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## Climate Change and International Justice

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To the Graduate Council:

I am submitting herewith a thesis written by Sarah Brigid Kenehan entitled "Climate Change and International Justice." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Philosophy.

David Reidy, Major Professor

We have read this thesis and recommend its acceptance:

John Nolt, Heather Douglas

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Anne Mayhew  
Vice Chancellor and  
Dean of Graduate Studies

(Original signatures are on file with official student records.)

**Climate Change and International Justice**

**A Thesis  
Presented for the Master of Arts  
Degree  
The University of Tennessee, Knoxville**

**Sarah Brigid Kenehan  
December 2005**

## **DEDICATION**

This thesis is dedicated to my parents, Michael and Mary Ellen Kenehan, for their unending support and encouragement, to Keith Bustos, the love of my life, for inspiring me to do more than I ever thought I could, and to the rest of my family for providing the comic relief and love I needed to make it through this project.

## **ACKNOWLEDGEMENTS**

I wish to thank all those who helped me complete my Master of Arts Degree in Philosophy. First and foremost, I would like to thank Dr. David Reidy, for his seemingly endless patience, kindness, and guidance. I would also like to thank Dr. Heather Douglas and Dr. John Nolt for all of the insight and time they dedicated to this project.

Finally, I wish to thank my family for all their love and encouragement

## ABSTRACT

The effects that are predicted to occur as a result of global climate change have the potential to be devastating, effecting food and water security, threatening sensitive ecosystems and species, and forcing the relocation of thousands of people. However, little has been done to effectively combat this problem for two primary reasons: there are uncertainties surrounding climate change projections and many countries are unwilling to accept their fair share of the burden. This project will attempt to reframe these problems. Specifically, I will argue that it is rational for policymakers to act on the model-generated predictions of climate change, and (based on the framework that Rawls lays out in *The Law of Peoples*), all peoples have a duty to work towards the abatement of and adaptation to climate change.

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## Introduction

Since the late 1980s, the problem of global climate change has been center stage in the international policy arena. The effects that are predicted to occur as a result of global climate change have the potential to be devastating, effecting food and water security, threatening sensitive ecosystems and species, and forcing the relocation of thousands of people.<sup>1</sup> However, as of yet, little has been done that has both effectively incorporated all major global players while at the same time promoting the type of action that is necessary to combat this problem. The primary reasons underlying this lack of commitment have to do with the uncertainties surrounding climate change projections and the unwillingness of some countries to accept their fair share of the burden. Specifically, many policymakers have claimed that any action taken towards abatement would be irrational, since there is not yet one-hundred percent certainty surrounding the forecasts. Additionally, some world leaders have argued that they will not commit themselves to any treaty that places “too much” of a burden on their country, regardless of what is fair. This project will attempt to offer a new way of looking at these problems. Specifically, I will argue that it is rational for policymakers to act on the model-generated predictions of climate change, and (based on the framework that Rawls lays out in *The Law of Peoples*), all peoples have a duty to work towards the abatement of and adaptation to climate change (as a matter of international morality). I develop this latter claim by drawing on Rawls’s *Law of Peoples*.

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<sup>1</sup> Working Group II to the Third Assessment Report of the Intergovernmental Panel of Climate Change, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* (Cambridge: Cambridge University Press, 2001), Summary for Policymakers.

Chapter I lays out the necessary background information surrounding climate change. Specifically, I address the human contribution to climate change as well as the uncertainties intrinsic to climate science and climate change predictions. Continuing, chapter II deals with the issue of uncertainty surrounding climate change predictions. Coupling van Fraassen's concept of empirical adequacy with Douglas's conception of inductive risk, I argue for the rationality of acting on model-generated predictions. Since it is rational to act on the model-generated predictions, Chapter III explores the demands of international morality to the problem of climate change. Specifically, I argue that the framework that Rawls details in *The Law of Peoples* provides a viable option for dealing with this problem. From this framework, it can be shown that all peoples have a duty to work towards the abatement of climate change as well as to aid in the adaptation of other peoples to the effects of climate change as an extension of their duty to assist.

## **Chapter I – Climate Change and Climate Science**

### **Introduction**

This chapter seeks to give a brief layout of the scientific ground that currently surrounds the climate change debate. Section I gives a quick overview of the importance and functioning of the Earth's atmosphere. Section II outlines the contribution that anthropogenic activities have on global climate change. Continuing, section III details sources of uncertainty in climate science and prediction. Finally, section V illuminates the impacts that climate change is predicted to have and the degrees of certainty associated with the predicted impacts, as detailed by the Intergovernmental Panel on Climate Change (IPCC).

### **Section I - How the Atmosphere Works**

The Earth's atmosphere serves three vital functions. First, it provides those gases that are essential to the life-sustaining process on Earth. Specifically, it provides carbon dioxide for photosynthesis, oxygen for respiration, and nitrogen for nitrogen-fixing bacteria and plants. Second, the atmosphere also serves a very important protective function - it absorbs life threatening solar radiation, preventing it from reaching the surface of the Earth. Finally, the atmosphere stabilizes the Earth's temperature by a process known as the greenhouse effect. If the greenhouse effect did not occur, then the average surface temperature of the Earth would be around  $-18^{\circ}\text{C}$ .<sup>2</sup> In this process, water vapor and carbon dioxide reabsorb outgoing radiation from the surface and reradiate

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<sup>2</sup> Stanley E. Manahan, *Environmental Chemistry*, 6<sup>th</sup> ed. (Boca Raton, Fl.: Lewis Publishers, 1994), 270.

about half of that energy back to the surface, creating a relatively stable temperature of 15°C.<sup>3</sup> The water molecules in the atmosphere are primarily responsible for most of the absorption of infrared radiation. Carbon dioxide, although present in a much lesser concentration, also aids in the reabsorption of infrared radiation. This absorption is key in maintaining the Earth's heat balance. An increase in the concentration of any greenhouse gases in the atmosphere may lessen heat loss, thereby increasing Earth's temperature.

## **Section II - The Anthropogenic Contribution to Climate Change**

In 1988, the World Meteorological Organization and the United Nations Environment Programme jointly established the Intergovernmental Panel on Climate Change (IPCC). This organization was founded with the purposes of assessing “available scientific and socioeconomic information on climate change and its impacts on the options for mitigating climate change and adapting to it” and “to provide, on request, scientific/technical/socioeconomic advice to the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC).”<sup>4</sup> Recently, the IPCC completed their Third Assessment Report (TAR). Much of this report deals with determining the degree that anthropogenic activities have contributed to climate change. Indeed, atmospheric variability and climate change occur naturally, oscillating to maintain the natural, delicate balance that exists between all the elements of the climate system. However, since the beginning of the Industrial Revolution, man has influenced this balance by changing the concentrations of greenhouse gases in the Earth's

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<sup>3</sup> Manahan, 270.

<sup>4</sup> Working Group II, forward.

atmosphere, primarily through the burning of fossil fuels (aerosols, biomass burning, land-use change, and deforestation have all contributed, as well).<sup>5</sup> Science has confirmed that the levels of greenhouse gases in the atmosphere remained constant for about one thousand years before the Industrial Revolution.<sup>6</sup> Since then, the concentrations of several greenhouse gases have increased in the atmosphere, most notably the concentration of carbon dioxide. There has been a thirty percent increase in the carbon dioxide level since pre-industrial times, and this concentration is continuing to increase at a rate of .4 percent per year.<sup>7</sup> With regards to this observed change, the IPCC writes, “We know that this increase is anthropogenic because the changing isotopic composition of the atmospheric CO<sub>2</sub> [carbon dioxide] betrays the fossil origin of the increase.”<sup>8</sup> An increase in carbon dioxide and other greenhouse gases in the atmosphere leads to a greater amount of radiation that is trapped between the atmosphere and the surface of the Earth, thereby increasing the temperature of the Earth’s surface. In other words,

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<sup>5</sup> Human induced land-use changes have also been shown to significantly contribute to climate change. The term “land-use change” refers to “any change in use or management of the land”. (Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis* (Cambridge: Cambridge University Press, 2001), 93.) Changes in the land due to agriculture, irrigation, deforestation, reforestation, afforestation, urbanization, and traffic are some of the more severe ways in which anthropogenic activities have altered the land. (Working Group I, 93) The TAR reports that “land-use change results in changing the physical and biological properties of the land surface and thus the climate system.” (Working Group I, 93.) There are two specific ways in which land-use changes can affect the global climate system. First, land-use change can influence the land-atmosphere exchanges of radiation, heat, and water. Second, land-use changes can result in the destruction or alteration of vegetation, thus altering terrestrial carbon sinks. (Working Group I, 443) This problem can be intensified, as changes in climate can directly affect land-use. As the concentration of carbon dioxide increases in the atmosphere, and the surface temperature of the Earth increases, there will be substantial changes in the ways that certain land areas can be used. For example, agriculture in some regions will change. In some areas it is likely that crop yields and crop types will be altered. Changes in water availability due to climate change will also influence agricultural practices.

<sup>6</sup> Working Group I, 92.

<sup>7</sup> Working Group I, 92.

<sup>8</sup> Working Group I, 92.

anthropogenic activities are contributing to higher concentrations of carbon dioxide (and other greenhouse gases) in the atmosphere, thus creating an enhanced greenhouse effect.

The TAR reports that “the warming over the last 50 years due to anthropogenic greenhouse gases can be identified despite uncertainties due to anthropogenic sulfate aerosol and natural factors (volcanoes and solar irradiance).”<sup>9</sup> Further, “human influences will continue to change atmospheric composition throughout the 21<sup>st</sup> century” and “anthropogenic climate change will persist for many centuries.”<sup>10</sup> Anthropogenic influences on climate change can be identified apart from natural influences in order to determine the affect that human activities have on the climate system. These claims are founded on a multitude of detection and attribution studies.<sup>11</sup> Through these types of studies, new evidence has surfaced that shows that anthropogenic activity has influenced the observed trend of global warming, and will continue to influence climate change, primarily through the use of fossil fuels and the consequent release of carbon dioxide into the atmosphere. By analyzing new reconstructions of temperature over the last 1,000

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<sup>9</sup> Working Group I, 10.

<sup>10</sup> Working Group I, 12, 17.

<sup>11</sup> Detection is “the process of demonstrating that an observed change is significantly different (in a statistical sense) than can be explained by natural variability.” (Working Group I, 55) Attribution is “the processes of establishing cause and effect with some defined level of confidence, including the assessment of competing hypotheses.” (Working Group I, 55) Through detection studies, scientists are able to determine whether or not an observed change is statistically unusually. However, these studies cannot pinpoint the cause of the change. Attribution studies in climate change employ statistical analysis and careful examination of evidence to show (within a pre-specified margin of error) that the changes in question are:

- 1.) unlikely to be due entirely to internal variability;
- 2.) consistent with the estimate responses to the given combination of anthropogenic and natural forcing; and
- 3.) not consistent with alternative, physically plausible explanations of recent climate change that exclude important elements of the given combination of forcings. (Working Group I, 55-56. Natural external forcings include, but are not limited to, radiation from the sun or volcanic activity. Anthropogenic external forcing of the climate system includes, but is not limited to, burning fossil fuels and deforestation.)

years, it was found that the observed temperature changes in the last 100 years are “unlikely to be entirely natural in origin, even taking into account the large uncertainties (in palaeo-reconstructions).”<sup>12</sup> The authors of the TAR write, “even if the models underestimate the magnitude of the response to solar or volcanic forcing, the spatial and temporal patterns are such that these effects alone cannot explain the observed temperature changes over the 20<sup>th</sup> century.”<sup>13</sup> Furthermore, these studies have found that a “significant anthropogenic contribution” is needed to account for the changes in surface and tropospheric temperature trends over “at least the last thirty years” and “while detection in anthropogenic factors is often ambiguous, detection of the influences of greenhouse gases on the surface temperature changes over the past 50 years is robust.”<sup>14</sup>

To add to the scope of new evidence that shows that human activities are contributing to climate change, there is now a broad range of reliable detection techniques from which to gather and assess data. The TAR reports that “the increase in the number of studies, breadth of techniques, increased rigor in the assessment of the role of anthropogenic forcing in climate, and the robustness of results to the assumptions made using those techniques, has increased the confidence in these aspects of detection and attribution.”<sup>15</sup> Perhaps most importantly, the TAR reports that despite uncertainties, there is no question that human activities have contributed to global warming. The

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<sup>12</sup> Working Group I, 56.

<sup>13</sup> Working Group I, 57.

<sup>14</sup> Working Group I, 57.

<sup>15</sup> Working Group I, 57.

authors write, “uncertainties in other forcings that have been included do not prevent identification of the effect of anthropogenic greenhouse gases over the last 50 years.”<sup>16</sup>

### **Section III - Sources of Uncertainty**

The authors of the TAR acknowledge and assess the uncertainties that are inherent in climate science. In this report, the authors address the uncertainties of climate science and the impacts that they have on the likelihood of their future projections. The TAR cites three main categories of sources of uncertainties: problems with data, problems with models, and other sources of uncertainties.<sup>17</sup> Problems with data include, but are not limited to:

- 1.) Missing components or errors in the data
- 2.) “Noise” in data associated with biased or incomplete observations
- 3.) Random sampling error and biases (nonrepresentativeness) in a sample.<sup>18</sup>

Problems with models include, but are not limited to:

- 1.) Known processes but unknown functional relationships or errors in structure of model
- 2.) Known structure but unknown or erroneous values of some important parameters
- 3.) Known historical data and model structure but reasons to believe parameters or model structure will change over time
- 4.) Uncertainty regarding predictability (e.g., chaotic or stochastic behavior) of system or effect
- 5.) Uncertainties introduced by approximation techniques used to solve a set of equations that characterize the model.<sup>19</sup>

Finally, other sources of uncertainty include, but are not limited to:

- 1.) Ambiguously defined concepts and terminology

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<sup>16</sup> Working Group I, 59.

<sup>17</sup> Working Group II, 127.

<sup>18</sup> Working Group II, 127.

<sup>19</sup> Working Group II, 127.



- 2.) Inappropriate spatial/temporal units
- 3.) Inappropriateness of/lack of confidence in underlying assumptions
- 4.) Uncertainty resulting from projections of human behavior (e.g., future consumption patterns or technological change), as distinct from uncertainty resulting from “natural” sources (e.g., climate sensitivity, chaos).<sup>20</sup>

The projections of the impacts of future climate change made by the IPCC are made with these uncertainties in mind. Additionally, each projection is categorized by its degree of uncertainty.

#### **Section IV - Impacts of Climate Change and Degrees of Certainty**

Given the uncertainties in both the science of climate change and in the projections that climate scientists make, the authors of the TAR attempt to employ a “unified approach for assessing, characterizing, and reporting uncertainties in the TAR.”<sup>21</sup> The importance of recognizing and characterizing uncertainty is expressed by Moss and Schneider. They write;

One of the major challenges in preparing the IPCC Third Assessment Report (TAR) is that authors will need to present a clear snapshot of information on climate change, potential impacts, and response options, when the extent of that we know is continuously evolving. Given the needs of decision-makers to weigh potential responses to the risks of climate change before all uncertainties can be resolved, the available information, imperfect as it may be, must be synthesized, evaluated, and presented in a responsible and informative manner. To do this, lead authors will be reviewing the published literature, documenting the ranges and distributions of findings and estimates in the literature, assessing the scientific merit of this information, and explicitly distinguishing and communicating which findings are well understood, which are somewhat understood, and which are speculative. In short, assessment of the relative credibility of a variety of processes and outcomes is a major goal of the Reports.<sup>22</sup>

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<sup>20</sup> Working Group II, 127.

<sup>21</sup> Working Group II, 80.

<sup>22</sup> R. Moss and S. Schneider, “Uncertainties in the IPCC TAR: recommendations to lead authors for more consistent assessment and reporting,” in *Guidance Papers on the Cross Cutting Issues of the Third*

In an effort to promote consistency, confidence schemes and qualitative terms were developed and utilized to assess and communicate the scientific merit of the information presented.

The degrees of uncertainty presented in Working Group II are based on a Bayesian probability framework. Within this framework, “the probability of an event is the degree of belief that exists among lead authors and reviewers that the event will occur, given observations, modeling results, and theory currently available.”<sup>23</sup> Expressed on a quantitative scale, there are five levels within this scheme that are used to categorize degrees of uncertainty; these levels are very high confidence level, high confidence level, medium confidence level, low confidence level, and very low confidence level.<sup>24</sup> Additionally, there is an optional second scale that could be used to supplement the quantitative scale if the authors deemed necessary; this second method employed is Bayesian as well, but is qualitative, rather than quantitative. It exists as a supplement, and not an alternative, because the terms do not map well onto a quantitative scale, thus increasing the possibility for inconsistent usage; it was used only in those instances when a writing team felt the need to explain why it assigned the confidence

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*Assessment Report of the IPCC*, ed. R. Pachauri, T. Taniguchi, and K. Tanaka (Geneva: World Meteorological Association, 2000), 34.

<sup>23</sup> Working Group II, 79.

<sup>24</sup> Working Group II, 79.

5-Point Qualitative Scale for Confidence Levels

1. 95% or greater is a very high confidence level
2. 67-95% is a high confidence level
3. 33-67% is a medium confidence level
4. 5-33% is a low confidence level
5. 5% or less is a very low confidence level

level that it did.<sup>25</sup> It assesses and reports on the “quality or level of scientific understanding that supports a given conclusion” based on evidence and agreement among experts.<sup>26</sup> Within this method, there are four “state of knowledge” descriptors; these descriptors are well-established knowledge, established but incomplete knowledge, competing explanations, and speculative knowledge.<sup>27</sup> While the five point scale was recommended for all working groups to the third assessment report, working Group I adopted a separate, seven point scale (also Bayesian) to express judgmental degrees of confidence. This was done primarily because authors in Working Group I disagreed with the recommended wording; “Decisions to adopt a 7-level scale for describing likelihood were taken primarily to introduce a descriptor for a very high level of likelihood expressing results from observational studies involving large amounts of information.”<sup>28</sup>

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<sup>25</sup> Moss and Schneider, 44.

<sup>26</sup> Working Group II, 79.

<sup>27</sup> Working Group II, 79.

Qualitative State of Knowledge Descriptors

1. *Well- Established* – Models incorporate known processes; observations are consistent with models; or multiple lines of evidence support the finding.
2. *Established but Incomplete* – Models incorporate most known processes, although some parameterizations may not be well tested; observations are somewhat consistent but incomplete; current empirical estimates are well founded, but the possibility of changes in governing processes over time is considerable; or only one or a few lines of evidence supports the finding.
3. *Competing Explanations* – Different model representations account for different aspects of observations or evidence or incorporate different aspects of key processes, leading to competing explanations.
4. *Speculative* – Conceptually plausible ideas that haven’t received much attention in the literature or that are laced with difficulty to reduce uncertainties.

<sup>28</sup> Martin Manning, et al, ed., *IPCC Workshop on Describing Scientific Uncertainties in Climate Change to Support Analysis of Risk and of Options: Workshop Report* (Boulder, CO.: IPCC Working Group I Technical Support Unit, 2004), 33.

They use the following terms: virtually certain, very likely, likely, medium likelihood, very unlikely, and exceptionally unlikely.<sup>29</sup>

Despite the implicit uncertainties present in predictions involving the impacts of future climate change, there are several predictions that are made with force in the TAR. In general, climate sensitivity is likely to range between 1.5-4.5°C between the years 1990 and 2100.<sup>30</sup> These numbers are based on the atmospheric-ocean general circulation model (AOGCM), which uses a range of possible emissions scenarios as developed in the IPCC Special Report on Emissions Scenarios (SRES).<sup>31</sup> The TAR also states that all land areas will warm more rapidly than the global average, as the global average takes into account the warming of the oceans which warm slower than land masses.<sup>32</sup> For instance, AOGCM scenarios project that winter warming for all high-latitude northern regions will exceed the global mean warming by more than 40%.<sup>33</sup> Glaciers and ice caps are predicted to retreat, while Northern Hemisphere snow cover and sea ice are projected to decrease, as well. Global average sea level increases are expected to fall between .11 and

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<sup>29</sup> Working Group I, 28.

1. virtually certain – greater than 99% that a result is true
2. very likely – 90-99% chance
3. likely – 69-90% chance
4. medium likelihood – 33-66% chance
5. unlikely – 10-33% chance
6. very unlikely – 1-10% chance
7. exceptionally unlikely – less than 1% chance

<sup>30</sup> Working Group I, 67. Climate sensitivity is defined as “the equilibrium response of global surface temperature to a doubling of equivalent CO<sub>2</sub> concentration.”

<sup>31</sup> For more information on the IPCC SRES, see Working Group I to the Third Assessment Report of the Intergovernmental Panel of Climate Change, *Climate Change 2001: The Scientific Basis* (Cambridge: Cambridge University Press, 2001), 62-63.

<sup>32</sup> Working Group I, 67.

<sup>33</sup> Working Group I, 67.

.77 meters.<sup>34</sup> Additionally, carbon dioxide concentrations are predicted to reach 540-970 ppm by 2100.<sup>35</sup>

Further, the TAR projects even more specific impacts with high confidence levels. In Africa, it is predicted that grain yields will decrease, affecting overall food security. There is expected to be an increase in droughts, floods, and other extreme weather events which will undoubtedly put stress on food and water resources, hinder development, and adversely affect human health. Additionally, scientists predict that coastal settlements in Africa will suffer in various ways (higher instances of erosion, displacement of people, etc) because of the predicted rise in sea-level.<sup>36</sup>

Asia is forecasted to experience an increase in floods, droughts, forest fires, and tropical cyclones, especially in the temperate and tropical regions of the continent. These extreme weather events, specifically tropical cyclones and flooding, are expected to displace tens of millions of people in the low lying coastal areas of temperate and tropical Asia. Due to the predicted rise in sea level, the ecological security of delicate ecosystems, primarily mangroves and coral reefs, will be put at risk.<sup>37</sup>

In Australia and New Zealand, water security will be jeopardized because of the drying trends that are expected to envelop the region. Further, animal and plant species

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<sup>34</sup> Working Group I, 75. The TAR cites the following contributions to the rise in sea level:

1. a thermal expansion of .11 - .43 m
2. a glacier contribution of .01-.23m
3. a Greenland contribution of -.02 - .09m
4. an Antarctic contribution of -.17 - .02m

<sup>35</sup> Working Group I, 63. Uncertainties in this projection cause a variation of -10 - +30%. Given this variation, the total range of carbon dioxide concentration in 2100 is 490 – 1260 ppm. (Working Group I, 63.)

<sup>36</sup> Working Group II, 14.

<sup>37</sup> Working Group II, 14.

with very specific climate niches are expected to become endangered or extinct due to the fragile ecosystems in this region that will be negatively affected by climate change.<sup>38</sup>

In Europe, decrease in summer runoff, water availability, and soil moisture will heavily impact the drought prone southern regions. In coastal areas, the risks of flooding, erosion, and wetland loss are anticipated to increase, consequently affecting human settlement, industry, tourism, agriculture, and coastal habitats. Moreover, biotic zones are projected to make a northward shift, resulting in the loss of important natural habitats, thereby threatening the livelihood of some species.<sup>39</sup>

In Latin America, water supplies will be compromised due to the loss and retreat of glaciers. Droughts and floods are expected to become more frequent, with floods increasing sediment deposit, consequently tainting water supplies in some areas. Decreases in the yields of important crops are predicted and subsistence farming in some regions of Latin America will be threatened. In addition, the rate of biodiversity loss is expected to increase for this area.<sup>40</sup>

Areas of North America are expected to experience enhanced coastal erosion, coastal flooding, loss of coastal wetlands, and an increased risk of storm surges, particularly in Florida and large portions of the U.S. Atlantic coastline. Furthermore, the TAR reports that “Climate change in the polar regions is expected to be among the largest and most rapid of any region on Earth, and will cause major physical, ecological,

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<sup>38</sup> Working Group II, 15.

<sup>39</sup> Working Group II, 15.

<sup>40</sup> Working Group II, 15.

sociological, and economic impacts, especially in the Arctic, Antarctic Peninsula, and Southern Ocean.”<sup>41</sup>

Finally, small island states will also suffer many severe effects of climate change. The anticipated rise in sea-level will be especially detrimental to these areas. The increase in sea-level is expected to cause enhanced coastal erosion, an increased loss of land and property, an increased risk of storm surges, dislocation of people, and an increased risk of the loss of coastal ecosystems, and pose a threat to freshwater reserves due to the infiltration of sea water. The agricultural and tourism industries will also suffer losses due to the rise in sea-level.<sup>42</sup> Moreover, for all the regions described there are additional impacts that are predicted with medium confidence.<sup>43</sup>

## **Conclusion**

The atmosphere is vital to life (human and nonhuman) on Earth. However, with the onset of the Industrial Revolution, mankind has started to alter one of the fundamental functions that the atmosphere provides; specifically, anthropogenic activities have begun to intensify the greenhouse effect, consequently resulting in an overall warming of the globe. While there are uncertainties associated with climate science and the impacts that climate change will have, many predictions can be made with a very high or high degree of certainty. In sum, anthropogenic induced climate change will have an effect on all life forms on the planet, including humans.

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<sup>41</sup> Working Group II, 16.

<sup>42</sup> Working Group II, 17.

<sup>43</sup> These impacts are detailed in Working Group II to the Third Assessment Report of the Intergovernmental Panel of Climate Change, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* (Cambridge: Cambridge University Press, 2001), table SPM-2, 15-17.

## **Chapter II - Empirical Adequacy, Inductive Risk, and Model-Generated Climate Predictions**

### **Introduction**

In this chapter, I argue that the predictions generated by climate models offer a foundation from which to act (to develop policy), even though there are uncertainties associated with them. This claim will incorporate both van Fraassen's idea of empirical adequacy and Douglas's extended conception of inductive risk.

In section I, I give a brief explanation of van Fraassen's account of empirical adequacy. In section II, I offer a general description of general circulation models and the problems that are associated with their use. In section III, I argue that the theories on which the general circulation models are based are empirically adequate based on their ability to accurately account for past and present climate events. Continuing, in section IV, I argue that Douglas's conception of inductive risk offers a framework within which to consider these predictions. However, in order to correctly calculate the inductive risk, the risk of wrongfully accepting the predictions needs to be considered. Thus, I consider some of the relevant non-epistemic values as well as assess the empirical adequacy of economic models. Finally, I conclude that by coupling the idea of empirical adequacy with the idea of inductive risk, it is rational to act on model-generated climate predictions.<sup>44</sup>

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<sup>44</sup> The term "rational" used in this chapter is simply meant to refer to an action that is based on reason. The use of the term "rational" in this chapter differs from the use in Chapter III, as Rawls gives a very specific definition for what is meant by rational.



## Section I - A Brief Explanation of van Fraassen's Concept of Empirical Adequacy

In his work, *The Scientific Image*, Bas van Fraassen writes that “Science aims to give us theories which are empirically adequate; and acceptance of a theory involves a belief only that it is empirically adequate.”<sup>45</sup> A theory is empirically adequate if what it says about observable things is true, and “...such a theory has at least one model that all the actual phenomena fit inside.”<sup>46</sup> Thus, for van Fraassen, what is counted as an observable entity is of extreme importance. He holds that what is observable is both theory-independent and a function of the facts about humans qua organisms in the world. Additionally, he explains that “...what counts as an observable phenomenon is a function of what the epistemic community is (i.e. *observable* is *observable to us*).”<sup>47</sup> Elaborating on this idea, he explains that science designates what is properly considered observable and that the limits of observation cannot be described with finality. Therefore, for a scientist to accept a theory means that he holds that the theory is accurate with regards to its account of the observable.<sup>48</sup>

Continuing, van Fraassen explains that

To present a theory is to specify a family of structures, its models; and secondly, to specify certain parts of these models (the empirical substructures) as candidates for the direct representation of observable phenomena. The structures which can be described in experimental and measurement reports we can call appearances: the theory is empirically adequate if it has some model such that all appearances are isomorphic to empirical substructures of that model.<sup>49</sup>

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<sup>45</sup> Bas van Fraassen, *The Scientific Image* (New York: Oxford University Press, 1980), 12.

<sup>46</sup> van Fraassen, 12.

<sup>47</sup> van Fraassen, 19.

<sup>48</sup> van Fraassen, 57-9.

<sup>49</sup> van Fraassen, 64.

Complete empirical adequacy seems to be an ideal for van Fraassen. He writes, “...empirical adequacy goes far beyond what we can know at any given time. (All the results of measurement are not in; and in any case, we won’t measure everything that can be measured.)”<sup>50</sup> This suggests that there can be degrees of empirical adequacy, all of which aim towards complete empirical adequacy. Therefore, for van Fraassen, it seems as if in a theory’s “lifetime” it can become more or less empirically adequate depending the tools available for measurement and observation; however once measurement or observation has been made, then the theory must agree. To the degree that the theory agrees it is empirically adequate.

## **Section II - General Circulation Models**

The most common types of models used in climate science are general circulation models (GCMs). In general, GCMs are mathematical simulations of climate based on physical principles of long-term atmospheric conditions.<sup>51</sup> These basic and well-understood principles provide the foundation of all climate models and include things such as theories of the behavior of gases, the radiation absorption and emission characteristics of different gases, and turbulent fluid gas flows (defined primarily within the field of thermodynamics and other branches of physics).<sup>52</sup> These models are used for two primary purposes: for predicting future climates, and accounting for causes of change in the past. They incorporate a wide range of complex processes that are attributed to

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<sup>50</sup> van Fraassen, 69.

<sup>51</sup> Paul N. Edwards, “Representing the Global Atmosphere: Computer Models, Data, and Knowledge About Climate Change,” in *Changing the Atmosphere: Expert Knowledge and Environmental Governance*, eds. Clark A Miller and Paul N. Edwards (Cambridge: The MIT Press, 2001), 37.

<sup>52</sup> Edwards, 35-36.

climate change. (These processes include, but are not limited to large scale oceanic processes and atmospheric processes and most aspects of terrestrial energy, water, and carbon cycles.<sup>53</sup>) However, they are currently incapable of simulating some climate process directly (often, these processes are not completely understood, and their relationship to other known processes are assumed). For example, currently, the role of clouds, some stratospheric processes, the role of humidity/water vapor, and soil moisture processes are not accurately represented in models.<sup>54</sup> Processes that cannot be simulated directly are known as sub grid scale processes. GCMs start with a few empirically derived inputs, such as solar radiation, gas composition of the atmosphere, sea surface temperature, and orbital precession.<sup>55</sup> The models are then run and the simulated climate is compared to long term observed climate trends.

Consequently, several problems arise with the use of climate models. First, due to the fact that all the processes still can't be simulated directly, there are uncertainties with regard to how accurate the simulated climates will be. Additionally, many of the predictions that are generated by the models are for hundreds to thousands of years in the future. Therefore, there are obvious difficulties confirming the model outputs.

In order to counter these uncertainties, techniques have been developed to improve the models. One such technique is parameterization. Parameterization seeks to represent sub-grid-scale processes in terms of large scale variables. Thus, a large part of the modeler's job is determining this relationship; Edwards writes,

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<sup>53</sup> Working Group I, Technical Summary.

<sup>54</sup> Working Group I, Technical Summary.

<sup>55</sup> Edwards, 38-39.

For example, rather than represent cloud formation in terms of convection columns, cloud condensation nuclei, and other direct causes, a GCM typically calculates the amount of cloud cover within a grid box as some function of temperature and humidity.<sup>56</sup>

If the relationship cannot be determined, modelers are forced to use ad hoc schemes that provide the models with the necessary connection.<sup>57</sup> Thus, there is a question of how (if at all) parameterization affects the overall model results. Additionally, scientists are often forced to tune the parameters. Tuning the parameters involves “adjusting the values and coefficients and even, sometimes, reconstructing equations to produce a better overall model result.”<sup>58</sup> There are additional problems that arise in tuning, namely the tuning (or changing) of one coefficient may necessitate the tuning of other coefficients. Thus, changing one coefficient could push other coefficients outside an acceptable range.<sup>59</sup>

Despite these uncertainties, climate modelers have been able to make some successful predictions. Specifically, they have been able to develop models that have accurately reproduced actual real world phenomena. This has been shown in their ability to replicate past climate changes, and predict present climates with the necessary base input.<sup>60</sup> The IPCC reports;

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<sup>56</sup> Edwards, 56.

<sup>57</sup> Edwards, 57.

<sup>58</sup> Edwards, 57. “‘Better’ may mean that the result agrees more closely with observations, or that it more closely corresponds with the modeler’s judgment...” (Edwards, 57.)

<sup>59</sup> Edwards, 57.

<sup>60</sup> Working Group I, Executive Summary and Chapter 7. For example, some models have been successful in predicting and/or simulating El Niño events (Working Group I, 473), mean atmospheric fields (Working Group I, 486), large scale features of the Holocene climate (Working Group I, 496), 20<sup>th</sup> century climate (Working Group I, 498), 20<sup>th</sup> century global precipitation trends (Working Group I, 498), annual and decadal mean near surface palaeo-temperature (Working Group I, 500), extra-tropical storms and storm tracks (Working Group I, 508), wind driven-dynamics of the interior of the ocean basins (Working Group I, 486), Arctic sea ice in the 20<sup>th</sup> century (Working Group I, 490), and tropical cyclones (Working Group I,

Coupled models can provide credible simulations of both the present annual mean climate and the climatological seasonal cycle over broad continental scales for most variables of interest for climate change...Confidence in the ability of models to predict future climates is increased by the ability of several models to reproduce the warming trend in the 20<sup>th</sup> century surface air temperature when driven by radiative forcing due to increasing greenhouse gases and sulphate aerosols.<sup>61</sup>

### **Section III – The Empirical Adequacy of Model-Tested Theories**

Recall that van Fraassen wrote that “Science aims to give us theories which are empirically adequate; and acceptance of a theory involves a belief only that it is empirically adequate.”<sup>62</sup> Moreover, a theory is empirically adequate if what it says about observable things about events in the world is true and “...such a theory has at least one model that all the actual phenomenon fit inside.”<sup>63</sup> When a scientist accepts a theory, he considers the theory accurate with regard to the observable. Recall also that according to van Fraassen’s view, what is observable is, in part, a function of what the epistemic community designates as observable. Further, observation cannot be described in finality.

In the climate science community, a theory of how the climate system works has been developed, including how certain forcings affect the natural climate system. This theory is composed of a family of structures that van Fraassen calls models. Within each model there is a family of substructures, such as accounts of air and water circulation and

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509). (This is not a comprehensive list.) They are currently not successful (in varying degrees) in accounting for clouds (Working Group I, 511), humidity (Working Group I, 511), solar variability (Working Group I, 473), western boundary ocean currents (Working Group I, 488), ocean convection (Working Group I, 488), ocean eddies (Working Group I, 488), snow mass and cover (Working Group I, 491), dynamics of ice sheets (Working Group I, 491), and volcanic aerosols (Working Group I, 473). (This is also not a comprehensive list.)

<sup>61</sup> Working Group I, 473.

<sup>62</sup> van Fraassen, 12.

<sup>63</sup> van Fraassen, 12.

accounts of atmospheric chemistry and physics (among others). Parts and combinations of these substructures have been deemed as candidates for direct representation by observable phenomena; these are the empirical substructures. In modeling the natural climate system (primarily through the use of GCMs), the substructures are accounted for and represented by the mathematical formulas that make up the GCM. The climate model is then run and the predictions that result are the appearances (according to van Fraassen). If the appearances (the results of experiment, measurements, etc) are isomorphic to the empirical substructures, then the theory can properly be said to be empirically adequate. In other words, if the results of the GCM run match up with actual, observable climate phenomenon, then the theory underlying the model can be said to be empirically adequate.

Recall that climate models are used to account for past climate changes as well as to predict future climate changes. Since the timeline in which future predictions are made hundreds to thousands of years in the future, it is often very difficult, if not impossible, to compare the predicted results against the actual results. In other words, in the case of future predictions, there is no way of knowing whether or not the appearances are the same as, or similar to, the empirical substructures. Thus, in terms of being able to predict future climate, the theories that climate models are based on do not seem to be empirically adequate by the standards that van Fraassen has outlined. In fact, it makes no sense to talk about empirical adequacy, since the future, in the present, is not observable. Empirical adequacy speaks only to what is observable. Even though the future

predictions cannot yet be deemed empirically adequate, this fact cannot be held against GCMs because future predictions say nothing about current empirical adequacy.

But what of the aim of predicting past climate changes? As mentioned above, many of the climate models in use today are parameterized to meet the recorded conditions and changes of past climates. In this instance, the modelers know what the outcome of their experiment (the model simulated climate) should be; it should effectively simulate past climates. In this sense, the appearances (the model outcome) can be compared against the empirical substructures (the past recorded climate). In the instance that the results are not isomorphic, scientists return to the model to parameterize and calibrate it so that the appearances and the empirical substructures are in line. Many of today's models are able to match the outcomes of actual recorded historical climates.<sup>64</sup> Thus, with regards to the aim of accounting for past climate changes, the theories on which these climate models are based can be properly called empirically adequate.

Taking these two aims together suggests that the predictions of future climate change that are generated by climate models will also exhibit the empirical adequacy of the theories behind the models, since the same theories are used to predict both past and future climates. Although scientists can't compare their predictions of the future with what actually happens yet, they can test their model (and thus the theory that the model is based) by comparing their results to past climates. If the model output and the past recorded results are in line, then the theory can be said to be empirically adequate. This holds even if they can't compare their predictions for the future with the actual empirical

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<sup>64</sup> Working Group I, Executive Summary.

outcomes. Presumably, the interactions and relationships that make up the natural climate system will remain the same. Predicting what will happen if one of these relations changes can occur only through the use of modeling, since the climate system cannot be replicated in a lab. The theory that drives the models making these predictions is the same theory that has been tested through the comparison of model results with actual, past climate activities.

#### **Section IV - Inductive Risk and Climate Modeling**

Given the need to predict future climate change (so that policy can be made to adapt to and slow down the process), what can be said of theories (and the models that represent them) that are empirically adequate to a significant degree, but have not yet achieved the ideal of empirical adequacy? Many have argued that because of the implicit uncertainties in such predictions, it is foolish and unnecessary to act on them.<sup>65</sup> However, I hold that this is not the case. I claim that this problem can be dealt with by coupling the idea of inductive risk (proposed by Douglas) with the proven empirical adequacy of the theories that drive the models that accurately account for past and present climate changes.

In the article “Inductive Risk and Values in Science” Heather Douglas argues that “...because of inductive risk, or the risk of error, non-epistemic values are required in

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<sup>65</sup> Naomi Oreskes, Kristin Shrader-Frechette, and Kenneth Belitz, “Verification, Validation, and Confirmation of Numerical Models in the Earth Sciences,” *Science* 263 (1994): 641-647. Naomi Oreskes, “Testing Models of Natural Systems: Can It Be Done?,” *Logic, Methodology and Philosophy of Science Proceedings of the International Congress of Logic, Methodology, and Philosophy of Science 2* (1997): 207-217. Steve Rayner, “Prediction and Other Approaches to Climate Change,” in *Prediction: Science, Decision Making, and the Future of Nature*, eds. Daniel Sarewitz, Roger A. Pielke, Jr., and Radford Byerly, Jr. (Washington, D.C.: Island Press, 2000): 269-296.



science wherever non-epistemic consequences of error should be considered.”<sup>66</sup>

Expanding on Hempel’s idea of inductive risk, Douglas argues that inductive risk is a relevant aspect of the entire scientific process, not just in accepting or rejecting hypotheses. Specifically, there is inductive risk for accepting methodologies, data, and interpretations.<sup>67</sup> I would like to expand on this idea and add that there are indirect non-epistemic consequences that should necessarily be considered in taking too seriously, or not seriously enough the results of climate model predictions of future climate change.

It is commonly accepted that non-epistemic values have a legitimate role to play in the direct application of scientific knowledge in society. However, my point is different than this. First, it is different because we do not yet have scientific knowledge (or, for van Fraassen, complete empirical adequacy); rather, all that we have are predictions generated by theories that have been shown to be empirically adequate on other accounts (accurately predicting past and present climates). While someday the model-generated predictions will be able to be compared to the actual results, and the predictions can be confirmed or rejected, that information is not available today. All that there is to go on are predictions that are made by models that have been shown to exhibit a high degree of empirical adequacy in their ability to account for past and present climate, but not yet for future climate. Second, the predictions have no direct impact on society – there are no direct social or ethical consequences that arise from the predictions themselves. Unlike results of some research programs, these predictions cannot be applied to design biological weapons or to make more effective bombs (endeavors that

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<sup>66</sup> Heather Douglas, “Inductive Risk and Values in Science,” *Philosophy of Science* 67 (2000): 559.

<sup>67</sup> Douglas, 565.

many would agree are unethical on many grounds); they can serve only as guides to direct research goals. Predictions alone have no intended or unintended consequences. Rather, incorrectly acting (or not acting) on them has unintended consequences. In other words, either wrongfully accepting or wrongfully rejecting the predictions about future climate change (and the consequent action or inaction) has unintended consequences. The predictions should be used as guides to develop effective policy to slow down climate change as well as to adapt to climate change. On this account of inductive risk, scientists have the responsibility of detailing and communicating their predictions and the risks associated with their predictions to policymakers. In turn, policymakers have the responsibility of calculating the inductive risk and acting appropriately.<sup>68</sup>

In light of the decision at hand (whether or not to risk losing large amounts of resources by erroneously adopting climate change mitigation policy or to risk suffering potentially disastrous consequences of erroneously choosing not to adopt climate change mitigation policy), it is important to investigate what is at stake. Earlier in chapter I, I presented a brief overview of what stands to happen if nothing is done about climate

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<sup>68</sup> Consider the following example. In the 1980's there was growing concern over the effects of CFCs on the ozone layer. While there was uncertainty with regards to whether or not ozone depletion was occurring and whether or not it was a result of human activity, the Montreal Protocol was proposed to phase out the potentially harmful chemicals. For this situation, calculating the inductive risk (whether or not phase out the harmful substances) would look something like the following. If ozone depletion was not happening, to wrongfully sign the treaty may result in the wasting of valuable resources (for example, money spent on replacing CFCs). Conversely, if ozone depletion was occurring, then to rightfully sign the treaty would serve to protect the ozone, and consequently protect the biosphere from the resulting harms. If ozone depletion was a reality, then to fail to ratify the Montreal Protocol could result in the degradation of the ozone layer, and consequently have disastrous effects on the biosphere. On the other hand, if ozone depletion was not occurring, then not ratifying the protocol would save resources from being squandered on a non-existent cause. So, there is inductive risk in wrongfully accepting and wrongfully rejecting the treaty. The role of the policymakers in this situation is to evaluate and compare the respective risks, considering the relevant non-epistemic values. As history shows, it seems that, all things considered, the risk of wrongfully rejecting the protocol was greater than wrongfully accepting the Protocol; it was ratified in 1987. (Daniel Sarewitz, *Frontiers of Illusion* (Philadelphia: Temple University Press, 1996), 89-92.)

change. Here, I will focus on the other side of the coin – namely, I will investigate what lies behind the objection that there is too much to lose by wrongfully (or even rightfully) adopting climate change mitigation policy. First, I will show that since climate change is not solely an economic problem, economic considerations should not be the only values appealed to. Second, while there is admitted uncertainty with regards to the projections that the IPCC makes, there is even more uncertainty surrounding the economic projections.

### ***The Problem of Values***

The self-proclaimed Skeptical Environmentalist, Bjørn Lomborg, is probably one of the most notable opponents of climate change mitigation policy. His opposition is based solely on the fact that the benefits of climate change abatement policies will be enjoyed many years in the future, while the price tag of such action is a burden of the present. According to Lomborg (and other economists) the costs of a climate change protection policy will range anywhere from 1.5 to 2 percent of global GDP (this is roughly between 480 and 640 billion dollars).<sup>69</sup> Lomborg claims that initially it will be relatively cheap to make emissions cuts, but it will become progressively more expensive. Thus, the costs of reduction will increase over time; the cost in 2050 will be about 2 percent of the OECD countries' GDP and 4 percent in 2100.<sup>70</sup> Additionally, Lomborg argues that with time the global GDP is predicted to increase, so the consequences of climate change need not elicit worry;

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<sup>69</sup> Bjørn Lomborg, *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001), 301.

<sup>70</sup> Lomborg, 304.

Global warming will not decrease food production, it will probably not increase storminess or the frequency of hurricanes, it will not increase the impact of malaria or indeed cause more deaths. It is even unlikely that it will cause more flood victims, because a much richer world will protect itself better.<sup>71</sup>

He holds that to spend 2 percent of the global GDP on climate change would be foolish, and that such money would be better spent on worthier causes. He concludes, “To put it squarely, what matters to our and our children’s future is not primarily decided within the IPCC framework, but within the WTO framework.”<sup>72</sup>

Perhaps Lomborg is right –based solely on economic considerations (assuming his figures are correct) to choose to take substantial action towards mitigation is irrational. However, to categorize climate change as solely an economic problem is erroneous. Climate change will inevitably have ethical, social, ecological, and agricultural effects, among others (see chapters I and III for more detail). While economic considerations are surely important, other values should be taken into consideration. To choose not to do anything about climate change in the present based solely on economic considerations is to ignore other important values. In support of this account, Jamieson offers an argument against what he calls the management approach to climate change. The management approach to climate change draws on techniques from economic theory for guidance towards policy. In general, it seeks to manipulate behavior by controlling economic incentives. While Jamieson agrees that economic considerations in policy are important, he holds that looking solely to economics for answers is a

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<sup>71</sup> Lomborg, 317.

<sup>72</sup> Lomborg, 324.

mistake. First, economic efficiency is only one of many values that is important, and second, economics tends to generalize human interests.<sup>73</sup> He writes;

It seems plain that people are motivated by a broad range of concerns, including concern for family and friends, and religious, moral, and political ideals. And it seems just as plain that people sometimes sacrifice their own interests for what they regard to be a greater, sometimes impersonal, good...People often act in ways that are contrary to what we might predict on narrowly economic grounds, and moreover, they sometimes believe that it would be wrong or inappropriate even to take economic considerations into account.<sup>74</sup>

Since human motivations differ from person to person and circumstance to circumstance, assuming that all individuals are motivated by self-interest all of the time is fallacious.

Other values may come into play and should be considered. In the case of global climate change, its effects include more than its economic effects. Thus, when calculating the inductive risk, it is important to consider the effects that climate change will have socially, ethically, ecologically, etc. The inductive risk of adopting climate change mitigation policies and not adopting climate change mitigation policies should therefore include a consideration of all relevant values; to consider only the economic values would leave the calculation incomplete. For instance, values such as fairness, political and social stability, human rights considerations, the ability of a nation to sustain itself, national self-determination, biodiversity, and ecological integrity are all values that should be considered. None of these values are represented in economic analysis, and it is not clear that they do have a market value. While it is beyond the scope of this project to develop and argue for a comprehensive list of values that should be considered, it is

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<sup>73</sup> Dale Jamieson, "Ethics, Public Policy, and Global Warming," *Science, Technology, and Human Values* 17 (1992): 143-144.

<sup>74</sup> Jamieson, "Ethics, Public Policy, and Global Warming," 144.

not unreasonable to assume that these values are at least equal to or of greater weight (when considered together) than only economic values.<sup>75</sup>

How do these values weigh out on either side of the decision at hand? In chapter I, I detailed what stands to happen if climate change goes unchecked; in general, it is predicted that there will be global impacts (many of which are predicted to be severe) that will be felt socially, politically, and ecologically. Moving towards climate mitigation will also have an effect in some of these areas. For instance, some societies will be forced to adopt more sustainable ways of living, or pay the increased cost of maintaining a highly consumptive lifestyle. Others will be forced to adjust to new taxes, and the effects that they will have on the economy. Depending on the type of abatement that is agreed upon, the cost of energy has the potential to increase until greener technologies are developed and implemented; this could consequently cause the costs of goods and

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<sup>75</sup> A complete argument in support of this point is not made because the argument depends largely on the moral camp that one is arguing from. If we accept the fact of moral pluralism, and thus agree that there can be competing conceptions of the good, there are going to be different weights given to each value depending upon an individual's moral position. This will largely affect how one would weight the inductive risk calculation. I don't think that it is unreasonable to hold that, although there may be differences in the weight given to each, arguments can be made from utilitarianism, Kantianism, and virtue ethics theories that there is more that matters than just the financial cost of an action. Further, while mitigation will certainly have impacts environmentally, politically, socially, etc the impacts will be much less severe than if we allow climate change to go unchecked. It is important to keep in mind that there is no way to predict the specifics of climate change or of the impacts of mitigation policy. Thus, it is impossible to make an exact list of what the social, environmental, and political effects will be. What is known now is that if climate change goes unchecked, the most impoverished countries will be carrying the greatest burdens. We can expect things like food and water shortage, the spread of disease, dislocation of peoples, etc. Mitigation will put the largest burdens on developed countries because they have to learn how to become less dependant on fossil fuels; however we know that there won't be food and water shortages, the spread of disease, and the dislocation of large amounts of people. If values other than economic values are important, then it seems (to me) that we should adopt a policy of mitigation; most would say that the loss of human life, severe human rights violations, the destructions of ecosystems, etc cannot be calculated in monetary terms, and even if it could it would be inappropriate to do so. (This argument may still be incomplete. However, it may not be necessary to have an exact weight. This is true because it can be shown that GCMs are more empirically adequate than long-term economic forecasts. Based on risk assessment alone, then, it makes sense to act on the predictions generated from climate models because they are more likely to be right.)

services to increase in some nations. However, most of these burdens are likely to fall on highly industrialized countries - those countries that will have to make the most transitions in order to reduce emissions. While reducing emissions will certainly be a challenge, those nations that will be forced to make the biggest changes are also the nations that have the economic and technological resources to effectively adapt to the changes that are in order. Additionally, mechanisms can be adopted that will effectively lessen the load for industrialized nations, such as emissions trading.

As a matter of summary, then, one problem with relying solely on economic models is that they fail to take into account other relevant values. When considering some of these values, it is clear that there will be consequences in these areas if climate change policy is either wrongfully accepted or wrongfully rejected. However, it appears that wrongfully accepting the policy poses less of a risk since the effects will largely occur in those nations that have the best capacity to adapt to them. Conversely, wrongfully rejecting climate change mitigation policy has the potential to cause much more severe impacts (socially, politically, and ecologically), largely on those nations with low adaptive capacities.<sup>76</sup>

### ***The Empirical Adequacy of Economic Models***

In addition to considering other relevant values, it is helpful to examine the empirical adequacy of economic models, since there is seemingly so much to lose (economically speaking) in wrongfully accepting climate change mitigation policy. To start, there are several problems associated with economic modeling. Many of the

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<sup>76</sup> Working Group II, Summary for Policymakers.

problems that economic models face are due to the fact that they are driven primarily by questionable assumptions (in human behavior, market trends, political trends, etc). These problems are inherent with economic analysis, but they are amplified when applied to events that will occur tens to hundreds of years in the future. Consequently, the outputs of the model depend upon the assumptions the modelers make and it is often the case that models of the same scenario can achieve drastically different outputs.<sup>77</sup>

To begin, there are problems with assigning market values to non-market goods, such as the costs of species extinction, the loss of biodiversity, and the loss of human life. In other words, the loss of non-market goods won't be considered because they can't be entered into the equation simply because they don't have a market value; the model fails to account for all that we value. In addition, economic analysis tools employ discounting, which is based on the assumption that future costs and benefits are worth less than present costs and benefits.<sup>78</sup> Compounding the problem is the fact future people can't be compensated for irreversible losses. Additionally, since the specifics surrounding the timing, severity, and placement of climate change impacts cannot be known, it becomes extremely difficult, if not impossible to predict the costs of such impacts.

Moreover, there is also difficulty with the valuation of policies set to reduce greenhouse gas emissions. On this subject, McKibben and Wilcoxon write:

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<sup>77</sup> For example, "Clinton Administration economists used one eminent macroeconomic model to conclude that stabilizing greenhouse gas emissions at 1990 levels by 2010 would raise the price of a metric ton of carbon by \$100 – doubling the wholesale price of energy. Another use of the same model, done for industry groups by the consulting firm WEFA Inc., put the increase at \$200 per metric ton." (Carey, 64)

<sup>78</sup> The use of discounting poses many ethical problems surrounding intergenerational equity. Specifically, it's not clear that it is entirely fair to count the interests of future people less just because they exist in the future. Undoubtedly, future people will be interested in economic, ecological, social, and political stability just as much as present people are.



The costs of policies that would limit greenhouse gas emissions are highly uncertain. The reason, in large part, is that baseline emissions are very difficult to predict. [Baseline emissions are “the greenhouse gas emissions that would occur in the absence of a climate change policy.”<sup>79</sup>] The cost of reducing emissions to a target level depends heavily on how much they would have grown otherwise: the more quickly emissions grow in the absence of policy, the larger will be the reductions needed to reduce them to a given target. Not only that, but reductions will have to be made a lot sooner, and will hence be more expensive in present value terms, when baseline emissions are growing rapidly.

Many factors affect the baseline path of the world economy: the rates of population growth in different countries; the age structure, educational attainment and labour productivity of those populations; the rates of productivity growth within individual industries; the rates of convergence of developing country incomes and productivity to the levels prevailing in developed countries (or the lack of such convergence); OPEC’s production decisions; new developments in the technology of fossil fuel extraction; technical progress in conservation and fuel efficiency; the discovery of new fuel deposits and reserves; and even the degree of social and economic integration between countries. As a result, the economy is very difficult to predict over long spans of time and past attempts have been generally far off the mark. Plausible alternative assumptions about these factors can lead to vastly different emissions trajectories.<sup>80</sup>

Not only is the baseline path of the economy and emissions nearly impossible to predict in the long-term, but there are further uncertainties in calculating the costs of reducing emissions. First, there are several key economic parameters that are not known precisely: short and long-term price elasticities of demand for different fuels; the rate at which the consumption of household demands change as income rises; the degree of substitutability between products from different countries; the intertemporal elasticity of substitutions ; the elasticity of the labor supply; and reasons why more efficient energy supplies have

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<sup>79</sup> Warwick J. McKibbin, and Peter J. Wilcoxon, “Economic Modeling of Global Climate Change,” in *The Economics of Climate Change*, ed. Anthony D. Owen and Nick Hanley (New York: Routledge, 2004), 189.

<sup>80</sup> McKibbin and Wilcoxon, 175.

not been adopted yet.<sup>81</sup> Furthermore, there are uncertainties in identifying and calculating the indirect benefits of climate change mitigation policy. For instance, it has been speculated that a policy that incorporated a tax on emissions could decrease the need for other taxes (because the emissions tax would raise government revenue). As a result of all of the aforementioned uncertainties, the results of economic models differ, even when modeling the same scenarios.<sup>82</sup> A final uncertainty that cannot be controlled for in the economic analysis of climate change is the simple fact that there is no way to predict how humans are going to react to the consequences of climate change. This problem is compounded when one takes into account that the exact timing, placement, and severity of the impacts are still unknown. In sum, it is impossible to predict how individuals and nations are going to react to the many changes that climate change will instigate, thus, it is also impossible to put an accurate price tag on it.

Given all of these uncertainties, just how reliable are economic forecasts? Or, in other words, are economic models empirically adequate? Consider the following example. In a recent article in *The Wall Street Journal*, reporter Justin Lahart detailed a survey on the accuracy of economic predictions in the bond market. He wrote;

Using quarterly forecasts compiled by the Philadelphia Fed, Mr. Montier found that , over the past dozen years, whenever economists have predicted that 10-year yields would rise in the following 12 months, they have ended up being right only 45% of the time. Quarter-ahead forecasts for rising bond yields are even less accurate – they’re right only 22% of the time.<sup>83</sup>

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<sup>81</sup> McKibbin and Wilcoxon, 175.

<sup>82</sup> McKibbin and Wilcoxon, 175-176.

<sup>83</sup> Justin Lahart, “Ahead of the Tape,” *The Wall Street Journal*, 24 February 2005, sec. C1.

Factors influencing the bond market include the state of the economy, other markets, current business trends, and current (or predicted) government policy (especially having to do with new taxes), among others. Of course, the farther into the future a prediction is made, the harder it will be to predict the influential trends. In general though, the bond market is a relatively specific market with relatively identifiable variables. As the variables increase, as in the case of predicting the GDP for a given year for the United States, projections become even more uncertain. In fact, economists admit that “their models fall far short of simulating something as complex as the U.S. economy.”<sup>84</sup>

While there is no way to know (in the present) how accurate the economic models surrounding climate change will be, there is good reason to doubt them when taking into account the trouble the economists have predicting much smaller, short term economic trends. Some economists have even turned down the task of modeling climate change policy, stating that “We couldn’t possibly run something like this through and come up with anything meaningful.”<sup>85</sup> In general then, it seems as if economic models can exhibit some empirical adequacy some of the time (from the example above, 45% and 22% respectively). However, as the predictions reach farther into the future, and the variables become greater, the empirical adequacy of the models declines greatly, as modelers are assuming more about future trends.

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<sup>84</sup> John Carey, “Greenhouse Gases: The Cost of Cutting Back,” *Business Week*, 27 December 1997, 64.

<sup>85</sup> Carey, 64.

### *Choosing To Act On Model-Generated Climate Predictions*

Returning to the question at hand – in employing inductive risk, which is it rational to choose: the possibility of wasting precious economic resources, or the possibility of someday facing the consequences of unchecked global climate change? Put another way, should climate change mitigation policy be adopted or rejected, based on the predictions put forth by the IPCC? In the case of climate change, wrongfully rejecting the predictions, and thus not developing effective policy, would lead to a global ecological catastrophe with severe social and political ramifications (or a complete unpreparedness to adapt to the predicted changes).<sup>86</sup> Wrongfully accepting the predictions and developing policy that is not needed will lead to unnecessary expenses, with notable social impacts. On the other hand, if we accept the predictions and develop effective policy, and the predictions are correct, the goal of mitigating and/or adapting to the predicted changes will be met. Finally, by correctly rejecting the predictions, and not developing policy, we will be no better or worse off.

It has been shown that economic models exhibit a lower degree of empirical adequacy than GCMs. Specifically, economic models are unable to reliably predict long-term economic trends; conversely, GCMs have been shown to accurately predict past and present climate changes. Consequently, it is more likely that successful predictions will be made by models exhibiting a high degree of empirical adequacy than those models exhibiting low degrees of empirical adequacy. Additionally, in order to consider all necessary non-epistemic values, more than just economic values need to be considered.

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<sup>86</sup> Working Group II, Summary for Policymakers.

Economic models do not account for these other important values, so to make a decision just on the output of economic models would be incomplete. Specifically, as shown in chapter I (and developed further in chapter III), unchecked climate change will have social, political, and ecological consequences. While moving towards climate change mitigation will also have consequences in these realms, they will be far less severe in most instances (since mitigation can be planned). Thus, by taking into consideration the empirical adequacy of both GCMs and economic models, as well as the relevant non-epistemic values, it seems that the inductive risk of needlessly adopting policy (wrongfully accepting the predictions) is less than the inductive risk of wrongfully rejecting policy (wrongfully rejecting the predictions). In other words, all things considered, at this point in time it is rational to choose to act on the predictions put forth by the IPCC based on what stands to occur if the predictions are wrongfully rejected.

## **Conclusion**

In conclusion, by coupling the idea of empirical adequacy with the idea of inductive risk, it is rational to act on model-generated climate predictions. Because the theories that drive GCMs have been shown to be empirically adequate in their ability to account for past and present climate, and these same theories generate future accounts of climate events, there is good reason to hold that they will exhibit empirical adequacy on this front as well (presuming that the relationships and interactions that account for climate change will remain the same). Despite the fact that these theories have not achieved complete empirical adequacy, a framework for considering these predictions can be found in Douglas's conception of inductive risk. Specifically, by considering the

non-epistemic consequences of wrongfully rejecting the predictions vs. wrongfully accepting them, it is rational to choose to accept and act on these predictions.

## Chapter III – Rawls’s *The Law of Peoples* and Climate Change

### Introduction

Since it has been shown that it is rational to act on the model-generated predictions associated with climate change, and that this responsibility lies primarily with policymakers, a framework from which to deal with these predictions needs to be developed. To this end, this chapter explores the applicability of Rawls’s *The Law of Peoples* to the problem of climate change. Section I gives a brief summary of Rawls’s theory, focusing on those aspects of his work that are most relevant to the problem at hand. Section II details how climate change can threaten the well-orderedness of just or decent peoples, in at least three distinct ways: by threatening the ability of societies to meet their human rights requirements, by threatening the necessary public and political infrastructures, and finally by infringing on the abilities of just and decent regimes to meet their respective, distinct requirements. In these instances, the duty of assistance can be extended to protect the well-orderedness of those peoples in danger. Section III details an alternative Rawlsian route to dealing with the problem of climate change. Namely, it may be the case that behind the veil ignorance, parties will agree to a ninth principle to be added to the Law of Peoples that will address the problem of externalities. Finally, section IV deals with the problem of free riders and climate change. This section details how, as a last resort, strict measures of coercion can be taken against those peoples that threaten the well-orderedness of other peoples by refusing to act on their duty to assist. I conclude that the framework that Rawls offers in *The Law of Peoples* is able to adequately deal with the problem of climate change.

## Section I - Summary of Rawls's *The Law of Peoples*

In *The Law of Peoples* John Rawls outlines his principles and norms for international law.<sup>87</sup> The Law of Peoples applies to the Society of Peoples which Rawls defines as “all those peoples who follow the ideals and principles of the Law of Peoples in their mutual relations.”<sup>88</sup> To be a member of the Society of Peoples a nation must have either a constitutional liberal democracy or a non-liberal, but decent, form of constitutional and republican government. Rawls writes that the aim of the Law of Peoples is to realize the establishment of all societies into either of the above-mentioned regimes.

To arrive at the principles to govern the relations of the Society of Peoples, Rawls employs two original position arguments. The first is set at the domestic level. In this original position, members of the same society are choosing the principles of justice that will regulate their society; representatives are to agree on fair terms of cooperation that

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<sup>87</sup> Rawls writes that the Law of Peoples refers to a “particular political conception of right and justice that applies to the principles and norms of international law.” (John Rawls, *The Law of Peoples* (Cambridge: Harvard University Press, 1999), 3.

<sup>88</sup> Rawls, *The Law of Peoples*, 3. Rawls stresses the categorization of peoples above states because peoples can act for moral reasons and can be held morally accountable. One of the features of a liberal democratic people is a moral nature which allows them to establish fair terms of cooperation with others. Further, for Rawls, peoples lack traditional sovereignty and this distinguishes them as entities distinct from states. Additionally, the character of a peoples is different from the character of the state. Liberal peoples define their interests according to the reasonable, allowing it to be stable for the right reasons. Conversely, the interests of the state are based on the rational, and therefore do not allow for it to be stable for the right reasons. Despite this distinction, Rawls is very clear as to what the roles of national boundaries are. He explains that “unless a definitive agent is given responsibility for maintaining an asset and bears the loss for not doing so, that asset tends to deteriorate. In this case, the asset is the people’s territory and its capacity to support them in perpetuity; and the agent is the people themselves as politically organized.” (Rawls, *The Law of Peoples*, 38) The government’s role is to be a responsible steward of the peoples’ territory, including maintaining the environmental integrity of the territory. If a government fails to do this, it cannot correct its error by conquest of, or migration into, another peoples’ territory.



will be used to govern the basic structure of society.<sup>89</sup> Hence, the political conception of justice that will be agreed upon is the one that is both reasonable and rational and has the best reasons in support of it.

In the second original position, the liberal conception of justice that was chosen in the first original position will be extended to the Law of Peoples; this process occurs at the international level between members of separate, but equal, liberal, democratic regimes in which parties choose between different formulations of the principles of the Law of Peoples.<sup>90</sup> Again, the parties are represented as rational and are represented symmetrically (therefore fairly). Each representative in the original position represents only one people as a corporate body and seeks to protect the fundamental interests of this people. These interests include political independence and civil liberties, the peoples' security, territory, and well-being and self-respect. The principles that would be agreed upon would be the following (or versions of the following):

1. Peoples are free and independent, and their freedom and independence are to be respected by other peoples.
2. Peoples are to observe treaties and undertakings.
3. Peoples are equal and are parties to the agreements that bind them.
4. Peoples are to observe a duty of non-intervention.
5. Peoples have the right of self-defense but no right to instigate war for reasons other than self-defense.
6. Peoples are to honor human rights.
7. Peoples are to observe certain specified restrictions in the conduct of war.

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<sup>89</sup> There are five features of the original position that Rawls describes as essential: "(1) the original position models the parties as representing the citizens fairly; (2) it models them as rational; and (3) it models them as selecting from among available principles of justice that apply to the appropriate subject, in this case the basic structure. In addition, (4) the parties are modeled as making these selections for the appropriate reasons, and (5) as selecting to reasons as related to the fundamental interests of citizens as reasonable and rational." (Rawls, *The Law of Peoples*, 30-31.)

<sup>90</sup> The second original position also is subject to the five essential features as outlined in footnote 68.

8. Peoples have a duty to assist other peoples living unfavorable conditions that prevent their having a just or decent political and social regime.<sup>91</sup>

The above principles are recognized as principles of political conduct that will govern the members of the Society of Peoples; they constitute the fundamental charter of the Law of Peoples. Together, they dictate ways of forming and regulating associations of peoples as well as standards of fairness in trade and cooperation.

All members of the Society of Peoples need not be liberal peoples. Here the role of toleration emerges. Rawls explains that to tolerate means

...not only to refrain from exercising political sanctions – military, economic, or diplomatic – to make a people change its ways. To tolerate also means to recognize these non-liberal societies as equal participating members in good standing in the Society of Peoples, with certain rights and obligations, including the duty of civility requiring that they offer other peoples public reasons appropriate to the Society of Peoples for their actions.<sup>92</sup>

Rawls holds that liberal peoples must cooperate and assist all other peoples in good standing, including decent peoples. Decent peoples are those non-liberal peoples whose basic institutions of society live up to specified standards of political right and justice. Additionally, these peoples must be able to justify a reasonable and just law for the Society of Peoples.

Rawls also addresses the problem of burdened societies in the global community. He defines burdened societies as societies that “while they are not expansive or aggressive, lack the political and cultural traditions, the human capital and know-how,

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<sup>91</sup> Rawls, *The Law of Peoples*, 37.

<sup>92</sup> Rawls, *The Law of Peoples*, 59.

and, often, the material and technological resources needed to be well ordered.”<sup>93</sup> Well-ordered societies have a duty to assist burdened societies (in line with principle eight of the Law of Peoples). Rawls points out that even if a society is not wealthy, it can still be a well-ordered society. Thus, while acting on their duty of assistance, the aim for all parties involved, is to “realize and preserve just institutions, and not simply to increase, much less maximize indefinitely, the average level of wealth, or the wealth of any society or any particular class in society.”<sup>94</sup> The aim of the duty of assistance is to move burdened societies into the Society of Peoples; this is the target of the duty of assistance and assistance can cease once the target has been reached.

## **Section II - Climate Change and the Well-Orderedness of Just and Decent Peoples**

Rawls’s eighth principle for The Law of Peoples states, “Peoples have a duty to assist other peoples living in unfavorable conditions that prevent their having a just or decent political and social regime.”<sup>95</sup> Further, Rawls describes the goal of the Law of Peoples as the establishment of all societies into either a liberal or decent regime. With this aim in mind, it would presumably be the case that the eighth principle could be extended to include a duty of assistance to those peoples that are in danger of experiencing unfavorable conditions that would severely jeopardize, or even destroy, the just or decent regime of an individual society. In other words, if the aim of the Law of Peoples is the establishment of just or decent societies, then it follows that there should be a duty to assist those societies that are in danger of having such regimes compromised.

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<sup>93</sup> Rawls, *The Law of Peoples*, 106.

<sup>94</sup> Rawls, *The Law of Peoples*, 107.

<sup>95</sup> Rawls, *The Law of Peoples*, 37.

Thus, the question of whether or not global climate change would create the aforementioned conditions needs to be addressed. I contend that global climate will lead to conditions that will threaten the well-orderedness of just or decent societies in at least three distinct ways. First, climate change will leave some societies unable to meet their human rights requirements. Second, climate change will render some societies unable to maintain the right sort of public political infrastructure and political culture. Additionally, the predicted effects of climate change will leave some peoples unable to meet the further requirements of well-ordered liberal democratic societies or well-decent societies.

***Climate change and Human Rights: Will climate change leave any society unable to meet its human rights requirements?***

Rawls explains that human rights “set a necessary, though not sufficient, standard for the decency of domestic political and social institutions.”<sup>96</sup> Rawls explains that these rights include;

...the right to life (to the means of subsistence and security); to liberty (to freedom from slavery, serfdom, and forced occupation, and to a sufficient measure of liberty of conscience to ensure freedom of religion and thought); to property (personal property); and to formal equality as expressed by the rules of natural justice (that is, that similar cases be treated similarly).<sup>97</sup>

In addition, Rawls cites some articles of the Universal Declaration of Human Rights (UDHR) that may be included in his conception of human rights; specifically, he cites Articles 3 to 18. The rights mentioned in the UDHR include the rights to life, liberty, and security; freedom from slavery; the right to freedom from torture and degrading

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<sup>96</sup> Rawls, *The Law of Peoples*, 80.

<sup>97</sup> Rawls, *The Law of Peoples*, 65.

treatment; the right to recognition before the law; the right to nondiscrimination and equal protection before the law; the right to an effective remedy for an act violating fundamental rights; the right to freedom from arbitrary arrest, detention, and exile; the right to a fair and public hearing to determine the rights and obligations of criminal charges; the right to the presumption of innocence until proven guilty; the right to freedom from arbitrary interference; the right to freedom of movement and residence; the right to asylum; the right to a nationality; the right to refuse marriage; the right to property; and the right to freedom of thought, conscience, and religion.<sup>98</sup> In short, these are necessary conditions for any form of social cooperation, and are requirements for well-orderedness in just and decent regimes. Thus, if they are directly infringed upon, or if society's ability to pursue these rights is infringed upon, then the well-orderedness of that society is threatened.

Of all the rights listed above, it is presumably the case that climate change will have the potential to at least affect the ability of a people to maintain and pursue the right to subsistence. In the paper "Political Authority and Human Rights," author David Reidy writes,

But when Rawls focuses directly on the basic human rights possessed by individual persons, he interprets the right to subsistence as a right to a 'minimum economic security' including 'general all-purpose economic means' sufficient to make 'sensible and rational use' of the liberties afforded within one's own domestic political order...A more charitable reading, then, would have Rawls committed to a basic human right to a substantial economic and social minimum relative to the decent or liberal democratic domestic order to which one belongs, a minimum (in all cases except perhaps the atypical case of an isolated and primitive indigenous

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<sup>98</sup> Office of the High Commissioner for Human Rights, "Universal Declaration of Human Rights," *The Universal Declaration of Human Rights*. <<http://www.unhchr.ch/udhr/lang/eng.htm>> (27 May 2005).

people) beyond what typically comes to mind when one thinks of mere subsistence.<sup>99</sup>

Thus, at minimum, it appears that any substantial threat to economic, food, or water security would pose a threat on the ability of a people to maintain and pursue the right to subsistence, and possibly pose a threat to the well-orderedness of the society. The well-orderedness of a society would be threatened in those instances when a people's resources are degraded to such a degree that, even with trade it is no longer viable, or a people is left with nothing to trade in order to secure its necessities.

Does climate change pose a substantial threat to economic, food, and/or water security? The IPCC reports that climate change does indeed pose such a threat. They write that "the vulnerability of these systems varies with geographic location, time, and social, economic, and environmental conditions."<sup>100</sup> In general, as a result of the increase in temperature, water availability is expected to be reduced in those countries that are already water-stressed. Additionally, sea-level rise will lead to the contamination of freshwater sources of many coastal nations and small island states.<sup>101</sup> Food and agricultural security will also be threatened. The IPCC writes,

...assessments indicate that yields in some crops in tropical locations would decrease generally with even minimal increases in temperature, because such crops are near their maximum temperature tolerance and dryland/rainfed agriculture predominates. Where there is also a large decrease in rainfall, tropical crop yields would be even more adversely affected...Most studies indicate that global mean annual temperature increases of a few °C or greater would prompt food prices to increase due

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<sup>99</sup> David Reidy, "Political Authority and Human Rights," in *A Realistic Utopia: Essays on Rawls's "The Law of Peoples,"* eds. Rex Martin and David Reidy (Blackwell, 2005 forthcoming), 5.

<sup>100</sup> Working Group II, 5.

<sup>101</sup> Working Group II, 9, 14-17. Additionally, the IPCC specifically cites that parts of Africa, Asia, Latin America, and small islands states are expected to experience a decrease in water security and supply. (Working Group II, 14-17)

to a slowing in the expansion of global food supply relative to growth in global food demand (*established, but incomplete*)...studies find that climate change would lower incomes of vulnerable populations and increase the absolute number of people at risk of hunger...<sup>102</sup>

Specifically, those most vulnerable to diminishing food and agricultural security include peoples in Africa, parts of Asia, and on some small island states.<sup>103</sup>

Thus, it appears that climate change will affect the ability of some peoples to internally secure and pursue the right to subsistence. That is, the ability of some peoples to maintain an acceptable social minimum, in accord with Rawls's interpretation of the right to subsistence, will be diminished. (I will discuss economic security below.)

Consequently, the well-orderedness of some peoples will be threatened if, even with trade they are left unviable, or if the country is left with nothing to trade in order to secure its resources. In these instances, the duty to assist is triggered.<sup>104</sup>

***Climate Change and the Public Political Infrastructure: Will climate change leave any society unable to sustain the right sort of public political infrastructure, or solidarity in political culture?***

Rawls points out that citizens of a liberal and decent societies are regarded as having the two moral powers – “a capacity for a sense of justice and a capacity for a conception of the good.”<sup>105</sup> The role of the principles of justice is to “protect citizens’ higher-order interests; they are guaranteed within the framework of the liberal constitution and the basic structure of society.”<sup>106</sup> In order for the body of citizens to

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<sup>102</sup> Working Group II, 10-11.

<sup>103</sup> Working Group II, 14-17.

<sup>104</sup> It may be the case that one way to fulfill the duty of assistance is to open trade with nations that are susceptible to the criteria described above.

<sup>105</sup> Rawls, *The Law of Peoples*, 92.

<sup>106</sup> Rawls, *The Law of Peoples*, 92.

exercise and develop these two moral powers, the right type of constitution and basic structure need to be in place. In general, these requirements demand a secure economy and a rule of law, as well as the preservation of those things that give a people its identity as a people. Therefore, the ability of climate change to affect these systems needs to be explored.

### *Small Islands States and Economic Stability*

One way in which climate change could affect the systems necessary for the basic structure of a well-ordered peoples is by destroying or severely debilitating a people's economy. The IPCC reports that "The economic sectors that support the [human] settlement are affected because of changes in resource productivity or changes in market demand for the goods and services produced there."<sup>107</sup> In addition, "Settlements with little economic diversification and where a high percentage of incomes derive from climate-sensitive primary resource industries (agriculture, forestry, and fisheries) are more vulnerable than more diversified settlements (*high confidence*)."<sup>108</sup>

While all countries are expected to feel the impact of climate change on their economies, small island states are predicted to experience the worst affects.<sup>109</sup> On this matter, the IPCC reports

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<sup>107</sup> Working Group II, 12.

<sup>108</sup> Working Group II, 13. Also noteworthy is that with the increase in the severity and incidence of severe weather predicted with climate change, the costs of insurance will also rise. The IPCC reports that "Such changes would trigger increased insurance costs, slow the expansion of financial services into developing countries, reduce the availability of insurance for spreading risk, and increase the demand for government-funded compensation following natural disasters." (Working Group II, 13.)

<sup>109</sup> Working Group II, 14-17. Among others, the IPCC lists the following effects: In Asia, "Climate change would increase energy demand, decrease tourism attraction, and influence transportation in some regions of Asia (*medium confidence*)." (Working Group II, 14.) Additionally, "Poleward movement of the



The projected sea-level rise of 5 mm yr<sup>-1</sup> for the next 100 years would cause enhanced coastal erosion, loss of land and property, dislocation of land and people, increased risk from storm surges, reduced resilience of coastal ecosystem, saltwater intrusion into freshwater resources, and high resource costs to respond to and adapt to these changes (*high confidence*)... Limited arable land and soil salinization makes agriculture of small island states, both for domestic food production and cash crop exports, highly vulnerable to climate change (*high confidence*)... Tourism, an important source of income and foreign exchange for many islands, would face severe disruption from climate change and sea-level rise (*high confidence*).<sup>110</sup>

The effect that climate change will have on tourism on these areas is of great concern.

The IPCC reports that these islands will suffer both direct and indirect effects in this area; for instance, the loss of beaches and degraded coastal ecosystems (as a result of sea level rise), coupled with the warmer winters that are projected for the developed countries of the north may leave these destinations less attractive. A further concern related to tourism is that it is a major source of employment in many of these areas; for example, this industry represents 70% of the labor force in the Bahamas and 40% in Malta.<sup>111</sup>

Thus, any impact that climate change has on tourism, will affect the job opportunities and well-being of the laborers in these areas.

Small islands are also less likely to be able to adapt to the effects of climate change due to their small physical sizes, limited natural resources, relative isolation, the

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southern boundary of the permafrost zones in Asia would result in a change of thermokarst and thermal erosion with negative impacts on social infrastructure and industries (*medium confidence*).” (Working Group II, 14.) In Europe “River flood hazard will increase across much of Europe (*medium to high confidence*); in coastal areas the risk of flooding, erosion, and wetland loss will increase substantially with implications for human settlement, industry, tourism, agriculture, and coastal natural habitats.” (Working Group II, 15.) In Latin America, “Coastal settlements, productive activities, infrastructure, and mangrove ecosystems would be negatively affected by sea-level rise (*medium confidence*). (Working Group II, 15.) In North America, “Weather-related insured losses and public sector disaster relief payments in North America have been increasing; insurance sector planning has not yet systematically included climate change information, so there is potential for surprise (*high confidence*). (Working Group II, 16.)

<sup>110</sup> Working Group II, 17.

<sup>111</sup> Working Group II, 862.

openness of their small economies that are very sensitive to external shocks and natural disasters, undeveloped infrastructures, and limited funds and skills.<sup>112</sup> The IPCC explains that while small islands states contribute less than 1% of the global GHG emissions, they are the most vulnerable to the consequences; even if a global effort (the Kyoto Protocol) was adopted, it would be too late to make a significant difference for small island states – “Therefore, climate change impacts are inevitable.”<sup>113</sup>

In general, climate change has the potential to affect the economies of almost all nations, but its most severe effects will be borne by those peoples that do not have the capacity to effectively adapt. Small islands states are especially vulnerable, and the impacts that climate change will have on these nations’ economies will certainly threaten the well-orderedness of these peoples, since climate change embodies the potential to debilitate or completely destroy these peoples’ economies. Thus, in those cases where the stability of the economy will be substantially affected by climate change, and consequently affect the ability of a well-ordered society to remain as such, the duty of assistance is triggered.

#### *Climate Change and Cultural Threats*

Rawls writes, “...it is surely, *ceteris paribus*, a good for individuals and associations to be attached to their particular culture and to take part in its common public and civic life.”<sup>114</sup> To unnecessarily infringe on a people’s culture is to unnecessarily infringe on their right to self-determination. With the predicted effects of

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<sup>112</sup> Working Group II, 60.

<sup>113</sup> Working Group II, 854-855.

<sup>114</sup> Rawls, *The Law of Peoples*, 61.

climate change, many peoples are going to be forced to change the ways that they live, and abandon priceless aspects of their culture. However, some of these impacts are going to be harsher on certain populations than they are on others. Some peoples stand to lose ecosystems that are considered national treasures, while others are going to have to give up the traditions of their ancestors, and still others are going to lose invaluable symbols of spirituality and history. In what follows, I will offer a few examples in support of this claim, but it is important to note that this is far from a comprehensive list.

To begin, climate change is predicted to lead to the destruction or severe impairment of ecosystems that some people depend on for their cultural and spiritual livelihood. This is especially true in parts of Latin America. The local people inhabiting parts of this region have strong ties to the land, both aesthetically and spiritually.<sup>115</sup> The IPCC writes that an increase in sea level “could affect monuments and historic sites of Central America.”<sup>116</sup> Indigenous peoples in the polar regions are also very susceptible to the consequences of climate change. In these regions, “Harvesting [of fish] contributes to community cohesion and self-esteem, and knowledge of wildlife and the environment strengthens social relationships.”<sup>117</sup> With the onset of climate change, the increase in temperature, sea-level rise, and coastal erosion the range and abundance of keystone (for the people) marine and terrestrial animals will be threatened; “At minimum, salmon, herring, walrus, seals, whales, caribou, moose, and various species of waterfowl are likely to undergo shifts in range and abundance. This will entail local adjustments in

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<sup>115</sup> Working Group II, 717.

<sup>116</sup> Working Group II, 717.

<sup>117</sup> Working Group II, 827.

harvest strategies as well as in allocations of labor and resources.”<sup>118</sup> Additionally, changes in the seasons experienced in this region will also have profound effects on the inhabitants. Consider the following;

For example, when sea-ice is late in forming, certain forms of hunting are delayed or may not take place at all. When sea ice in the spring melts or deteriorates too rapidly, it greatly decreases the length of the hunting season. Many traditional foods are dried (e.g., walrus, whale, seal, fish, and birds) in the spring and summer to preserve them for consumption over the long winter months. When the air is too damp and wet during the “dying” seasons, food becomes moldy and sour. The length of the wet season also affects the ability to gather greens such as willow trees, beach greens, dock, and wild celery.<sup>119</sup>

In sum, “the combination of alternative cultural lifestyles and altered subsistence opportunities resulting from a warmer climate may pose the greatest threat of all to the continuity of indigenous cultures in northern North America.”<sup>120</sup>

A final example of a threatened culture lies in the peoples that inhabit small islands states. Again, this culture is a risk of losing much of its subsistence and traditional skills and knowledge, its community structure, and its villages and settlements.<sup>121</sup> Already

Sea-level rise and climate changes, coupled with environmental changes have destroyed some very important and unique cultural and spiritual sites, coastal protected areas, and traditional heritage sites in the Federated States of Micronesia, Tuvalu, the Marshall Islands, Niue, and Kiribati, and

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<sup>118</sup> Working Group II, 827.

<sup>119</sup> Working Group II, 827.

<sup>120</sup> Working Group II, 827. It should be noted that it is not clear whether or not the indigenous peoples mentioned above actually constitute a people in the Rawlsian sense. Specifically, the IPCC does not specifically state which nation these peoples are a part, or whether they constitute a nation in and of themselves. If they are part of a larger nation, and this particular subculture is threatened, it may not always be the case that such a threat would also threaten well-orderedness. However, if, for instance, the indigenous peoples had their own central government, shared common sympathies, a shared history, etc, and could properly be classified as a people (in the sense that Rawls meant the word), then the type of cultural threat described above would almost certainly threaten well-orderedness.

<sup>121</sup> Working Group II, 865.

continue to threaten others...In Tuvalu, for instance, strong traditional ties to land and sea constitute a vital component of local cosmology.<sup>122</sup>

The effects of climate change will have an impact on many cultures around the world, but some are more severely threatened by others. As of now, many of the most negative effects are still avoidable, and for those that are inevitable, there is still enough time to prepare for them. Since for Rawls a peoples' culture is part of its self-identity and self-respect, to infringe upon on a peoples' culture in a way that is both negative and avoidable is to infringe upon their right to self-determination. Additionally, a peoples' self-identity and their ability for self-determination are imperative for a society to become and remain well-ordered. Thus, any negative, avoidable threat to the self-identity or (unnecessary) threat to the self-determination of a peoples threatens the well-orderedness of a peoples; climate change poses such a threat. Therefore, the duty of assistance is triggered.

***Climate Change and the Further Requirements of Well-Orderedness: Will climate change affect the ability of liberal societies to meet their respective requirements of well-orderedness?***

Rawls writes that liberal peoples, while rational, are constrained by the reasonable.<sup>123</sup> This moral nature, in order to achieve stability for the right reasons, must be sustained from one generation to the next. These reasonable interests allow peoples to attain stability for the right reasons. Rawls explains, "Stability for the right reasons describes a situation in which, over the course of time, citizens acquire a sense of justice

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<sup>122</sup> Working Group II, 865.

<sup>123</sup> As described earlier, this means that citizens "offer to cooperate on fair terms with other citizens, so (reasonable) liberal (or decent) people offer fair terms of cooperation to other peoples." (Rawls, *The Law of Peoples*, 25.)

that inclines them not only to accept but to act upon the principles of justice.”<sup>124</sup> For Rawls, a reasonably just constitutional democratic society meets three characteristic principles:

the first enumerates basic rights and liberties of the kind familiar from a constitutional regime;  
the second assigns these rights, liberties, and opportunities a special priority, especially with respect to the claims of the general good and perfectionism values; and  
the third assures for all citizens the requisite primary goods to enable them to make intelligent and effective use of their freedoms.<sup>125</sup>

Rawls explains that the third principle requires certain types of institutions and arrangements if a regime is to achieve stability for the right reasons:

- (a) A certain fair equality of opportunity, especially in education and training. (Otherwise, all parts of society cannot take part in the debates of public reason or contribute to social and economic policies.)
- (b) A decent distribution of income and wealth meeting the third condition of liberalism: all citizens must be assured the all-purpose means necessary for them to take intelligent and effective advantage of their basic freedoms. (In the absence of this condition, those with wealth and income tend to dominate those with less and increasingly to control political power in their own favor.)
- (c) Society as employer of last resort through general or local government, or other social and economic policies. (The lack of a sense of long-term security and of the opportunity for meaningful work and occupation is destructive not only for citizen’s self-respect, but of their sense that they are members of society and not simply caught in it.)
- (d) Basic health care assured for all citizens.
- (e) Public financing of elections and ways of assuring the availability of public information on matters of policy. (A statement for the need for these arrangements merely hints at what is needed both to ensure that representatives and other officials are sufficiently independent of particular social and economic interests and to provide the knowledge and information upon which policies can be formed and intelligently assessed by citizens.)<sup>126</sup>

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<sup>124</sup> Rawls, *The Law of Peoples*, 45.

<sup>125</sup> Rawls, *The Law of Peoples*, 14.

<sup>126</sup> Rawls, *The Law of Peoples*, 50.

These requirements will serve to help protect the basic liberties and will help to prevent excessive inequalities. Thus, the question must be asked, will the effects of climate change have the potential to threaten these requirements and/or the three principles of a just democratic society.

To begin, it is worth noting that it has already been shown that climate change has the potential to affect the ability of a people to meet its human rights requirements as well as its ability to sustain the right sort of public political infrastructure (as seen in the possibility that climate change will effect both the stability of economies and the self-identity of some peoples). If these requirements cannot be met, it would be very difficult, if not impossible, to meet the further requirements of a well-ordered democratic society. Nonetheless, it is worth exploring this possibility.

Depending on the relative wealth of a people (and therefore their adaptive capacities), climate change may in fact have a profound impact on the ability of a society to meet the aforementioned requirements.<sup>127</sup> Climate change is going to demand lifestyle changes to reduce the impacts of climate change, or as a result of the impacts of climate change. The costs of maintaining food security, water security, dealing with new health issues, and/or preparing for and recovering from weather events may create a burden that can not be overcome, while at the same time maintaining the requisite structures for a just democratic society. For example, the IPCC reports, “It is established, though

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<sup>127</sup> However, it is worth noting that Rawls does not hold that wealth is a necessary condition for well-orderedness. Of additional note is the fact that many of the most susceptible societies to the effects of climate change are societies that, in the present, may already be considered burdened and are therefore already entitled to aid (for ex, some countries in Africa and some small island states). Further, it seems that while wealth is not a necessary condition for well-orderedness, in the case of climate change, the wealthier a society is, the more easily it will be able to adapt, and the safer it will be from losing its well-orderedness.

incompletely, that climate change, mainly through increased extremes and temporal/spatial shifts will worsen food security in Africa.”<sup>128</sup> Additionally,

Adaptive capacity of human systems in Africa is low due to lack of economic resources and technology, and vulnerability high as a result of heavy reliance on rain-fed agriculture, frequent droughts and floods, and poverty....Grain yields are expected to decrease for many scenarios, diminishing food security, particularly in small food-importing countries (*medium to high confidence*)...Increases in droughts, floods, and other extreme events would add to stresses on water resources, food security, human health, and infrastructures, and would constrain development in Africa (*high confidence*).<sup>129</sup>

If there exists a country in Africa that is well-ordered and meets the aforementioned criteria, but is susceptible to the problems described above, then it may be that its status as a well-ordered, liberal society is in jeopardy. The characteristics and principles that Rawls offers above are in place so as to ensure that all citizens can remain free and equal, politically speaking. In order for this to occur, and as reflected above, the society must be able to sustain a decent social minimum for all its citizens. Rawls describes this minimum, “This covers at least the basic needs essential to a decent life, and presumably more.”<sup>130</sup> This foundation is needed to secure the idea of political equality and self-respect in citizens. A citizen lacking in the basic needs will be politically withdrawn from society, and will be more likely to see himself as inferior to his fellow citizens. Rawls describes the social bases of self respect as “essential if citizens are to have a lively sense of their worth as persons and to be able to advance their own ends with self-

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<sup>128</sup> Working Group II, 11.

<sup>129</sup> Working Group II, 14.

<sup>130</sup> John Rawls, *Justice as Fairness: A Restatement*, ed. Erin Kelly (Cambridge: The Belknap Press of Harvard University Press, 2001), 130.



confidence.”<sup>131</sup> If, for example, food or basic health care is only available to wealthier citizens then the equality and self-respect of citizens cannot be assured. In general, the severity of impacts that a society may face, coupled with its ability to adapt to these impacts may affect the ability of a society to maintain the equality (and perhaps other requirements) of all its citizens.

Thus, it seems to be the case that in some well-ordered, democratic countries climate change may infringe upon their abilities to maintain the equality of their citizens. If this is the case, then climate change can actually threaten the well-orderedness of some democratic regimes. Thus, again, the duty of assistance is triggered.

***Climate Change and the Further Requirements of Well-Orderedness: Will climate change affect the ability of decent societies to meet their respective requirements of well-orderedness?***

For Rawls, a non-liberal society is decent if its “basic institutions meet certain specified conditions of political right and justice and lead its people to honor a reasonable and just law for the Society of Peoples.”<sup>132</sup> One condition for such a society is that it must secure the human rights of all its members, including

the right to life (to the means of subsistence and security); to liberty (to freedom from slavery, serfdom, and forced occupation, and to a sufficient

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<sup>131</sup> Rawls, *Justice as Fairness: A Restatement*, 59.

<sup>132</sup> Rawls, *The Law of Peoples*, 60. While Rawls writes that there can be different forms of a decent society, he takes time to outline the characteristics of only a decent consultation hierarchy. The first condition for such a society is that it achieves legitimate ends through peaceful methods. Additionally, while some religious or comprehensive doctrine influences its government and social policies, the society respects the political and social orders of other societies. The second condition that a decent consultation hierarchy must meet has three parts. First, the society must secure the human rights of all its members. Second, the law of the decent people must be such that it imposes “bona fide moral duties and obligations (distinct from human rights) on all persons within the people’s territory.” (Rawls, *The Law of Peoples*, 65-66) The third criterion of the second condition details that judges and officials administering the legal system must have a sincere and reasonable belief that the law they uphold is guided by a common good idea of justice.

measure of liberty of conscience to ensure freedom of religion and thought); to property (personal property); and to formal equality as expressed by the rules of natural justice (that is, that similar cases be treated similarly).<sup>133</sup>

The rights and liberties outlined above are needed in order to secure that persons can meet their duties and obligations, as well as be and remain cooperating members of society.<sup>134</sup> Second, the law of the decent people must be such that it imposes “bona fide moral duties and obligations (distinct from human rights) on all persons within the people’s territory.”<sup>135</sup>

While it has already been shown that climate change may affect a society’s ability to meet its human right requirements, a decent society may also be in jeopardy if it cannot provide its citizens with those resources necessary for them to meet their duties and obligations and to remain cooperating members of society. As in the case with liberal societies, things such as food and water security are some of the resources necessary to sustain this standard. Those countries that are susceptible to the severe impacts of climate change but do not have the wealth or resources to adapt are the nations that are most in jeopardy. The IPCC reports that countries in Africa, Asia, Latin America, and small island states will experience threats to their water and/or food security.

Additionally, it is in these same areas that the IPCC reports as having the least adaptive capacity due to things such as lack of economic resources and technology, climate sensitive agriculture, and small economies.<sup>136</sup> In these areas, it may be that the well-orderedness of some peoples may be threatened because the background resources that

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<sup>133</sup> Rawls, *The Law of Peoples*, 65.

<sup>134</sup> Rawls, *The Law of Peoples*, 68.

<sup>135</sup> Rawls, *The Law of Peoples*, 65-66.

<sup>136</sup> Working Group II, 14-17.

are necessary to sustain such a society is threatened. Therefore, the duty to assist is again triggered.

In addition, even if these resources are sustained to a minimum degree, a decent society also demands a certain type of public political infrastructure along with the rule of law.<sup>137</sup> While these societies need not be liberal, they must remain non-authoritarian. In those cases when the background resources are in serious shortage, the rule of law and the right sort of public political infrastructure will likely be left unstable. In some instances it may be that they degrade entirely. In these instances, the duty to assist is triggered.

Finally, decent societies, unlike liberal societies may have a national religion or conception of the good. As a matter of self-determination, a decent society ought to be allowed to pursue its chosen religion or conception of the good. Of course, this ability may be threatened by the impacts of global climate change in any of the ways previously mentioned. If the ability of a nation to pursue its conception of the good is threatened, the duty to assist may be triggered.

### ***The Duty to Assist***

Thus, it is clear that global climate change will affect the ability of some decent and some liberal societies to remain as such. Recall that Rawls's duty to assist states: "Peoples have a duty to assist other peoples living under unfavorable conditions that prevent their having a just or decent political and social regime."<sup>138</sup> Further, the aim of

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<sup>137</sup> Rawls, *The Law of Peoples*, 65-67.

<sup>138</sup> Rawls, *The Law of Peoples*, 37.

the Law of Peoples is the establishment of all societies into either a liberal or decent regime. With this aim in mind, the duty to assist could be proactively invoked to protect those peoples that are in danger of experiencing unfavorable conditions that would severely jeopardize, or even destroy, the ability of a society to remain well-ordered. (However, Rawls himself never discusses such a possibility.) In other words, if the aim of the Law of Peoples is the establishment of just or decent societies, then it follows that there should be a duty to assist those societies that are in danger of having such regimes compromised. Additionally, all members of the Society of Peoples are obligated by the duty to assist, not just those members who are most responsible for the damage, and not just the wealthiest societies. (However, the amount of wealth a society has can limit its contributions.)

So, how then can Rawls's duty to assist be extended to deal with this problem? Presumably, there are two important steps that should be taken. First, there is a duty to slow down or stop those processes that are causing the harm. Namely, those practices that have led to climate change need to be refined in such a way that they create no or little threat. Further, there is a duty to help those countries that will suffer the consequences of climate change adapt to the changes that will inevitably occur as a result of global climate change. Since climate change is a global problem, brought on by each member of the human race (admittedly, some societies have contributed more damage than others), the solution needs to be one that adequately and fairly deals with these facts. In general, the solution must be one that encompasses the participation and cooperation

of all countries, especially those countries that have been shown to contribute the most to the problem at hand.

In *The Law of Peoples*, Rawls writes that in the second original position peoples will “formulate guidelines for setting up cooperative organizations and agree to standards of fairness for trade as well as certain provisions for mutual assistance.”<sup>139</sup> Presumably, then, in the Society of Peoples, an agreement that dealt with the problem of climate change could be formed. Additionally, it is important to note that for Rawls, the principles that constitutes the charter of the Law of Peoples include, “Peoples are to observe treaties and undertakings,” and “Peoples are equal and are parties to the agreements that bind them.”<sup>140</sup> Thus, once an agreement has been reached the parties to the agreement (in this case, the whole of the Society of Peoples) would be bound to live up to the agreement.<sup>141</sup>

### **Section III - An Alternative Rawlsian Route to Dealing With the Problem of Climate Change**

While extending the duty to assist is one viable way for dealing with the problem of climate change within the Rawlsian framework, there may be another; namely, behind the original position representatives may agree on a ninth principle that deals with the problem of externalities. One reason to be concerned with externalities would be issues of fairness. Specifically, it would presumably be unfair to force country A to bear the

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<sup>139</sup> Rawls, *The Law of Peoples*, 42.

<sup>140</sup> Rawls, *The Law of Peoples*, 37.

<sup>141</sup> Working from Rawls’s account of ideal theory, a direct application of the eight principles (and the proposed ninth) leads towards collective action and treaty making as ways to deal with the problem of climate change (as a coordinated extension of the duty of assistance). Unfortunately, this leaves the door open for the opportunity to free ride. This problem is addressed in section IV.

costs of country B's action, while only B enjoys the benefits of such action. A second reason that agents may be concerned with externalities has to do with efficiency; in other words, aside from questions of fairness, externalities pose the risk of inefficiency. In those instances where externalized costs are greater than the internalized gains the behavior poses the risk of being a leach on social utility and cooperation, rather than a contributor to it.

Recall that the second original position is set up to extend a liberal conception of justice to the Law of Peoples; that is, they are deliberating over the content of the Law of Peoples. The parties are restricted by a veil of ignorance that protects them from knowledge of the size of the territory inhabited by those that they represent, the population of those they represent, the strength of those that they represent, the availability of natural resources in the territory, the level of economic development, and other such information. They do know that there are conditions that make a democratic society favorable. The representatives are to secure the interests of the parties that they represent. Rawls writes, "Thus, they strive to protect their political independence and their free culture with its civil liberties, to guarantee their security, territory, and the well-being of its citizens."<sup>142</sup> In addition, Rawls states a further interest – that of amour-propre. Rawls explains "...this interest shows itself in a people's insisting on receiving from other peoples a proper respect and recognition of their equality."<sup>143</sup> Behind the veil of ignorance, the peoples are regarded as being equal, reasonable, and rational; thus, all are prepared to offer and accept fair terms of social and political cooperation. Rawls

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<sup>142</sup> Rawls, *The Law of Peoples*, 34.

<sup>143</sup> Rawls, *The Law of Peoples*, 35.

writes, “These fair terms are those that a people sincerely believes other equal peoples might accept also; and should they do so, a people will honor the terms it has proposed even in those cases where a people might profit from violating them.”<sup>144</sup> In short, this is a criterion of reciprocity. Under these conditions, Rawls was led to the eight principles that serve as the charter for the Society of Peoples. The principles agreed upon rest on a foundation of equality and equal rights for all peoples and all satisfy the criterion of reciprocity. Under the same conditions, with the same interests in mind, it would presumably be the case that the representatives would agree on a ninth principle: Peoples have a duty to internalize externalities that threaten the ability of other peoples to maintain territorial integrity.

Like the original eight principles, the proposed ninth principle would meet the criteria of reciprocity and equality. With regards to reciprocity, this principle could be sincerely proposed and could be reasonably accepted by others “without submitting to a position of inferiority or domination.”<sup>145</sup> In other words, it is based on reasons that all behind the veil of ignorance could accept. These reasons are properly based on political values (efficiency and fairness), and thus are reasons that all can accept; they are not based on some particular comprehensive doctrine of the good or the like. Additionally, the ninth principle meets the baseline of equality because it preserves the equality and equal rights of all people by preventing one people from unfairly imposing themselves and their damaging byproducts on another people. Consequently, by adopting such a principle the representatives in the original position would serve to protect the

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<sup>144</sup> Rawls, *The Law of Peoples*, 35.

<sup>145</sup> Rawls, *The Law of Peoples*, 121.

fundamental interests of the parties that they represent. Specifically, this principle would protect the territory and well-being of represented peoples by either prohibiting harmful externalities, or demanding adequate compensation for harmful externalities. This principle would also serve to protect the self-respect of the people. For example, a nation that is subject to the harmful pollution of another country could come to see itself (and be seen by the world) as a dumping ground for unwanted byproducts. Such a nation would no longer be viewed as an equal, and would not be able to exercise its right of self-determination.<sup>146</sup>

### ***Evaluative Criteria for Realizing the Principle***

The issue of identifying a proper procedure or mechanism for realizing this principle in the real world is beyond the scope of this project. However, there are certain criteria that any procedure or mechanism should meet. Presumably, the same criteria that led to the agreement of the ninth principle (behind the veil of ignorance) should be the standard that the realization of the principle should meet. Thus, any procedure that is

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<sup>146</sup> In the same line of reasoning that Rawls employs, it may be helpful to imagine an alternative to this principle; such a principle would state something to the effect that a people need not internalize externalities that threaten the ability of other peoples to maintain territorial integrity. Would this alternative be accepted? First, recall that representatives are driven to secure the interests of those peoples that they represent. To adopt such a principle would be to unnecessarily disregard these interests. Second, does such a principle rest on a foundation of equality? In other words, does adopting this principle adequately preserve the independence and equality of each of the peoples represented? The alternative principle would allow for one people to treat another people in way that disregarded their equality and the respect that it deserved; as Rawls explains a people would insist on "...receiving from other peoples a proper respect and recognition of their equality." (Rawls, *The Law of Peoples*, 35.) To allow for the realization of a principle that allowed for one people to threaten the territorial integrity of another would be to place the two peoples on unequal grounds. Since such an inequality would not be to the benefit of both peoples and thus would not be agreed to. Finally, this principle fails to satisfy the criterion of reciprocity. A principle that allowed for one people to threaten the territorial integrity of another would not be a principle that could reasonably be accepted by all parties. This is the case because, behind the veil of ignorance, no party knows the position of the peoples it represents, and thus there is a possibility that the people that it represents would be harmed by the adoption of such a principle. Thus, it would not be reasonable for the representatives to accept such a principle based on securing the interests of the peoples that they represent.



adopted to deal with the internalization of harmful externalities should be fair, it should protect the fundamental interests of the members of the Society of Peoples, it should recognize all peoples as equals, and it should contain an element of mutuality. In addition, any such procedure should be concerned with economic efficiency; because, presumably, behind the original position, representatives will not only want to agree on principles of trade that are free and fair, but also ones that maximize social benefits. These criteria would lead to the adoption of a mechanism that was both fair and accepted for the best reasons (reasons that all could agree to).

A fair mechanism for the specific case of climate change would be one that fairly allocated emissions quotas (or in other words, offered a fair distribution of the global atmosphere). This issue is perhaps the most fundamental issue that needs to be addressed, for it will set parameters for the other criteria and will establish the playing field for future interactions. In other words, establishing who has rights to what (a right to pollute vs. a right to clean air, etc) is foundational. As a baseline, it seems clear that at minimum, each people has a right to the commons to the extent that is needed to support its own well-orderedness. This share cannot be sold or traded (within the Rawlsian framework I have developed); if the aim of the Law of Peoples is the establishment of all societies into just or decent regimes, then all societies must retain at least their minimum share of the atmospheric commons that is needed to remain well-ordered. On the other hand, no people has a right to harm or destroy the territory of another people. Since well-orderedness is a fundamental interest shared by all peoples, the amount of the

atmospheric commons that is necessary for well-orderedness cannot be infringed upon by another or used by another society.

Beyond this initial distribution, though, it's not so clear how the remainder of the commons (presuming there is a leftover) should be distributed. As Singer proposes, there are various ways to divide the atmosphere: according to past offenses, according to population at either present or future levels, according to economic activity, or according to energy needs (this could be a function of standard of living, geography, level of industrialization, etc).<sup>147</sup> While I don't claim to have a definitive answer to this, there is something to be said for the proposal that Singer himself endorses: allocate quotas according to "equal per capita future entitlements to a share of the capacity of the atmospheric sink, tied to the current United Nations projections of population growth per country in 2050."<sup>148</sup> In other words, whatever is leftover in the pie after the initial distribution should be divided according to equal per capita allocations (of a global emissions cap) based on the estimated population for some fixed year in the future. As Singer points out, this method gives incentive to keep a nation's population down; the smaller the population is at the target year, the greater the allocation is per capita. This type of distribution embodies the idea that each individual has an equal share to the global commons, regardless of what nation he is from, and protects nations from having to pay for offenses that they did not know that they were committing. Further, it allows developing nations the much needed room to grow; that is, their claim on the atmosphere

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<sup>147</sup> Peter Singer, *One World* (New Haven: Yale University Press, 2002), 26-43.

<sup>148</sup> Singer, 43.

will not be diminished because they are not yet industrialized, rather they will be given the leeway to move towards industrialization.

Moreover, such a procedure would have to respect the fundamental interests of all the peoples of the Society of Peoples as specified behind the veil of ignorance; in general, these interests include the protection of a peoples' political independence as well as the protection of its security, territory, and well-being of its citizens, and the preservation of its self-respect and self-determination. Thus, no procedure could be adopted that unfairly favored the interests of one people over another. Further, as all members of the Society of Peoples are equals, all should be treated as such; Rawls writes, "Well-ordered peoples insist on equality among themselves as peoples..."<sup>149</sup> In general then, no such procedure should be adopted that forced one people to suffer undue hardships for the benefit of another people. Any mechanism adopted should also contain an element of mutuality. That is, the chosen procedure should be one that, "... a people sincerely believes other equal peoples might accept also; and should they do so, a people will honor the terms it has proposed even in those cases where a people might profit from violating them."<sup>150</sup> Contained in this idea of mutuality is the ability of all peoples to agree on the procedure without having to submit to a position of inferiority. The reasons appealed to in support of such principles should be properly political; that is, for example, a certain religious doctrine, on its own, does not offer good reasons for others to accept or reject any given mechanism.

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<sup>149</sup> Rawls, *The Law of Peoples*, 40.

<sup>150</sup> Rawls, *The Law of Peoples*, 35.

The final criterion that any mechanism must meet is that of economic efficiency, which is concerned with maximizing the social benefit of instituting the principle, constrained by the criteria that trade should be both free and fair. Since externalities pose the risk of inefficiency, any mechanism that was instituted to deal with the problem of externalities should be concerned with efficiency. Again, here the importance of a fair distribution of initial rights is highlighted. It is imperative that, from the start, rights are assigned that establish either the right to pollute or the right to be free from pollution. These rights will establish the initial bargaining positions; from these positions individuals/peoples can deal with each other depending upon how much they value the right to pollute and the right to be free of pollution. One such way to ensure this type of efficiency is to use the global market. In this setting, participants can bargain to the most efficient outcome. Simply put, within the market setting, participants can sell or purchase their rights as they see fit; the outcome will be the most efficient outcome (that which maximizes social utility). Employing the use of the global market also helps to ensure that any people that is subjected to another people's externalities will do so voluntarily (fairly). That is, the offending people will have to purchase another people's right to be free from harmful externalities.<sup>151</sup>

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<sup>151</sup> This line of argumentation is based primarily on the Coase Theorem. The Coase Theorem states: "In a well-functioning market, individuals trade with one another in ways that benefit all concerned. These exchanges are Pareto superior or Pareto improving (barring adverse third-party effects). In a perfect or idealized market, such exchanges occur until no further mutually advantageous exchanges can be made. (Jules L Coleman, Jules L., "Law, economic approach to," in Routledge Encyclopedia of Philosophy. ed. E. Craig (London: Routledge 1998). <<http://www.rep.routledge.com/article/T015SECT2>> (23 May 2005).)" Essential to this theory is the assignment of property rights, as they define the initial bargaining positions; if property rights are uncertain, then successful exchange becomes jeopardized. So, in the case of climate change it is important to assign rights to the atmospheric commons. Additionally, there must be a market in which the transactions may occur. This means that there needs to be some sort of global emissions trading, in which countries that want or need more emissions quotas could purchase these rights from other

As a matter of summary, then, any mechanism that is established to realize the ninth principle should meet a certain set of criteria. First, the procedure should be fair. Thus, it needs to be decided what a fair allocation of the global atmosphere would be. Additionally, the procedure should protect the fundamental interests of the members of the Society of Peoples and should recognize each member as an equal. Consequently, the mechanism should fairly consider the interests of all peoples and no people should be forced to adopt undue hardships for the benefit of another. Next, the procedure should embody an element of mutuality; that is, it should be a procedure that can be accepted by other equal peoples. Finally, the mechanism should be concerned with efficiency. Therefore, it should seek to maximize the social benefit within the limits of free and fair trade.

#### **Section IV - Free Riding and Climate Change**

Working from Rawls's account of ideal theory, a direct application of the eight principles (and the proposed ninth) leads towards collective action and treaty-making as

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countries that did not want or need them. According to Coase, these transactions would continue until the most efficient allocation was reached – such an allocation would distribute emissions quotas to the societies that needed them until the costs of quotas become such that they outweighed the benefits of emitting, while at the same time distributing the monetary value of the quotas to the less emitting countries until these benefits were outweighed by the costs of giving up their right to emit/their right to be free from pollution. Coase argues that in perfect market situations, the social costs of one's actions – “the external effects; effects of one person's conduct or consumption on the welfare of others” – will be internalized. (Jules Coleman and Jeffrie Murphy, eds. *Philosophy of Law* (Boulder: Westview Press, 1990), 187.)

So, for the case at hand, the damage done by harmful green house gas emissions will be internalized by putting a price on the right to emit, the sum of which will be paid to the country that would have otherwise suffered from the damaging externalities. (Of course, there are some shortcomings to this theory. First, this theory assumes that there will be zero transaction costs. Additionally, market correction of inefficiencies is dependant upon the transaction being allowed. So, in order to correct for the externality of GHG, there must be rules that allow for such transactions. Also, there could be problems in agreeing to a fair initial distribution of property rights. Fourth, and perhaps most importantly, hold-out behavior can decrease the possibility of ending up at the most efficient allocation. That is, this theory is dependant upon individuals acting cooperatively. (Andrew Altman. *Arguing About Law*, 2nd ed. (Belmont: Wadsworth Publishing, 2001), 181-183.)

ways to deal with the problem of climate change (as a coordinated extension of the duty of assistance). Unfortunately, this leaves the door open for the opportunity to free ride. In other words, peoples that do not participate in collective action or treaty making, and thus don't bear the costs of such actions, can still reap the benefits. His account of ideal theory states that as members of the Society of Peoples, peoples ought to live up to their duty of assistance. Thus, any collective action that is taken as an extension of this duty should be honored by all members of the Society of Peoples. With regards to climate change, it is presumably the case that any free rider (especially one as large and damaging as the United States) could compromise the effectiveness of collective action, if that people is not undertaking a unilateral plan to fulfill their duty of assistance. In such cases, economic and diplomatic sanctions may be justified. Measures such as these may in fact motivate a people into compliance. But, what if they don't work? Unfortunately, Rawls's theory does not offer any direction to dealing with the problem of free riders beyond this point. However, it may be the case that there is a solution to the problem of free riders in the instance of climate change and situations like it. Specifically, based on the predictions that climate change will threaten the ability of some peoples to remain well-ordered, coupled with the fact that a people has a right to war in self-defense, as a very last resort, coercion (possibly in the form of military intervention) may be justified on those peoples that are not cooperating, that are significant contributors to the problem, and, at the same time, are not taking any unilateral efforts to fulfill their duty of assistance.<sup>152</sup>

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<sup>152</sup> At this point, it may be helpful to distinguish between at least two important issues. The first is the issue

To begin, it is worth noting that it may be the case that a people has reasonable objections to the proposed actions of the Society of Peoples. Such objections are extensions of a people's reasonable interests. Rawls defines the reasonable interests of a liberal people in the following manner:

They seek to protect their territory, to ensure the security and safety of their citizens, and to preserve their free political institutions and the liberties and free culture of their civil society. Beyond these interests, a liberal people tries to assure reasonable justice for all its citizens and for all peoples...<sup>153</sup>

Thus, in any treaty making or collective action situation, it may be that a people may have reasonable objections to the proposed treaty or collective action. However, there are limits that are placed on these interests. Rawls states clearly that "...no people has the right to self-determination, or a right to secession at the expense of subjugating another people."<sup>154</sup> As an example of such a violation, Rawls cites the South's attempt to secede in the late 1860s. He claims that such action was unjustified since it was doing so to perpetuate the institution of slavery, an institution that was based on severe human

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of free riders, defined by one party enjoying the benefits of collective action, but refusing to participate in collective action. The second issue is related to, but can be distinguished from free riding. Namely, it may be the case that a would-be free rider refusing to participate in collective action can completely negate the actions of the other parties. That is, the benefit of collective action can never be realized because of the actions of the would-be free rider. (In this instance, it would be incorrect to deem the nonparticipating party a free rider because there would be no benefits on which to free ride.) It is arguably the case that both situations should be treated in the same manner. Specifically, both free-riders and would be free-riders, in the instances where the duty to assist is triggered to protect the well-orderedness of a people, should be (first) subject to economic and diplomatic sanctions and/or (second) military intervention if they refuse to act on this obligation. However, as noted above, refusing to participate in collective action does not, in and of itself, justify sanctions or military intervention. The people has a duty of assistance whether or not it participates in collective action. Thus, sanctions and military intervention can only be justified when a peoples has first refused to participate in collective action and has also failed to undertake any unilateral action to sufficiently fulfill its duty, and when the total benefits of such action would outweigh the costs.

<sup>153</sup> Rawls, *The Law of Peoples*, 29.

<sup>154</sup> Rawls, *The Law of Peoples*, 38.

rights violations.<sup>155</sup> While not as overt or direct as slavery, the effects of climate change will violate human rights standards and threaten the well-orderedness of many peoples. Thus, the largest and most damaging emitters cannot appeal to their right to a free culture or self-determination since such rights (in this case) are dependant upon the subjugation of other peoples.

It still may be the case that a people can have a reasonable objection to the action or treaty proposed by the Society of Peoples. However, it does not seem that such an objection could free a people from its duty of assistance, although it may free a people from a particular treaty or proposed action; the Law of Peoples is binding on all members of the Society of Peoples. If a people has legitimate, reasonable objections to such actions, it has a duty to engage in unilateral actions that will adequately satisfy their duty of assistance. Failure to meet this obligation would effectively render a nation an outlaw state.

Outlaw states are those regimes that refuse to comply with a reasonable Law of Peoples.<sup>156</sup> However, Rawls limits his discussion of such states to those societies that wage war on other societies to advance their own rational interests. Rawls writes that well-ordered peoples have a right to war only as a matter of self-defense. He explains “To trespass on citizens’ liberty by conscription, or other such practices in raising armed forces, may only be done on a liberal political conception for the sake of liberty itself,

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<sup>155</sup> Rawls, *The Law of Peoples*, 45n.

<sup>156</sup> Rawls, *The Law of Peoples*, 5.



that is, as necessary to defend liberal democratic institutions and civil society's many religious and nonreligious traditions and forms of life."<sup>157</sup>

At this point, I extend Rawls's idea, arguing that self defense may require going to war with countries that are well-ordered, but fail to comply with the list of principles that constitute the Law of Peoples. Such an action may in fact be "...for the sake of liberty itself, that is, as necessary to defend liberal democratic institutions and civil society's many religious and nonreligious traditions and forms of life."<sup>158</sup> Further, this action is only justified when a people's territory, basic structure, and organizations supporting human rights are endangered (in short, when its well-orderedness is threatened). If a people fails to act on its duty to assist, and their actions threaten the well-orderedness of other peoples, then strict forms of coercion can be justified only with the failure of economic and political sanctions, and only when the total benefits of intervention would exceed the total costs.

I hold that strict forms of coercion may be the only answer, but such an action is to be used only as a last resort, when the total benefits of the action will outweigh the total costs, and only when the consequences of the offending society threaten the well-orderedness of other peoples or make it impossible for other peoples to maintain territorial integrity in perpetuity. In the case of climate change, peoples that are significant emitters of greenhouse gases that refuse to participate in collective action while at the same time refusing to embark on unilateral efforts to fulfill their duty of assistance are effectively attacking those peoples that will most severely suffer the

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<sup>157</sup> Rawls, *The Law of Peoples*, 91.

<sup>158</sup> Rawls, *The Law of Peoples*, 91.

consequences of climate change. Thus, as a matter of self-defense, military action can be taken against the offender. Such action would be necessary only until the offending country was forced into compliance or agreed to comply.

The objection may be raised that allowing for such actions would violate Rawls's conception of tolerance. Included in this idea is the requirement of a liberal society to respect the diverse comprehensive doctrines of its citizens (within limits) and, internationally, that a liberal society tolerate nonliberal societies that meet certain standards of political right and justice, while leading its people to a respect and adhere to a reasonable Law of Peoples. However, it may be the case that while a society is liberal internally – it is well-ordered and respects the comprehensive doctrines of its citizens – it may not be adhere to the Law of Peoples. That is, there could be a democratic country that acts on its rational interests rather than on reasonable terms. Should such a nation be tolerated when its actions threaten the well-orderedness of other societies? If military action is allowed when an outlaw state has violated the human rights of its own citizens or as "... necessary to defend liberal democratic institutions and civil society's many religious and nonreligious traditions and forms of life," then it should be allowed when a state is violating the human rights of other nation's citizens or when a state is jeopardizing the well-orderedness of other societies.<sup>159</sup>

While the infringement on well-orderedness resulting from climate change is less than overt and will likely take years to come into full effect, the strictest forms of

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<sup>159</sup> Rawls, *The Law of Peoples*, 91.

coercion may seem severe and unreasonable. However, the nature of climate change is that emissions today will cause damage many years from now. Rawls writes,

As I see the point of the institution of property is that, unless a definitive agent is given responsibility for maintaining an asset and bears the loss for not doing so, that asset tends to deteriorate. In this case, the asset is the people's territory and its capacity to support them *in perpetuity*; and the agent themselves as politically organized. As I noted in the Introduction, they are to recognize that they cannot make up for their irresponsibility in caring for their land and its natural resources by conquest of war or by migrating into other people's territory without their consent.<sup>160</sup>

The environmental damage that will likely be caused by climate change will, in many instances, limit the ability of some well-ordered peoples to support themselves in perpetuity, and in this way may also threaten well-orderedness. It is the government's responsibility to make sure that its people's land is cared for and that its natural resources are managed wisely. If a government is careless with these responsibilities, then war with, or expansion into, other countries cannot be justified. However, it may not be the case that territorial degradation is the fault of the government; territorial degradation may occur because of uncontrollable and unpredictable natural disasters, or, as is the case with climate change, it may occur because of the actions of other peoples (in this case, the irresponsible use of fossil fuels). In the latter case, it seems that if the offending people is not willing to change its ways, to engage in collective action to rectify the problem, or to live up to its duty to assist, and it can be shown that its actions are either (or both) threatening the well-orderedness of a people, or infringing on the ability of a people to

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<sup>160</sup> Rawls, *The Law of Peoples*, 39.

maintain its territorial integrity in perpetuity, then strict forms of coercion may be justified.<sup>161</sup>

In sum, while Rawls does not directly deal with the problem of free riders beyond the point of political and economic sanctions, his theory can be extended to ground strict forms of coercion (possibly military intervention) against offending peoples on the basis of self-defense. Specifically, climate change will threaten the ability of peoples to remain well-ordered. Peoples that are emitting damaging amounts of greenhouse gases, while simultaneously refusing to act on their duty to assist, are, in a way, attacking the peoples that will suffer the worst consequences of climate change. On this basis, military actions can be taken against offending countries as a form of self-defense, but only as a last resort.

## **Conclusion**

In this section, I explored the applicability of Rawls's *The Law of Peoples* to the problem of climate change. It has been shown that climate change has the potential to affect the well-orderedness of just and decent regimes. Thus, the duty to assist can be extended to protect those peoples that are the subjects of such threats. Additionally, I have shown that behind the veil of ignorance, parties in the original position would agree

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<sup>161</sup> Here, it is worth noting that coercion may only be justified when the actions of a people directly threaten the well-orderedness of another (and refuse to change), or if the inactions of a people threaten the well-orderedness of a people (For example, the United States refusing to participate in collective action to combat climate change while simultaneously not undertaking any program to live up to their duty of assistance.). Thus, not all free riders can properly be the subjects of coercion or military intervention. Additionally, coercion or military intervention for the case of climate change may need to be taken proactively if a people is threatening the well-orderedness of another by refusing to adopt any measures towards abatement. Or, it may also be justified after the damage has been done, and a people is not willing to act on its duty to assist to help repair the damage that it has contributed to.

to a ninth principle. Specifically, representatives would agree to a principle that would fairly address the problem of externalities. Finally, I showed that Rawls's theory is also equipped to deal with the problem of free riders in the case of climate change. Namely, as a matter of self-defense, coercion (possibly in the form of military intervention) can be taken against an offending peoples who refuse to act on their duty of assistance and whose actions threaten the well-orderedness of other peoples. In conclusion, Rawls's theory as espoused in *The Law of Peoples* is able to adequately deal with the problem of climate change.

## **Conclusion**

While there is much hype surrounding the problem of climate change on the international front, this problem has yet to receive the attention that it rightly deserves. In general, many policymakers cite the uncertainties surrounding climate change predictions as reasons not yet to act; additionally, some leaders are unwilling to commit to carrying their nation's fair share of the burden. In this paper, I have attempted to reframe the problem of climate change. In sum, I have argued that it is rational for policymakers to act on the model-generated predictions surrounding climate change and that the framework that Rawls details in *The Law of Peoples* is a viable option for dealing with this problem. In conclusion, not only is it rational to act on the model-generated predictions of climate change, but (working within Rawls's framework) failure to adequately do so would be a failure to act on one's duty to assist.

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