic view will only hinder potential progress, table negotiations, and endanger the planet's biosphere as a whole. It, therefore, becomes necessary to explore or propose other environmental ethics which are inherently pluralistic.

Differing concepts of value have led to defining the environment as either of intrinsic or instrumental importance, and understanding the distinction between these two is critical to the overarching debate of the source of value in environmental ethics. Intrinsic and instrumental value can each be viewed anthropocentrically or non-anthropocentrically. Instrumental value implies that a species, individual, community or biosphere is a means to an end; whereas, anthropogenic intrinsic value is a value we give to an object or that the object itself possesses and can be recognized by humans. Non-anthropogenic intrinsic value is the value an object itself possesses independent of any value (Garvey, 51). Even if nature is credited with intrinsic value, it is still bestowed by humans thereby necessitating someone to recognize the value. Understanding the debate between intrinsic and instrumental value of nature is crucial to solving the problem of climate change since throughout the world, each country, family, and individual may value nature differently. This precipitates the problem of what can be done to resolve various conflicting ethics in order to develop sustainable policies for averting climate change. Without a unified concept of nature, any monistic solution to climate change would fail.

This raises the questions: How does environmental pragmatism dictate that climate change be combated and abated by implementing sustainable practices when the current value system is centered upon economics? What responsibilities does the developed and developing world each possess, and how can we apply these ethics to providing justification for footprinting analysis? I argue that environmental pragmatism is the best solution to formulating ethics around environmental policy related to climate change since it allows for multiple viewpoints to be assessed and a common resolution reached.

### **An Overview of Climate Change Ethics**

Historically, nature has almost always only possessed instrumental value and as such has been treated for the pleasure of man to use it as he sees fit. This describes our general indiscriminate resource usage and non-sustainable practices in general. The fundamental problem with this view is that

it is inconsistent with sustainable practices which are necessary to preserve the biosphere. By allowing humans to consume without limit, the biotic resources of the planet will be totally consumed, instability will ensue, and the stability of the ecosystems will be compromised. A prime example of this is the mass bleaching of coral where the species that inhabit these areas are being forced to move or face extinction. This destabilizes these regions of the ocean and disturbs nature's balance (Threats: Coral Reef Bleaching). As a result, anthropocentrism places humans at the center of importance; there is not as much incentive to respect and preserve nature. Instrumental value may not necessarily be the best conception of value, since it does not imply that nature has independent value of humanity; thereby justifying saving the environment slightly more difficult. The best way to protect the environment, in my opinion, is to ensure that it has intrinsic value.

If we are to value nature then, I would argue from a pragmatist viewpoint that it is essential for nature to possess intrinsic value. Whether that intrinsic value is anthropogenic or non-anthropogenic is less important. What is best is to realize that everything in nature has intrinsic value and therefore some consideration of our actions must be dedicated towards accounting for the good of nature in addition to the good of humanity (Garvey, 53-54). The environment has intrinsic value which can be either independent of a valuer or must be recognized by a valuer. In my opinion, it does not matter which of these two are the dominant view. The whole point is that without some sort of intrinsic value, it will be much harder to persuade people to want to act to avert climate change as they will not recognize that a wrong is being committed in the first place. An ethic that values the environment intrinsically has more instrumental value in averting climate change. Naturally, this leads to the question of what is our responsibility to nature and to our fellow human beings?

Responsibility becomes the quintessential problem for climate change since the consequences are so vast and may extend well beyond our lifetimes. The consequence of fossil fuel burning, for example, is leading to increasing global temperatures, melting polar ice caps, and rising sea levels. The increase in salinity (defined as the saltiness or dissolved salt content of a given body of water) can subsequently contaminate ground water supplies, leading to the death of plants, animals, and humans all of which have done nothing wrong (Singer, 17-19). Large effects of climate change include weather extremes, rising sea levels, spread of disease to new areas, water shortages, conflict,

death or displacement of many people, as well as disappearance of species and whole ecosystems (Houghton, 172-208). Global involvement in climate change and large time scales make the consequences of each pollution action seem non-existent and distant, which helps to jade people into a false sense of security.

The work of James Garvey, on whom this paper relies heavily upon, incorporates scientific arguments into the philosophical realm and applies an almost pragmatic approach to solving the issue of climate change. He writes about finding the culprit of climate change as:

“It is almost as though I am jointly responsible, with a million other people, for a billion little actions, in a trillion little moments. Each act is nothing in itself, each person does no obvious wrong, but together the results are catastrophic” (Garvey, 61).

This quote is crucial since it is hard to point the blame about climate change to any one person; deciphering who is morally reprehensible is a challenging task. This quote points out that while each and every one of us make choices about our power consumption, the car we drive, the food we eat, etc, we are each making our own contribution to furthering the climate change problem. Since each person is responsible for contributing to climate change, there is no responsible party; it will become the responsibility of each individual to contribute to solving the climate change problem. Since there is no clear wrong done for breaking the climate by just one person, it is all of our responsibility to make choices that are sustainable.

Climate change can be thought of as a Tragedy of the Commons. The Tragedy of the Commons is a situation where multiple individuals act rationally and individually for their own self-interests, ultimately depleting a shared resource (in this case natural resources) even when it is evident that these actions are not in the best interests for anyone when viewed from a long term perspective (property). In this case, global warming is exemplified by the fact that the common resource of the planet (the carbon sink) is being depleted by a few industrialized countries to the detriment of other countries (Garvey, 72).

On the other hand, the Prisoner’s Dilemma can also aptly describe the issue of climate change. The prisoner’s dilemma is defined in game theory as two people who will not cooperate with one another despite it being in both their best interests to do so in order to decrease the overall penalty (Prisoner’s Dilemma). A non-environmental example

would be two thieves who are caught for stealing. If each one talks, then they will both be imprisoned for three years. If neither of them talk, they both walk away. If one of them talks, then the other will go to prison for 8 years. The whole point of this is that while it is in their best interest to either say nothing or cooperate jointly, they will almost always do what is in the individuals best interest rather than the joint interest. When you apply the Prisoner’s Dilemma to global warming, it is in the best interest of all countries to work together to avert climate change as the consequences will affect every human on the planet; their concentration on economics, though, blinds them from participation.

Both The Tragedy of the Commons and the Prisoner’s Dilemma, exemplify the problems related to responsibility related to climate change as stated above. Individuals will exploit a common resource until it is exhausted, even at the expense of everyone else. The story according to authors like Garvey and Haller for climate change is as follows: developed nations exploit the carbon absorption of the planet (common resource), continue to burn fossil fuels since that is what the other countries are doing, and only the polluter enjoys the added benefits of being an economic powerhouse (Garvey). The problem with this particular outlook is that future generations stand to lose the most from climate change. These values are absolutely not what is needed to solve something as big as climate change (Garvey). This raises the question of what is the ethically commendable thing to do and who is going to be doing it?

An alternative view to solving climate change is proposed by Peter Singer who argues that a completely egalitarian distribution of emissions may not always exist since some injustice in terms of non-equal distribution may be allowable as long as it benefits everyone (Singer). As a utilitarian, he approaches problems with the idea of maximizing utility for the most number of people; but as we have seen, this causes a problem philosophically since the environment does not have a representative to ensure that its utility is maximized. With this introduction in mind, Singer moves to address climate change by considering the historical arguments associated with the global carbon sink. The global carbon sink is natural or man-made reservoir which accumulates or stores carbon for an infinite period, i.e. the oceans, atmosphere, and photosynthesis by plants which are the means for scrubbing carbon dioxide out of the atmosphere and storing it for long time periods. The usage of the global carbon sink by developed nations does not inherently help developing nations, according to Singer and Haller. Singer states that whatever

benefits have trickled down to developing nations, they have paid for. Developing nations do not benefit from the United States economic power house which consumes more materials per capita than any other nation on the planet and, as a result, uses a larger share of the carbon sink (Garvey, 71-72). While this is a good point, Garvey fails to note that even though the U.S. has the largest biocapacity and water usage; it also feeds 50% of the world by growing the largest amount of food of any country (Hails). If our additional expenditure of fossil fuels was curtailed, agricultural productivity would suffer as a direct result; agriculture is fossil fuel intensive for fertilizers, harvesting, and planting. With a surplus of cheap food, policy change would curtail fossil fuel usage and translate to a decrease in productivity. As a direct result of this curtailment, individuals in developing countries would not be able to receive as much aid in the form of food. Singer does make the point that developing countries will suffer disproportionately and will continue to suffer as a direct result of developed countries greenhouse gas emissions (Garvey, 72); although, it is not just the developing countries which are going to suffer, but all of humanity. The health externalities of development with fossil fuels in the industrialized world and assessing the extent to which fossil fuels plants are cumulatively impacting health are just beginning to be understood and studied. Developing countries as well as developed countries will feel the brunt of climate change. It is imperative that developing countries develop responsibly since humanity overall suffers the decrease in quality of life in terms of health problems. For example, China's exploding cancer rate and increase in incidence of cardiovascular disease is mainly attributable to their huge fossil fuel usage as evidenced by building of a coal plant every week (air pollution particulates and mercury are mainly to blame) (Kan, Huang and Chen) (Zhao, Wang and Aunan). As a result, nations who use fossil fuels pay a health price for that utilization along with the ecological damage that the usage causes.

To counter claims about health externalities, developing countries often cite the economic benefits of fossil fuel usage which has provided developed nations their current lifestyle. As a result, developing countries believe they should have no restrictions placed on the limits of their growth. The common example is the United States who has the highest standard of living. Has this occurred as a direct result of the largest per capita fossil fuel emissions, or is it just ingenuity? Singer utilizes the Adam Smith's invisible hand argument to explain how resource distribution occurs, which in theory is meant to ensure that necessities

would be distributed more or less equally as they would under an equal partition (Garvey,72). Singer utilizes this argument to show how the rich are not completely defrauding the poor under this distribution. The rich supposedly do not consume more than the poor, but rather take only the most valuable objects (fossil fuels) that the poor will not miss (Garvey, 72). This argument is true for present day since many developing nations claim the United States unfairly reap the benefit of fossil fuels; it is true that the economy has prospered as a direct result of the unequal distribution of emissions. While the United States does burn lots of fossil fuels, they use it not only to support their high standard of living, but to power industries. The products from these industries have made the United States rich, not the burning of fossil fuels, since energy is not a commodity that is sold internationally. The burning of fossil fuels has been largely responsible for the standard of life enjoyed in most developed countries, which has resulted in the monopolizing of carbon sinks. "In using the atmosphere as we have, we have not just consumed a little more than the poor. We've taken a possible future from them and replaced it with something much worse" (Garvey, 73). While this is an important point, the health externalities have also punished those developed countries that have burned them, with increased incidence of cancer to increased incidence of upper respiratory infections. Fossil fuels burned in China result in particulate matter which makes its way all the way to the west coast of the U.S. resulting in decreased air quality and increases in cardiovascular disease, which proves the point that the atmosphere is truly a common resource. If we look at pollution from the pragmatist viewpoint, pollution cannot be viewed as just a national problem, but rather a global problem since without common cooperation from every nation, climate change is a problem we cannot solve. It will take cooperation from every nation, both developed and developing, to devise a plan to avert climate change to preserve the biosphere. As a pragmatist, it becomes necessary for all countries to act to avert climate change, but they will obviously have different roles in helping the abatement process. Developed countries have a duty to redress the balance and at the least start reducing their emissions (Garvey, 73). Whether fundamental change is in the form of deploying renewable energy, leading the way in research to make these renewable sources more efficient, or in simple conservation, it is the developed world's responsibility to enforce change everywhere before it is too late for the rest of humanity.

Many authors, including Garvey and Singer, look to

historical emissions (emission occurring prior to the period in question, usually during industrialization) when they are trying to determine what a fair emissions distribution per capita would look like. Historical reflection leads to the conclusion that developed nations have a moral responsibility to combat climate change. While developed nations do have an obligation to avert climate change, the historical argument appears to let developing nations off the hook (Garvey, 73). So, what incentive would there be for developed nations to cooperate? If there were no alternatives for power generation prior to 1970 and developing nations now have greater access to cleaner technology with which to develop, why should developing nations be excluded from any treaties or climate change abatement policies as they were in the Kyoto Protocol? Such a historical concentration would unjustly punish developed countries (Garvey, 73-76). What would happen to the moral obligations of developed and developing nations?

To refute the usage of historical emissions to determine who pays to combat climate change, the developed world up until the 1970s had no clear alternatives for base load power (power plants which are expected to meet continuous power requirements of customers at all times throughout the year) due to a lack of technological innovation. As a result, it is unjust for any developed country to solely bear the brunt of combating climate change, not only due to a lack of technological choice, but also due to the economic forward momentum of development. Now that there are renewable sources of energy like wind, solar, hydropower, geothermal, and nuclear power, it is the responsibility of developed countries to utilize these power generation technologies along with their developing counterparts. Taking these scientific considerations into account and employing the pragmatist viewpoint, I believe emissions between the industrial revolution and 1970s should be excluded from all numbers concerning per capita emissions, as it is an unfair argument to use historical justification where no plausible alternative was available other than halting any further technological development. While the developed world has used more than its fair share of the carbon sinks, there have been benefits conveyed to the developing and impoverished rest of the world.

Developing countries should not be exempted from climate change combating measures simply due to economic reasons. Sensitivity should be made to their growth needs, but the growth must still be achieved sustainably. Unlike Garvey's theory of burdens, I believe that all countries need to work together to avert climate change, while

realizing each may have different responsibilities. The development card is not an adequate excuse to be environmentally irresponsible. When a country like China is the world's largest polluter, they cannot be excluded from climate change agreements on the basis of being a developing nation especially since they are a major contributor to the problem of climate change. As of October 2009, the International Monetary Fund (IMF) still classified China as a developing country despite their contributions to the world economy in terms of trade goods for exports to other countries and pollution output from the millions of tons of coal burned to provide unclean electricity; thereby proving that just because a country is developing, it can still have a large effect on the world as a whole (World Economic Outlook). China passed the United States in terms of gross pollution production in the summer of 2008; consequently, China, from a scientific perspective, cannot be allowed to achieve the emissions per capita of the United States or Europe. The reason for not allowing them to reach the same level of per capita emissions is simple, it would result in a greatly accelerated form of warming and doom the rest of civilization (China would negate any decreases in emissions by the developed world). Any international agreement must include all nations of the world, developed or developing, since this is a global problem that humanity as a whole has a responsibility to fix. It is the moral obligation of developed countries to cut their emissions by implementing clean sources of power (i.e. wind, nuclear, solar, geothermal, and hydro) since they have the technology to cut down on their emissions. At the same time, developed nations should help subsidize alternative energy sources for developing nations, so that the developed nations are not taking the brunt of the economic hit and everyone is being equally burdened to cut their emissions. As such, this is a prime application of Garvey's theory of equal burdens, but it requires further modification with environmental pragmatism as it places a moral responsibility on all countries to avert climate change and not hide behind economic development as an excuse not to avert climate change. This is a key difference between Garvey's argument and the pragmatism argument that I am advancing. I am advocating that we disregard specific historical emissions from the viewpoint that another technology was not available, and instead work together to avert climate change by employing synergy. As an example, if developing nations were to receive subsidized solar cells or wind turbines from developed countries, both countries would not only win but the environment would also benefit. As a result, it is important

from a pragmatist viewpoint to move towards actions to solve climate change rather than just debating who is responsible for the problem and under what conditions they should have to clean it up.

With a great deal of uncertainty contained in climate science models, philosophers and policy makers still advocate action but seem to delay in actually doing something to combat climate change. What would be the potential consequences of doing nothing, and would this be morally reprehensible? A potential consequence would be that Greenland melts, sea levels go up by as much as 7 meters, and many people are displaced from their homes (IPCC). This scenario is very real and very possible. Despite the uncertainty that most people cite in these calculations, uncertainty is not a justification for inaction. In fact, the uncertainty seems to command action, not inaction (Garvey, 95). If we wait for the uncertainty to clear, then it will be too late (Garvey, 95). Continuing with business as usual places many innocent people in harm's way. The precautionary principle is a moral and political theory which was first formulated at the Earth Summit in 1992. It states that if an action might cause permanent or severe harm to the public or environment, and if there is scientific uncertainty associated with the action, then the action should not be taken and alternatives should be found (Garvey, 96-97). If the precautionary principle is applied, as Garvey suggests, then we should seek to be conservative in the face of large uncertainty (Houghton, 274-276). Since the consequences of climate change are extremely great, and while there is uncertainty in the climate models used to predict future climate patterns, this uncertainty demands that we act to avert it since the consequences are so large. The precautionary principle here is extremely helpful since it forces us to act to be conservative so that we will not procrastinate to act until it is too late. Another argument for inaction is that climate change is cost prohibitive for something which may never occur, and is a waste of fund allocations for combating poverty in third world countries (Lomborg). Many economists and people find this argument extremely convincing since they are concerned especially in times of economic hardship about improving the economy, and they see climate change abatement as an unnecessary cost which may turn out to greatly stifle the economy. Cost is the usual excuse given by many governments for keeping with business as usual. While developed nations are extremely guilty, developing nations have likewise embraced this concept: Our easy high energy lives as compared to the suffering which greenhouse-gas emissions cause and will continue

to cause – you can come to the conclusion that avoiding action on climate change just because it might be expensive amounts to harming people for money (Garvey, 98).

The consequences of allowing climate change to occur just because it is expensive to avert, will far outweigh the initial investment in new technologies from a traditional cost-benefit analysis. If this is applied utilizing a pragmatist viewpoint, then it is important that we act to avert climate change before it is too late and refuse to remain inactive just because it could adversely affect the economy. Since pragmatism demands pluralism, the economy can be tailored to be green and environmentally friendly without sacrificing economic productivity; thus climate change and economic success will not be mutually exclusive. As such, if we are following the precautionary principle, the costs of doing nothing greatly outweigh the costs of acting now to curtail our greenhouse gas emissions.

Finally, we can utilize the typical process of allowing technological fixes to solve humanity's messes. A prime example would be Superfund sites like Love Canal, where 21,000 tons of toxic waste was buried beneath a neighborhood by Hooker Electrochemical Company. There were no laws preventing the practice previously. The result of Love Canal was large scale health problems during 1978 which made national and international headlines. In the words of a state health commissioner, "Among its legacies, Love Canal will likely long endure as a 'national symbol of a failure to exercise a sense of concern for future generations (Verhovek). Since the industrial revolution, we have been using future technology to bail humanity out of environmental situations we have created due to our own technological ingenuity. Currently with fossil fuels, the most recent hope is the use of Carbon Capture and Sequestration (CCS) to send Greenhouse Gases into geologic repositories in order to make coal cleaner. The whole concept behind this technology is to compress carbon dioxide gas into a liquid form and bury it miles underground in geological formations and keep it there for eternity. This does not solve the problem of burning fossil fuels, but rather provides a technological fix allowing us to keep burning them. This line of thinking, though, is extremely dangerous. The root of our inaction is selfishness, which is not acceptable under any condition (Garvey, 102). Since we have the technological innovation to solve climate change now, we have the obligation to remedy the situation so that we can preserve the planet for future generations. There is an obligation to nature as well, according to the pragmatist viewpoint, even if it is only for our own future usage it is still alive and as

such deserves our consideration (Light and Katz, 84-85). This leads to the conclusion that it is in the best interest of all humans to have a productive biosphere to work within and to preserve the environment for future generations.

The purpose of pursuing an agenda of sustainability is to attempt to bring everyone to table, which in this case is essential to solving a global problem such as climate change. Singer and Garvey each propose some variation of equal distributions of emissions per capita. Singer and Garvey each propose methods for dividing up emissions allotments and allocating them to each country. Garvey proposes his theory on equal distribution of burdens which seeks to level the economic burden to various countries, while Singer posits a theory of equal per capita distribution based of 2050 population projections. According to these schemes, the most moral distribution of emissions comes in the form of equal per capita emissions. Singer and Haller both agree that the only way to be fair is through equal emissions for everyone; the time frame, though, for which these figures depend upon are very different. Singer proposes to ignore historical emissions and calculate based on present per capita shares, which should allow for rich governments to find the solution more palatable (Singer, 34-35). If historical emissions are counted, then there would be little incentive for developed countries to participate since this would place a larger degree of the burden of combating climate change on developed countries thereby letting developing countries be exempt comparatively. One conclusion of historical emissions is that developed countries should not be entitled to any further emissions since they have used up our share of the carbon sink up; this becomes extremely problematic since there was no knowledge of climate change prior to 1950 and the technology to avert was no readily available until recently (Garvey, 127). If historical emissions were to be included and the developed world was not entitled to any more emissions, there would be no incentive for them to combat climate change since they would be unjustly punished for utilizing the carbon sink.

So how can we strike a compromise? Since population growth is occurring, it makes sense to tie emission limits to a specific time and population value; otherwise, emissions will continue to spiral out of control. Singer suggests that population projections be utilized from the UN population predictions for 2050 to base emissions per capita allowances for each country (Singer, 43). He believes that splitting emissions in this fashion is fair because of its simplicity, suitability to political compromise, and in the

end because it is likely to increase global welfare (Singer, 43-44). This suggestion is not reasonable since developing countries are experiencing the largest population growth, implying they will have a larger slice of the emissions pie, and this would subsequently penalize the developed world. In contrast to Singer, Garvey proposes the theory of equal burdens, whereby equal pain is felt by all nations, while the monetary contributions to combat or abate climate change might be drastically different (Garvey, 130). He chooses to abandon the historical responsibility in lieu of favoring a system of sustainability, since this principle is an argument which every country can agree to (Garvey, 133).

While, I agree with the concept of sustainability that Garvey and Singer are attempting to advance through their emissions schemes, I do have objections to an equal emissions scheme from a scientific and economic viewpoint. The concept of an equal emissions scheme as proposed by Singer may seem fair on the surface. The implementation is fuzzy and is highly dependent upon the population, which estimates have shown from carrying capacity studies to be approximately 4.1 billion people. An additional objection is that it will punish countries like the United States, who always come out as the bad guys even though 50% of the rest of the world is fed by us. The U.S. will bear the brunt of the economic punishment, where developing countries like China would still have room to grow (Garvey, 126). If CO2 suddenly needs to be reduced by the U.S., the logical place to reduce it is by curtailing agriculture and energy; consequently exports to people around the world would suffer as a direct result. Consequently, an equal emissions scheme is perhaps not the best solution for averting climate change. This is not to say that we should not act to avert climate change. Rather we all have an ethical obligation to, at the bare minimum, preserve the human race, and act to avert climate change (Haller, 143).

### **Science and Technology**

Climate change will impact humans through rising sea levels, decreased predictability of rain fall, drought, and water shortages leading to an increase in the number of environmental refugees and casualties. One impact in particular that is of great concern to people in coast regions and scientists is sea level rise. Modeling predictions have indicated that the 21st century could witness an increase in sea level by 1 meter (Houghton, 180). While this does not seem like a large impact, half of humanity inhabits coastal regions where fertile soil is crucial to survival (Houghton, 181). A prime example would be people in Bangladesh

where nearly 150 million people are located in the deltas of the Ganges, Brahmaputra, and Meghna rivers (Houghton, 181). In this region 10% of the habitable land would be lost with a 0.5m sea level rise and 20% would be lost in a 1m rise displacing 6 million and 15 million people respectively (Houghton, 182). Since 83% of the population relies on agriculture for making a living, the loss of agricultural land will remove their main method of subsistence (Houghton, 183). Additionally, climate change and increased sea levels will mean increased vulnerability to storms and the potential for large scale natural disasters, resulting in millions of refugees and deaths (Houghton, 181-187). Additionally, increases in sea level causes an increase in salinity problems in the soil, making once arable land, agriculturally unproductive (Houghton, 184-185). The combination of increases in flooding and salinity will make once habitable regions of the world uninhabitable causing pain and suffering to the inhabitants of these low lying regions.

Closely related to changes in sea level rise, will be the decrease in water availability for many regions due to a change in rain patterns and intensity of precipitation events (Houghton, 191). As 1/3 of the human population is dependent upon glacially fed streams for their drinking water supplies, they will become vulnerable to water shortages. This will lead to conflicts over a limited but necessary resource. As an example, the Himalayan glaciers which supply 1/6th of global population with water, are expected to decrease in area by 80% by 2030, meaning a future of water scarcity is in store for Asia (Houghton, 192). As populations continue to grow, water usage proportionally increases. Due to the decrease in rainfall predictability, there will be more world citizens who live in water scarce countries who are going to suffer from the consequences of climate change (Houghton, 193-194). Not only will countries have diminished access to constant supplies of fresh water, but agricultural productivity will be redistributed. In developed countries, agricultural productivity is expected to supply a larger surplus of food; whereas developing countries are likely to face intense deprivations, which will only aggravate the strain on feeding growing populations (Houghton, 202). These aforementioned consequences of climate change will cause pain and suffering to countless human beings, who will be unable to adapt to the changing climate. Consequently, it is a primary moral concern for every global citizen to act to prevent these climate modeling predictions from becoming a reality.

Until now, human health consequences have largely been excluded from the impacts of climate change since

the changes in temperature has not been enough to change disease vectors. Their effects cannot be disregarded now! With increased temperature and moisture content in the atmosphere comes an increase in disease vectors (insects usually) for carrying lethal infections like malaria to regions which were once immune (Houghton, 213-217). Not only will disease vectors increase, but a degraded environment will mean a poorer quality of life for many of the world's poorest inhabitants as drinking water will become increasingly polluted and nutrient-deficient soil will result in less productive agriculture and barren lands (Houghton, 213). From an anthropocentric ethical standpoint, how can we allow millions to be displaced and/or perish when the problem of climate change can be combated with technology now?

With the above anthropocentric reasons for preventing climate change in mind, it is important to recognize that there will still be a large impact on the ecology of the biosphere, which should compel us to act. There is a moral imperative to act to preserve biodiversity and natural resources for future generations. Imagine a world without species like the polar bear. Will we only be able to show our children pictures or take them to natural history museums to describe long extinct species which have taken millions of years to evolve, all because of anthropogenic climate change and a lack of human will to act? This question can be answered in a variety of ways, but one of the more interesting answers relates to medicine. If species are going extinct, we are missing not only an opportunity to study them in the wild, but we are potentially killing species that might possess medicinal remedies for various forms of cancer such as sea creatures. If for no other reason than our own self interest, we should be working to prevent species loss. From a non-anthropocentric viewpoint, species must be preserved since they have their own intrinsic value and as such they have a right to carry on their own existence.

Species are becoming extinct at a rate which is 1000 times the background rate of extinction, leading to the conclusion that anthropogenic climate change is responsible for accelerating this rate (Gore, 163). The root cause of this increase in extinction rates stems from the increases in global surface temperature, which ecosystems are highly sensitive to and have evolved to be productive in (Houghton, 203-206). With just an increase of 2 degrees Centigrade, which is predicted to occur during the next 150-300 years (IPCC), dire consequences are in store for the environment. These effects include: decreased resilience due to resource exploitation and pollution, and conversion of

the biosphere from a net carbon sink to a net carbon source (Houghton, 212-213). In terms of the environmental impact due to climate change, effects include: an increase of 20-30% of all plant and animal species to be at high risk of extinction, extensive forest and wetland decline, and substantial changes in marine ecosystems due to climate change and increased ocean acidity (Houghton, 212-213). Changing these ecosystems will cause pain and suffering in the human population for anyone that is dependent upon agriculture or fishing for a food supply, thereby affecting everyone in some way (Houghton, 203-211). Regardless if we are just recognizing intrinsic value of nature or we value it instrumentally, it is in the best interests of humanity to ensure long-term ecological health both for humanities benefit and are the ecological services the environment provides.

Building on previous ethics discussion on exponential population growth and how responsible growth is necessary, scientifically this excess population growth will place a large demand for resources which will only accelerate climate change. The current population is at 6.5 billion, and most models predict that population will increase to 9.1 billion by 2050; thus placing a huge strain on natural resources:

“It took more than 10,000 generations for the human population to reach 2 billion. Then it began to rocket upward from 2 billion to 9 billion in the course of a single lifetime: ours. We have a moral obligation to take into account this dramatic change in terms of the relationship between our species and the planet” (Gore, 216-217).

Eighty percent of population growth expected by 2020 will have occurred within developing countries. Consequently, developing countries need to be responsible for their rate of population growth and to think about how they will provide for this extra population with limited resources. Each of these people will require food, energy, and work to have some quality of life, all of which contribute to aggravating climate change (Houghton, 394-395). If the current population of 6.5 billion people were to enjoy a US lifestyle, then we would have an ecological footprint of over nine planets to sustain such a number (Hails, 9). An ecological footprint is a measure of the demand humanity places on the earth compared to the earth's ability to regenerate these resources. There must be a compromise made between living a luxurious life and living sustainably. Ecological models have calculated that the theoretical carrying

capacity of planet earth is 4.1 billion people and that any additional population is unsustainable. If these ecological models are correct, by increasing the human population we are consuming natural resources which will not be available for future generations to use even in moderate amounts (Houghton, 395). This raises the question of whether population control is necessary for the future on continents which have already exceeded their biocapacity (capacity of a biologically productive area to generate renewable resources and absorb waste). The answer scientifically to this question is simply yes. The regions of North America, Europe, Middle East, Central Asia, and Asia-Pacific have already exceeded their biocapacity. This means they are in ecological debt which occurs when an ecological footprint exceeds the biocapacity of a given area (Hails, 17). Either drastic changes in lifestyles are going to have to occur or a population curtailment towards the sustainable value of 4.1 billion is going to have to be enacted. This raises the moral question of whether a government can prevent individuals from procreating. It is in the best interests of humanity to curb our population.

### **Pragmatism and Footprinting**

Environmental pragmatism is a relatively new field of environmental ethics that seeks to move beyond the strictly theoretical exercises normal in philosophy and allows the environmental movement to formulate substantial new policies (Light, 1). Environmental Pragmatism was initially posited by Bryan Norton and evolved to not take a stance over the dispute between non-anthropocentric and anthropocentric ethics. Distancing himself from this dispute, he preferred to distinguish between strong and weak anthropocentrism (Light, 290-291, 298). The main philosophers involved in advancing the debate in environmental pragmatism include Eric Katz, Andrew Light, and Bryan Norton. This particular discipline advocates moral pluralism, implying that the environmental problems being faced have multiple correct solutions. Light argues that the urgency of ecological crises requires that action is necessary through negotiation and compromise. While theorists serve to further the field of environmental ethics and to debate the metaethical basis of various environmental philosophies, some answers to questions are best left to private discussion rather than taking time to argue about them publically (introduction of pragmatism). Pragmatism believes that if two theories are equally able to provide solutions to a given problem, then debate on which is more is argued that: “the commitment to solving environmental problems is the only precondition

for any workable and democratic political theory” (Light, 11). While the science behind a footprint is well understood, what can the synthesis of environmental pragmatism and footprinting tell us about the moral obligation to avert climate change? How does grounding the practice of sustainability footprinting in environmental pragmatism generate moral prescriptions for averting climate change?

Environmental Pragmatism necessitates the need for tools in engineering to be developed and applied to avert the climate change problem, since pragmatism inherently calls for bridging the gap between theory and policy/practices. With the theory of pragmatism in mind, further research and development of tools such as life-cycle analysis and footprinting are potential policy tools that are necessary under a pragmatist viewpoint so that informed decisions can be made by policy makers. Since the role of life-cycle analysis and footprinting attempt to improve the efficiency and decrease the overall environmental impact of a given process, good, or service, environmental pragmatism would call for the further development and usage of these tools so that we can continue to develop sustainably and fulfill our moral obligation to future generations. By utilizing footprinting and life-cycle analysis, it becomes possible to make environmentally conscious decisions not only based upon a gut instinct but additionally based on sound science. Finally, in regards to averting climate change, footprinting and life-cycle analysis offer another dimension to traditional cost-benefit analysis and can allow for our moral obligation to future generations to weigh into final decisions which will eventually result in policies and/or a production of a good or service. Since traditional cost-benefit analysis does not account for the environment explicitly, pragmatism would call for the application of these tools to ensure that the environment is adequately protected for future generations.

Climate change modeling inherently contains many unknowns in terms of future outcomes and applied simplifications, but these factors should not be enough to hold us back from an environmental pragmatism stand point. Rather than hiding behind a veil of uncertainty with the science, the uncertainty of the possible catastrophic outcomes demands action on the part of every human individual. Environmental pragmatism could also adopt a view point like the precautionary principle where a given action has great uncertainty, but also great consequence (Haller). Since we are attempting to protect human lives and prevent unnecessary suffering, environmental pragmatism would dictate that we should take action now and stop debating

the theoretical aspects of this problem. A moral obligation exists to protect human life, and it becomes our obligation to avert climate change. Despite the relatively high economic costs of averting climate change, it is worth noting that the creation of green jobs and new sectors will help to stimulate the economy rather than completely hindering it. People inherently fear change, and it is my opinion that averting climate change requires a drastic change in our consumption patterns, an important reason why people are resisting averting climate change. From an environmental pragmatism viewpoint, it is humanities responsibility to avert climate change before it is too late since we have a moral obligation to protect the future of humanity and the biosphere.

Footprints are only one tool in an arsenal of analytical tools that fall under life cycle analysis, which can be utilized to inform policy and help promote environmental responsibility. What does this have to do with environmental pragmatism? Pragmatism embraces moral pluralism where there is no one correct practice or set of practices to answer how we should proceed with climate change. We are free to explore what ethic will work best for each country and/or region to accomplish the end goal of averting climate change and preserving the planet for future generations. One approach that has been tried in the past in the United States was ecological management, but this was largely reducible according to Jamieson as a means of economics masquerading as environmental policy (Jamieson, 373). He argues that the tools of economic evaluation will not be sufficient to avert climate change. While I agree with him, he brings to light that the cumulative costs of specific types of power generation modalities may be enough to stimulate a shift in the consumption patterns (Jamieson, 373-374). So what ultimately will help humanity to become environmentally responsible? The answer is to “develop new values and conceptions of responsibility” (Jamieson, 377). By doing this, we will shift people’s motivation to preserving the environment, which was the whole concept behind the sustainability footprint. All of these changes in values that various authors have written about all are precipitated by an influx of new information which either informs of our inefficiency in the engineering arena or our moral obligation in the philosophical arena. It is up to philosophers to provide moral arguments to influence policy through environmental pragmatism and engineers/scientists to continue providing technological innovation and research breakthroughs to bring new information to light.

## Conclusions

Authors such as Singer and Garvey have posited that equal per capita emissions schemes are the most equitable distribution, but these schemes do not place an equal moral imperative on all nations to act to combat climate change and move towards sustainable practices. As I objected to earlier, an equal emissions scheme and/or theory of equal burdens fails to account for productivity within economies. Beginning with an equal emissions scheme and then adding and subtracting allotments based upon productivity would be the best method for ensuring that developing and developed nations all get on board to combat climate change. Historical emissions prior to 1970 must be ignored since there was no technological alternative for developed nations except for choosing not to technologically progress which is not plausible. Developed nations have a responsibility to cut their greenhouse gas emissions drastically by implementing nuclear power, wind power, solar power, and geothermal power. While nuclear power can be objected to since it does not have a carbon free life cycle (Shrader-Frechette, 19), no renewable power has a completely carbon free life-cycle. It is the operation portion of the cycle which constitutes over 95% of the emissions; therefore we should be looking to reduce emissions. By no means do developing nations get off the hook, rather they have an equal moral obligation to develop responsibly and to cut their emissions. The obvious objection here will be that developing countries cannot afford to cut emissions, since they are subsistence emissions (Garvey, 81). While this is true, the developed world has a moral obligation to subsidize renewable sources of power, since bringing these into full scale development will naturally decrease their overall cost. Unlike Garvey, Haller, and Singer, I argue that every man, woman, and child must face climate change together and work to save our planet for future generations. This raises one last series of questions: What is sustainability, and what in our morality will force us all to act?

We are all morally compelled to act to avert climate change, not only for the preservation of the human species, but also the preservation of the biosphere. It is this common humanity which we seek to protect, which compels all nations to act to avert climate change. We must act for future generations to be able to inhabit this planet and to ensure that they are born into a world where the Tragedy of the Commons has not been allowed to occur. We must act to preserve the biosphere, not only since we are directly dependent upon it, but also because it is intrinsically valuable. President John F. Kennedy summed up our common

humanity when he said, "For, in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal" (Kennedy). With this quote in mind, we must find the will to act quickly and with conviction to preserve our only home.

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