2010

Individualism Submerged: Climate Change and the Perils of an Engineered Environment

Juliet P Stumpf
Daniel J Chepaitis
Andrea Panagakis

Individualism Submerged: Climate Change and the Perils of an Engineered Environment

Daniel J. Chepaitis[*]
Andrea K. Panagakis[**]

Juliet P. Stumpf, editor[***]

> [W]e must consider . . . the danger of catastrophe that is created by the fact that technological progress is much more rapid than progress in developing and implementing methods of controlling the dangers that technology creates. Just compare scientific progress since 1800 with the progress in politics, law, and morals over the same period. Not that there hasn't been progress in those spheres. . . . It's just been slower. . . . (Richard A. Posner, *Catastrophe*)[1]

---

[*] B.A., Harvard, J.D. Georgetown. I dedicate this article to my uncle William Vallone and to the memory of my grandmother Elia Vallone and of my uncle Jack Vallone. Each, by their example, taught me important lessons about individualism. I also want to thank Andrea Panagakis, my wife, for her extensive efforts in co-authoring the article, and for her love and for her critical engagement with the project.

[**] B.S. Cornell, M.A. Columbia. The origin of this article rests with my husband Dan. His passion and respect for the environment and the individual have strengthened my own. This article therefore represents a synthesis of that which is most important to us in life.

[***]Associate Professor of Law, Lewis & Clark Law School. I am grateful to Jon Malis, Susan Mandiberg, and Melissa Powers for helpful comments and conversations. Thanks to Nicole Krishnaswami for excellent research assistance. Special thanks to Eric, Liam, and Kai.

[1] Richard A. Posner, Catastrophe: Risk and Response 70 (2004) (hereinafter, "Posner, Catastrophe").

Current approaches to addressing the negative impacts of climate change rely on collective capabilities. Welfare economics and contractualism, the two conventional perspectives that dominate the debate, support the pursuit of adaptive strategies such as large-scale geoengineering projects to reduce solar radiation or ameliorate sea-water inundation. In place of returning greenhouse gas emissions to natural levels, these approaches put the global climate system and compensation for losses resulting from climate change under the control of some group of fellow humans. In other words, they privilege mechanisms that increase each individual's dependence on a collective decisionmaker and decrease the individual's capacity to function on her own in the natural world. The climate change debate has ignored or overlooked this tremendous impact on individual capabilities and individual responsibility. Individualism does not seem to register as an important source of ethical considerations among the legal thinkers, policymakers, economists, and others who are influential in that debate.

This Article seeks to remedy that void. It engages legal philosophy to excavate the relationship between individualism and environmental degradation, articulating the importance of individual capacities as part-and-parcel of our character, central to who we like to think we are or aspire to be. A commitment to individualist values requires recognition that climate change and its proposed solutions threaten a loss of individual capacity and individual responsibility that is a distinct and, in its own way, catastrophic kind of injury. The Article concludes that concern about loss of individual responsibility justifies a stronger push for a rapid return to natural levels of greenhouse gases in the atmosphere than do most current analytical approaches and solutions. Individualist values support a race to the top, in which demonstrations of the feasibility of living in ways that produce less greenhouse gas emissions create a duty on the part of others to lower their emissions. Preserving a world in which individualism is a dominant feature requires maintaining greenhouse gas concentrations within the natural range for humankind.

Introduction

Human-induced climate change is creating conditions that undermine our ability to function as individuals in the natural world in which we evolved, impacting our fitness for individual agency and responsibility. In our day, many of the most significant consequences of human life arise from our collective capabilities, not from individual capabilities. We are all, to borrow Bernard Williams' useful phrase, pulling "causal levers" that, in combination with the pulling of innumerable other causal levers by innumerable others, sends forth a cascade of advantages and disadvantages for humankind.[2] In this modern reality, it can be extraordinarily difficult to locate causal responsibility; there is a certain reciprocity that negates the possibility of talk of one person committing a moral wrong against another.

This argument is in line with Judge Posner's admonition, in the quote with which the article opens, that we need to progress in our morals to keep up with changes in our lifestyles, or, to be more precise, to keep up with the technology that we use to sustain our lifestyles. With respect to the causation of climate impacts, consumers drive cars; someone else (or rather many others) designed and built the cars we drive; still others drill for the oil that fuels our cars; we drive as much as we do because planners have designed living spaces for us in ways that require transportation over significant distances.

Current legal, economics, and policy approaches to addressing the negative impacts of climate change rely on collective capabilities. Welfare economics (is it economical?) and contractualism (is it fair?), the two

[2] Bernard Williams, *Persons, Character, and Morality*, in MORAL LUCK: PHILOSOPHICAL PAPERS 1973-1980 1, 4 (1981).

conventional perspectives that dominate the debate, support the pursuit of adaptive strategies such as large-scale geoengineering projects to reduce solar radiation or ameliorate sea-water inundation.[3] In place of returning greenhouse gas emissions to natural levels, these approaches put the global climate system and compensation for losses resulting from climate change under the control of some group of fellow humans. Assuming geoengineering worked as intended, centralized decisionmakers would have the power to dial up climate conditions for the globe, as one does on a much smaller scale when setting the air conditioning in a car or house.

Collective approaches to climate change demand collective decisionmaking institutions and accompanying legal regimes.[4] They privilege legal and institutional mechanisms that increase each individual's dependence on a collective decisionmaker and decrease the individual's capacity to function on her own in the natural world. The impact of human-induced climate change is significant because loss of fitness for individual responsibility is part-and-parcel of a modification in our character, in who we are. Fitness for individual responsibility goes hand-in-hand with a certain kind of individualist agency, which is central to who we like to think we are or aspire to be. Loss of such fitness goes hand-in-hand with loss of individualist agency.[5] The loss of fitness for individual responsibility is a distinct and, in its own way, catastrophic kind of injury.[6]

Climate change poses a unique threat to individualist values. With respect to other aspects of modern life, opting out is possible, if extremely difficult. We can choose not to put ourselves in a position where our risk of getting salmonella poisoning is the responsibility of the system, of the government, of nameless bureaucrats who should have inspected the produce

[3] The motivation for this article stems originally from a provocative presentation on geoengineering as a solution to climate change. An example of a geoengineering proposal is the proposal that humankind, rather than controlling greenhouse gas emissions, could place mirrors in space to block solar radiation and thus offset the warming effects of higher greenhouse gas concentrations. *See, e.g,* David Adam, *Climate scientists convene global geo-engineering summit,* THE GUARDIAN A15 (Jan. 15, 2010) (summarizing geo-engineering techniques).

[4] The individualist objection to this sort of collective decisionmaking stems from, in the words of Friedrich Hayek, the "horror inspired by the idea of everything being directed from a single center." FRIEDRICH HAYEK, THE ROAD TO SERFDOM 47 (1994). The concern about centralized power is not exclusively an individualist concern. *See* MICHAEL J. SANDEL, DEMOCRACY'S DISCONTENT: AMERICA IN SEARCH OF A PUBLIC PHILOSOPHY 323 (1996) (emphasizing the value of community and power of republican ideals, and complaining that "we confront a world governed by impersonal structures of power that defy our understanding and control").

[5] The term "agency" is often tied to abstract notions of a perfect (perfect from a philosopher's perspective) agent that has somehow freed itself from the influences of the world. This Article uses "agency" in a more down-to-earth, less other-worldly way.

[6] That fitness for responsibility could be used as a focal idea, tying together concerns about both agency and responsibility, was inspired by PHILIP PETTIT, A THEORY OF FREEDOM (2001). *See id.* at 6 (offering argument that when one says someone is free, one thing that is meant is that the person can be held responsible for what they did in the condition of freedom). The approach here suggests a different type of responsibility and different agency concerns than Pettit, but his analysis was thought-provoking and helpful in organizing our own.

that found its way to us from Guam. We each can buy from local growers, and inspect their farming practices ourselves, or perhaps even grow some of our produce ourselves. Likewise, we have a choice with respect to some localized pollutants. We can inhale others' carbon monoxide emissions, making our health dependent on the decisions of innumerable car drivers, car manufacturers, and bureaucrats wielding cost-benefit analyses to decide just how many deaths and respiratory illnesses to allow. Alternatively, without radical displacement, we likely can find a place with little traffic congestion.[7] In short, in both instances, we can create conditions in our lives that make us fit for individual responsibility.

Climate change, though, is different. To a point, we can tolerate the illusion that experts cultivate that in our modern society we all have decided to share one another's fate *completely*, only because in most areas where they apply that idea, there are loopholes, ways to refuse to share all of humankind's fate and follies. But one cannot escape climate change and the ideas that the experts have about managing the climate system for the good of the whole. Impacts will be experienced globally. If our land is being submerged, it is impossible to simply disregard the odd notions of negative responsibility that certain experts hold, and then devote ourselves to producing each of our own good, dealing with natural climate conditions with our own individual resources. Individualist considerations, then, should be a critical component of the ethical debate over climate change solutions.

Yet meaningful discussion of individualist considerations in the broader climate change context is completely lacking.[8] Fitness for individual capacity does not seem to register as an important source of ethical considerations among the legal thinkers, policymakers, economists, and other experts who are influential in that debate. A foundation needs to be laid for deeper thinking about the relationship between individualism and climate change.

But what resources does individualism, and in particular an individualist view of the law, have at its disposal to cope with the complex problem of climate change? This Article suggests key considerations that bear on the proper response. First, concern about loss of individual responsibility justifies a stronger push for a rapid return to natural levels of greenhouse gases in the atmosphere than does the perspective of negative responsibility. In addition, a number of options that the experts tend to reject out-of-hand look far

[7] This approach will work, of course, only to the extent carbon monoxide is localized and its dangers well-recognized.

[8] See, e.g., Alan Carlin, *Global Climate Change Control: Is There A Better Strategy Than Reducing Greenhouse Gas Emissions?*, 155 U. Penn. L. Rev. 1401, 1480-1485 (2007) (purporting to identify the most "likely" objections to geoengineering, but failing to note that it might be objectionable from an individualist perspective). The strongest impetus for serious consideration of geoengineering seems to come from the United States—a point of interest since the rhetoric of this country often invokes individualism as one of its core values.

more sensible if individualist values are included in the climate change debate. Those options include, for example, bans on particular technologies (*e.g.*, a ban on the construction of pulverized coal fired power plants, which necessarily emit high levels of greenhouse gases). They would also include a modified federal cap-and-trade program in which the States are allowed to continue to impose more stringent requirements and, having demonstrated that those standards do not effect major disruption, can petition the federal government to revise federal standards in accord with the State's standard.

More generally, individualist values support a race to the top, in which demonstrations of the feasibility of living in ways that produce less greenhouse gas emissions create a duty on the part of others to lower their emissions. Though as a practical matter such a level might not be reached, or at least might not be reached in any of our lifetimes, the "top" would be a level of emissions consistent with maintenance of greenhouse gas concentrations within the natural range sustained, until recently, through all of human existence.

The outline of the article is as follows. Part II discusses discuss background facts about climate change, with a particular emphasis on how experts think we will adapt to it, if the need arises. Part III offers an account of individualism. It discusses why particular aspects of the climate change problem, in particular the methods of adaptation to which experts suggest humankind will turn to lessen the human impacts of climate change, should be of grave concern to individualists, though they do not register as significant in the conventional debate about climate change. Part IV examines the nature of the conventional debate about climate change and some of the moral ideas that seem to underpin that debate. Part V contrasts the legal responses that proceed from adherence to the idea of "negative responsibility" with those that an individualist would favor. This section is meant to provoke further thought, not to offer a precise prescription for an individualist response to climate change. Part VI offers some concluding thoughts.

I. Background

This section brings to the fore near-consensus facts, assessments, and predictions that are of particular relevance to the questions addressed subsequently.[9]

[9] For readily accessible, general purpose overviews of climate change science and social science, *see e.g.,* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT. SUMMARY FOR POLICYMAKERS 7 (2007) (hereinafter, "IPCC, CLIMATE CHANGE 2007: SUMMARY FOR POLICYMAKERS"); NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 3-24 (2007) (hereinafter, "STERN, THE STERN REVIEW") (Chapter 1, "The Science of Climate Change: The Scale of the Environment Challenge").

A. Rising Greenhouse Gas Concentrations and Their Effect on the Energy Balance of the Earth.

Although climate science can be complex, both the basic reasoning leading to the conclusion that humankind is dramatically increasing the concentrations of greenhouse gases in the atmosphere and the physics that explains why such increasing concentrations are likely to significantly perturb the global climate system are easily described.

Suppose the Earth had no atmosphere. On net, less of the energy from solar radiation would be retained near the Earth's surface. It is estimated that the Earth's surface temperature would be minus 18°C (-0.4°F).[10]

As it is, the Earth's global mean surface temperature is approximately 15°C (59°F). Greenhouse gases in the atmosphere are a critical factor in maintaining that heightened temperature. About 30 percent of the incoming radiation from the sun that reaches the atmosphere of the Earth is reflected back towards space, largely by cloud cover and aerosols in the atmosphere or by light-colored surfaces, *e.g.* snow, ice and deserts, on the surface of the planet.[11] Furthermore, some of the energy from solar radiation that is not reflected back to space, but is instead absorbed by the surface and atmosphere of the Earth, is then emitted as longwave radiation.[12] But greenhouse gases "act as a partial blanket for the longwave radiation coming from the surface," giving rise to what is known as the "natural greenhouse effect."[13]

Because of the greenhouse effect, the concentration of greenhouse gases in the atmosphere is a fundamental parameter that determines the amount of energy from solar radiation that is retained by the Earth system. While debate may continue over other aspects of climate change science, there is consensus that if one increases the concentrations of greenhouse gases, all other things being equal, the amount of solar energy retained in our atmosphere will increase.[14]

At present, the most important greenhouse gas subject to human influence is carbon dioxide. The concentration of carbon dioxide has risen sharply in what is, from the standpoint of geological time, an extremely short period of time. Prior to the industrial revolution that began in the 18th Century, the atmospheric concentration of carbon dioxide was about 280 parts per million

---

[10] Bert Bolin, *Geophysical and Geochemical Aspects of Environmental Degradation*, in 1 HANDBOOK OF ENVIRONMENTAL ECONOMICS: ENVIRONMENTAL DEGRADATION AND INSTITUTIONAL RESPONSES 7, 9 (KARL-GORAN MALER AND JEFFREY VINCENT, eds., 2003).

[11] *Id.*

[12] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 97 (2007) (hereinafter, "IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS").

[13] *Id.*

[14] *Id.*

(ppm). Scientists estimate that the natural range over the previous 650,000 years was approximately 180 to 300 ppm. By 2005, in a period of a little more than two centuries, the carbon dioxide concentration had risen to approximately 380 ppm.[15] While there are some who continue to dispute the effects of carbon dioxide and other greenhouse gas concentrations on global climate, no one seriously disputes that "humankind has dramatically altered the chemical composition of the global atmosphere."[16] The atmospheric concentrations of carbon dioxide and other greenhouse gases have increased and industrial activity, through the burning of fossil fuels, is primarily responsible for that increase.[17]

Greenhouse gas emissions are increasing and expected to continue to increase with economic growth.[18] Given knowledge of how much carbon dioxide natural systems can absorb, the Intergovernmental Panel on Climate Change (IPCC) has estimated likely future atmospheric concentrations of greenhouse gases for the year 2100 if we continue business as usual. The rate at which we will release greenhouse gases depends on socioeconomic factors. Understanding the difficulty in making predictions about humankind's socioeconomic future, it nonetheless is worth focusing briefly on the IPCC's estimates for greenhouse gas concentrations at the end of this century for a couple of plausible scenarios. In one such scenario (labeled "A1FI"), the IPCC envisions a future world in which significant economic growth is accompanied by rapid introduction of new, more efficient technology, but fossil fuels remain a dominant energy source. It also makes a standard assumption that population growth will increase until mid-century and then decline thereafter. Under such a scenario, the IPCC predicts that the carbon dioxide equivalent concentration of greenhouse gases will rise to 1,550 ppm. In another, more optimistic scenario (labeled "A1B"), the same assumptions are made, except that, notwithstanding an absence of legal limits on greenhouse gas emissions, the world economy comes to rely on a balance of fossil fuels and non-fossil fuel energy sources. In this scenario, the greenhouse gas equivalent concentration level reaches 850 ppm. Finally, in the most optimistic scenario (labeled "B1"), without legal limits on greenhouse gas emissions, the world economy shifts towards low-emitting and efficient technologies and also experiences a shift in "economic structures" away from the manufacture of goods and towards provision of services and information. In this scenario, the greenhouse gas concentration level reaches 600 ppm.[19]

As far as scientists can tell, for at least the last 650,000 years, the range of natural, atmospheric carbon dioxide concentration has been between 180 to 300 ppm. Yet humankind could, in less than a few hundred years of industrial

[15] *Id.* at 2.
[16] IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 97.
[17] *Id.* at 2-3, 100.
[18] IPCC, CLIMATE CHANGE 2007: SUMMARY FOR POLICYMAKERS, *supra* note __, at 7.
[19] IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 12 n.14, 18.

activity, emit enough greenhouse gases into the atmosphere to achieve concentrations that have roughly five times the climate-forcing effect of the upper end of that natural range.[20] Indeed, even under an optimistic scenario in which the economy spontaneously shifts away from carbon-intensive economic activities and technologies, the prediction is for a doubling of carbon dioxide equivalent greenhouse gas concentrations from the natural maximum.

The link that connects this increase in greenhouse gases to most of the impacts in the natural world that are of concern to humankind is the radiative forcing—that is, the increase in energy in the Earth's climate system—that results from the greenhouse effect.[21] One can get a sense of how significant the radiative forcing from increased greenhouse gases has been by comparing the effects of some natural changes with human-induced changes. It is estimated that, since the beginning of the industrial revolution, fluctuations in radiation from the sun itself is estimated to have caused radiative forcing of approximately 0.12 Wm^{-2} (watts per square meter). Increases in the three leading greenhouse gases, carbon dioxide, methane and nitrous oxide, in contrast, are estimated already to have caused an increase in radiative forcing of 2.30 Wm^{-2}.[22]

B. Predicted Impacts in the Natural World.

There is something faintly absurd about trying to provide a short list of specific impacts to be expected in the natural world from increases in greenhouse gases of the magnitude that is predicted and from the resulting radiative forcing. We are talking about a modification of the fundamental parameters of the global climate system. The particular range of climate conditions experienced on earth are what make life possible at all, and the particular climatic conditions experienced in any particular region or specific locale is often critical to what life is like in that region or locale. The IPCC Working Group 2's recent tome, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, bears witness to the multitude of ways that scientists already have

[20] Although the predictions are stated in terms of the carbon dioxide equivalent concentration of a number of greenhouse gases, not just carbon dioxide, it is legitimate to compare these to natural concentrations of carbon dioxide alone. That is because, before human-induced increases in the concentrations of these other greenhouse gases, their effect was relatively insignificant. *See* STERN, THE STERN REVIEW, *supra* note ___, at 5, Figure 1.1 (comparing carbon dioxide concentrations and carbon dioxide equivalent concentrations of combined greenhouse gases).

[21] The amount of energy that naturally enters and exits the Earth's system at the top of the atmosphere is measured in watts per square meter (Wm^{-2}). This also is the measure used to quantify the change in net balance of incoming and outgoing energy that a particular perturbation of the system causes. IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 2.

[22] *Id.* at 3, 5.

identified in which climate change likely will impact human and non-human life on the planet.[23]

Some examples will help to illustrate the types of impacts we can expect. The most obvious, overarching impact will simply be the pervasiveness and rapidity of change itself. This is evident in the most discussed impact, increases in average surface air temperatures, which can be considered both an indirect measure of the level of radiative forcing that we are causing and a change that in itself has more direct significance.[24] Already to date, increases in greenhouse gas concentrations appear to have resulted in a level of warming in the Northern Hemisphere that is unprecedented in at least the past 1,300 years.[25]

But the amount of warming experienced so far is trivial compared to the possible warming that could occur in this century. As noted above, if fossil fuel remains a dominant source of fuel and certain plausible projections about economic and population growth are realized (the "A1FI" scenario discussed above), the likely range of increase in average surface air temperature by the end of the century would be 2.4 to 6.4°C (approximately 4.3 to 11.5°F), with a best estimate of 4.0 °C (7.2°F). Even if, notwithstanding an absence of legal limits on greenhouse gas emissions, the world economy comes to rely on a balance of fossil fuels and non-fossil fuel energy sources (the "A1B" scenario), the likely range of increase in average surface air temperature would be 1.7 to 4.4°C (approximately 3 to 8°F), with a best estimate of 2.8 °C (5°F).[26] Even disregarding extremes, without ever having physically relocated, people will find themselves living in what is in effect a different place. As the IPCC explains, we will see "[s]ubstantial structural changes in biomes . . ., with ecosystem shifts towards higher latitudes and altitudes."[27] With the significant warming that is possible, in some ways Washington State could come to resemble parts of California, while California could come to resemble Mexico; likewise, New England could come to resemble Georgia, and Georgia could resemble places still further south.

More specifically, illustrative predicted impacts include rising ocean levels, increases in the frequency and intensity of extreme weather events, changes in water availability, changes in agricultural productivity, ecosystem disruption, and acidification of the oceans:[28]

Sea level rise. Sea levels are expected to rise in part because warming of the oceans causes seawater to expand and in part because of melting of

---

[23] *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2007) (hereinafter "IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY").

[24] *See generally id.* at 749, 797-811 (discussing temperature change predictions).

[25] IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 9.

[26] *Id.* at 17.

[27] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note ___, at 220; *see also id.* at 237 (discussing biome shifts).

[28] *See* JEFFREY D. SACHS, COMMON WEALTH 88-89 (2008) (summarizing impacts).

glaciers and ice caps.[29] Assuming the IPCC's fossil-fuel intensive scenario (A1FI), the IPCC predicts that the range of likely sea level rise is 0.26 to 0.59 meters. With the alternative assumption that the world economy adopts a balanced use of fossil fuels and other fuels (scenario A1B), that range falls to 0.21 to 0.48 meters.[30] Almost one quarter of the world's population lives within 100 km of the coast and below 100 m above sea level.[31] As sea levels rise, these populations become increasingly vulnerable to coastal erosion, to storm surges, flooding and other consequences of more intense storm activity, and to inundation of freshwater sources by sea water.[32]

Water supply. One of the principal concerns with regard to water supply is that more than one-sixth of the world's population lives in areas in regions where water is supplied by meltwater from major mountain ranges. In such regions, snow packs and glaciers act as natural reservoirs, releasing waters when demand is highest, in the spring and summer.[33] Increasing temperatures will cause snow cover to melt in the winter and early spring rather than in the drier summer and autumn; this will decrease the tendency of snow cover on mountains to act as a natural reservoir, releasing water into rivers during the dry season.[34] Initially, increasing temperatures also raise concerns about flooding, as glaciers and snow cover melts at increasing rates.[35] In the long run, the concern becomes that water supplies stored in glaciers and snow cover will significantly decline.[36]

Extreme Weather Events. Focusing on the predicted increases in average surface air temperatures can be misleading.[37] Increased energy in the climate system will result in more extreme weather events, not just incremental increases in temperature evenly distributed across regions and time. "The significance of gradual climate change . . . lies mainly in variability and volatility, including changes in the intensity and frequency of extreme events."[38] One illustrative example is an increase in the intensity and frequency of tropical

[29] IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 5.
[30] IPCC, CLIMATE CHANGE 2007: SUMMARY FOR POLICYMAKERS, *supra* note ___, at 8.
[31] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 319.
[32] *Id.* at 317, 331, 333.
[33] T.P. Barnett *et al.*, *Potential Impacts of a Warming Climate on Water Availability in Snow-Dominated Regions*, 438 NATURE 303, 304 (November 17, 2005).
[34] *Id.* at 303.
[35] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note ___, at 483.
[36] *Id.* at 5, 187, 483. *See also id.* at 493 (predicting that major rivers in India and China, which are fed by Himalayan glaciers, could become seasonal rivers).
[37] *See* SIMON LEVIN, FRAGILE DOMINION: COMPLEXITY AND THE COMMONS 27 (1999) (explaining that discussions about the predicted increases in global average temperature miss weightier concerns).
[38] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 41.

storms.[39] Recently, Hurricane Katrina—regardless whether its intensity was in any way attributable to human-induced climate change—highlighted the types and magnitude of impacts that tropical storms can have.[40]

Agricultural conditions. Agricultural productivity depends on climate variables that are likely to be affected by increased greenhouse gas concentrations, including temperature itself, precipitation levels, water availability, and cloud cover.[41] Two types of impacts are of particular interest. First, it is thought that overall yields will decrease for almost all regions if radiative forcing results in an increase in average surface temperatures of more than 3°C. At lesser increases, overall yields may increase for mid- to high-latitude regions while decreasing in low latitude regions.[42] Second, for all regions, regardless whether there is potential for greater yields, the growing conditions that any particular farmer faces will change significantly from the conditions within the farmer's experience. For reasons that will be discussed, that change is important regardless whether it presents primarily economic opportunities or constraints.[43]

Ecosystem disruption. Increased greenhouse gas concentrations and temperatures will alter the structure and perturb functioning of most ecosystems.[44] Ecosystem responses to climate change are likely to be non-linear: "Transitions between states may be triggered, or the ecosystem may even 'collapse,' *i.e.*, show a rapid transition to a much less productive and/or species-poor assemblage with lower biomass and other impairments such as degrading soils."[45]

Estimates of species extinction risks provide a sense of the magnitude of likely impacts. The IPCC predicts that by 2100 approximately 20% to 30% of species will be at increased risk of extinction.[46] Most species have a range of climate conditions in which they can persist. Although both animal and plant species can migrate towards the poles in response to warming to find conditions closer to those in which the species previously existed, it is thought that the rate of climate change will be too rapid for many species to keep pace. Also, cropland and human development block the path of migration for many species.[47]

---

[39] *Id.* at 14-15.
[40] *See id.* at 332, 377.
[41] *Id.* at 277.
[42] *Id.* at 275.
[43] Climate conditions will change significantly in every location, and appropriate crop choice and growing practices depend on local climate. "The latitudinal distribution of crop . . . species is a function of the current climatic and atmospheric conditions . . ." *Id.* at 277. As local conditions change, the distribution of crops that is currently appropriate will change.
[44] *Id.* at 213.
[45] *Id.* at 219.
[46] *Id.* at 213.
[47] *Id.* at 229, 230-31; MILLENIUM ECOSYSTEM ASSESSMENT, ECOSYSTEMS AND HUMAN WELL-BEING: SCENARIOS, VOLUME 2, at 202 (2005) (hereinafter, "MILLENIUM ECOSYSTEM ASSESSMENT, POLICY RESPONSES") ("The general impact of climate change will be that the habitats of many

Increased ocean acidity. Ocean uptake of carbon dioxide reduces surface ocean pH, that is, increases the acidity of surface ocean waters.[48] By 2100, the oceans are likely to be more acidic than they have been for 20 million years.[49] Scientists are uncertain of the likely impacts of such increased acidity. One concrete, known consequence will be to interfere with the ability of marine species (such as corals) to form shells and skeletons.[50]

C. Predicted Coping Mechanisms.

For each of the impacts discussed above, social scientists have suggested methods by which they believe that humankind can lessen the adverse consequences. More ambitiously, there are proposals to take control of the climate system in order to counteract the effects of continued greenhouse gas emissions. Let me begin with the latter first, before turning to more targeted adaptation mechanisms.

1. Geoengineering as adaptation to a perturbed climate system.

Geoengineering generally encompasses proposals to "rearrang[e] the earth's environment on a large scale to suit human needs and promote habitability."[51] In the context of climate change, geoengineering would entail "large-scale engineering to offset the warming effect of greenhouse gases."[52] Geoengineering would be aimed not at decreasing emissions, but rather at allowing emissions to continue unabated and "directly chang[ing] temperature regimes or atmospheric GHG [greenhouse gas] levels for the world."[53]

---

species will move poleward or to higher elevations from their current locations . . . For example, the climatic zones suitable for temperate and boreal plant species may be displaced by 200-1,200 kilometers over the next 100 years."); EDWARD O. WILSON, THE FUTURE OF LIFE 68-69 (2002) ("[a]s the thermoclines of global climate ease poleward, plant and animal species will be hard-pressed to keep up" and "[m]any native species are already trapped in natural reserves that have become islands in a sea of cropland and suburban sprawl"); G.P. von Maltitz *et al.*, *Adapting Conservation Strategies to Accommodate Impacts of Climate Change in South Africa*, AIACC Working Paper No. 35, at 3, 4 (August 2006) ("[t]he current rate of climate change far exceeds any climatic change records from the past and is likely to be too rapid for evolutionary adaptation in most species" so some species "will have to physically move with the changing climate to track areas with suitable climates"), http://www.aiaccproject.org/working_papers/Working%20Papers/AIACC_WP35_vonMaltitz.pdf.

[48] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 234.

[49] *Id.* at 37.

[50] *Id.* at 234-236 (discussing impacts on calcifying organisms, such as shellfish, as well as uncertainties about other effects on marine ecosystems).

[51] William J. Broad, *How to Cool A Planet (Maybe)*, N.Y. TIMES (June 27, 2006).

[52] WILLIAM NORDHAUS AND JOSEPH BOYER, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 126 (2000).

[53] *See*, *e.g.*, Carlin, *Global Climate Change Control*, *supra* note ___, at 1401, 1413.

While geoengineering the climate system may sound to the uninitiated like pie-in-the-sky, geoengineering research has a long history. The Soviet Union began serious research into the possibility of human control of weather and climate at least as early as the 1930s.[54] A first step was experimentation with cloud seeding to control precipitation, but the Soviets also explored far more ambitious plans. These ranged from proposals to "annihilat[e] . . . the ice cover of the Arctic" for new shipping routes to various precursors of current geoengineering proposals, such as injecting aerosols into near-earth orbit to control the solar radiation that reaches earth.[55]

Scientists in the United States were actively engaged in weather-control experiments at least by the time of World War II.[56] Politicians also took note, in part because of the national security implications of falling behind the Soviet Union in such research. In 1957, the chair of MIT's meteorology department opined that "ideally" scientists would enable society to "tak[e] the offensive" against nature "through control of weather."[57]

Not surprisingly, given the long history of research into and discussion of such proposals in scientific and political circles, geoengineering proposals left the engineering drawing board long ago.[58] An example of an early geoengineering proposal—which may not be the current favorite but nonetheless nicely illustrates the nature of geoengineering—is the proposal that humanity place mirrors in space to decrease the amount of solar radiation reaching the earth. Such an intervention, if it worked, could offset the effects of greenhouse gas emissions. In theory, the mirrors could be designed and positioned to block the precise amount of radiation necessary to achieve and maintain desired global climate targets.[59]

2. Targeted adaptations

Leaving geoengineering aside, potential adaptations to specific climate change impacts are central to discussions of appropriate climate change responses. Such adaptations are cited both insofar as they bear on the likely costs of climate change in the absence of efforts to abate greenhouse gas emissions and in advocating for proactive steps to implement or encourage

[54] David W. Keith, *Geoengineering the Climate: History and Prospect*, 25 ANN. REV. ENERGY & ENVIRON. 250-51 (2000).
[55] *Id*.
[56] *Id.* at 252-53.
[57] *Id.* at 252 (quoting US GPO, *Final Report of the Advisory Committee on Weather Control* 2:286 (1957)). Remarking on Soviet research, he opined that "I shudder to think of the consequences of a prior Russian discovery of a feasible method for weather control." *Id.*
[58] *Id.* at 249-59.
[59] *Id.* at 263. Other proposals include injecting sunlight scattering particles into the stratosphere and sowing the oceans with iron to induce plant blooms that will absorb carbon dioxide. *See generally id.* at 260-269 (reviewing and categorizing geoengineering proposals).

available efforts to reduce the costs of the climate change that already can be anticipated.[60]

a. Adaptation to sea level rise.

One of the principal types of mechanisms by which it is thought humankind can adapt to rising sea levels is "protection," by which the literature means "defensive measures and other activities to protect areas against inundation, tidal flooding, effects of waves on infrastructure, shore erosion, salinity intrusion, and loss of natural resources."[61] Specifically, "[c]oastal protection entails large infrastructural works which last for decades,"[62] such as the construction and maintenance of "hard structures such as sea walls and dikes" as well as "soft solutions" such as artificially-maintained dunes.[63]

The possibility of constructing, strengthening and maintaining such engineering solutions is critical to current assessments of the potential impacts of sea level rise. "Upgraded defences reduce the impacts [of sea level rise] substantially."[64] This is a significant reason why vulnerability to sea level rise is predicted to be far greater for developing countries than for developed ones:[65]

> Bangladesh and [t]he Netherlands share a similar physical susceptibility to sea level rise. But Bangladesh lacks the economic resources, technology, and infrastructure that [t]he Netherlands can call on to respond to such an event.[66]

Generalizing, there are many countries, both developed and developing, that have land that would fall below or be closer to sea level if sea level rises substantially.[67] But developing countries are less likely to erect defensive measures because "the capital costs associated with the 'hard' set of options may

---

[60] *See* IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 719, 725-27 (reviewing literature on potential of adaptation mechanisms to reduce the social costs of climate change impacts or even achieve net social gains).

[61] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, STRATEGIES FOR ADAPTION TO SEA LEVEL RISE. REPORT OF THE COASTAL ZONE MANAGEMENT SUBGROUP 7 (1990) (hereinafter, "IPCC, COASTAL ZONE MANAGEMENT REPORT"), http://www.epa.gov/climatechange/effects/downloads/adaption.pdf.

[62] Richard Tol, *The Double Trade-off Between Adaptation and Mitigation for Sea Level Rise: An Application of FUND* 3 (2007), www.springerlink.com/content/c62355m371146j08/.

[63] IPCC, COASTAL ZONE MANAGEMENT REPORT, *supra* note __, at iv. For a more complete description of "hard" and "soft" defensive measures, see *id.* at 8.

[64] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 334.

[65] *Id.* at 317.

[66] MILLENIUM ECOSYSTEM ASSESSMENT, POLICY RESPONSES, *supra* note __, at 384.

[67] *See* IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note ___, at 346 (showing land area exposed to inundation with a 1 meter, 5 meter, or 10 meter rise in sea level, by region).

prove a barrier to consideration of this option."[68] Because the market value of structures and activities in low-lying areas is much greater in developed countries, cost-benefit analyses of the economic impacts of sea level rise on developed countries are considerably lower than they otherwise would be, precisely because it is thought that such countries can successfully construct and maintain defensive infrastructure.[69]

b. Adaptation to disruption of natural water supplies.

One-sixth of the human population lives in regions that are dependent on meltwater from mountain ranges for their water supplies.[70] Snow cover and glaciers act as natural reservoirs, melting and thus feeding rivers and streams during the driest seasons of the year.[71] The obvious adaptation to the loss or disruption of these natural reservoirs is engineered water management systems, such as artificial systems of reservoirs with accompanying dams and water conveyances. For example, the United Nations Development Program notes that the shrinking of glaciers in the Andes will give rise to a "pressing need" for infrastructure projects such as dams, tunnels and reservoirs to meet the water needs of existing populations that formerly relied on natural run-off from the glaciers.[72]

c. Adaptation to extreme weather events.

Adaptation to an increasing intensity and frequency of tropical storm activity would likely entail some of the same technological responses discussed above in the context of rising sea levels: coastal defense infrastructure is designed to protect not only against gradually rising average sea levels, but also against increased storm surges. In addition, adaptation to increased and increasingly intense storm activity would involve a combination of government programs and insurance: common examples include building codes to decrease habitation in vulnerable areas, an increase in the resources devoted to government evacuation and emergency response programs, and increased reliance on insurance.[73]

---

[68] IPCC, COASTAL ZONE MANAGEMENT REPORT, *supra* note __, at 7.

[69] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 317 (noting developing countries' greater vulnerability because of lack of resources to implement coastal protection).

[70] *See supra* note 33 and accompanying text.

[71] *Id.*

[72] James Painter, *Deglaciation in the Andean Region*, HUMAN DEVELOPMENT REPORT 2007/ 55, FIGHTING CLIMATE CHANGE: HUMAN SOLIDARITY IN A DIVIDED WORLD 1 (2007). *See also*, *e.g.*, *id.* at 9 (discussing particular populations that will need dams, tunnels and reservoirs to meet water needs formerly met by natural run-off from Andes); STERN, THE STERN REVIEW, *supra* note __, at 500-501 (discussing decrease of run-off in Berg River Basin in South Africa and exploring benefits of constructing dam to control release of run-off).

[73] *See*, *e.g.*, IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note __, at 345, 795 (discussing measures to reduce risks from tropical storms); Roger A. Pielke, Jr., *Future Economic Damage from Tropical Cyclones: Sensitivities to Societal and Climate Changes*,

d. Adaptation to changing agricultural conditions.

There are a number of possible adaptations to lessen the negative impacts of, and even to profit from, changing climate conditions in agriculture. Many are likely to be technological. Examples include the development of new crop varieties suited to the new climate conditions in which farmers find themselves, introduction or intensification of irrigation to compensate for generally drier conditions or increased frequency of droughts, and climate forecasting systems as a substitute for farmers' inherited knowledge of local conditions.[74] Government programs and private insurance likely also would play prominent roles in adaptation to changing agricultural conditions, primarily in spreading some of the increased risk from increasingly unpredictable and variable agricultural conditions.[75] All of these adaptations contemplate a prominent role for industry, most notably agri-business and the financial sector, and for government.[76]

e. Adaptation to ecosystem degradation.

To reduce the number of species extinguished as a result of human-induced climate change, scientists will have to identify those that are thought to be valuable to humans and subject the ecosystems in which they are found to an unprecedented level of active management.[77] Such active will be necessitated by the fact that migration patterns of some species are simply too slow to keep up with the rate of climate change or are blocked by patterns of human settlement and land use. Where migration is blocked, scientists may have to "engineer" habitats along a possible route of migration.[78] In the case of species whose rate of migration would be insufficient even with migration corridors, it

---

2007 PHIL. TRANS. R. SOC. A 1, 11 (discussing "proven and promising options for cost-effective actions that increase resilience to disasters"), http://sciencepolicy.colorado.edu/admin/publication_files/resource-2517-2007.14.pdf.

[74] *See* Barry Smit and Mark W. Skinner, *Adaptation Options in Agriculture to Climate Change: A Typology*, 7 MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE 85, 96-99 (2002) (discussing and further categorizing technological options).

[75] *See id.* at 96, 99-100 (noting and discussing role of government programs and private insurance in climate change adaptation).

[76] *See*, *e.g.*, *id.* at 94 ("the use of crop development for changed climate conditions . . . would likely involve government agencies (encouraging this focus in breeding research), corporations (developing and marketing new crop varieties), and also producers (selecting and growing new crops)."); *id.* at 99 ("[t]he lead responsibility for developing technological adaptations tends to be governments and agri-business"); *id.* at 100 (noting possible role for "development of insurance schemes by private companies to address crop and property damage from such climate-related hazards as droughts, floods and other climate-related events").

[77] MILLENIUM ECOSYSTEM ASSESSMENT, POLICY RESPONSES, *supra* note __, at 383-84 (discussing increased need for management).

[78] IPCC, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note ___, at 247. *See id.* ("Engineering habitats to facilitate species movements may call for an entirely new field of study.").

will be necessary to identify suitable habitat further polewards and actually move individuals of the species to those new areas.[79] In the alternative, preserving such species would require storing their genes through gene banking and cryptopreservation or maintaining individuals in zoos and botanical gardens.[80]

f. Adaptation to ocean acidification.

In response to ocean acidification, it has been suggested that humankind can fertilize the oceans to promote the growth of carbon-dioxide absorbing plankton or regulate the acidity of the oceans by periodically dumping alkaline limestone into the oceans.[81]

II. An Individualist Perspective on Climate Change

This Part describes a conception of the good, individualism, and the ways in which someone committed to individualism might view the problem of climate change differently from participants in the conventional debate. It examines in light of individualism the list of engineering solutions (*e.g.*, dams and levees), government programs (*e.g.*, living assistance programs for regions struck by disaster), and economic products (*e.g.*, seed varieties) that the experts discuss as likely methods of coping with climate change, should we choose not to aggressively abate our emissions.

The point is not that individualism should be the sole moral guidepost that we follow. But individualist values are constitutive of our moral identity—perhaps not the whole of that identity, but at the very least an important part. At the very least, individualist concerns should be taken into account in the climate change debate as a counterpoint to the moral codes that are dominant among experts.

A. Individualism

1. An Intuitive View of Individualism.

This section offers a fairly detailed conceptual view of what an individualist life entails. By way of introduction, it contrasts two diametrically opposed writers, one who expresses a view of man that comports with the perspective of many experts, and one who expresses sentiments that are clearly more individualist.

First, consider John Rawls' view of man's dependence on others. He gives voice to this belief in the fundamental incompleteness of the individual

---

[79] *See*, *e.g.*, Maltitz, *Adapting Conservation Strategies in South Africa*, *supra* note __, at 4 (discussing need for "facilitated dispers[ion]").
[80] *Id.* at 10.
[81] Carlin, *Global Climate Change Control*, *supra* note __, at 1487.

when he declares that individual humans are "mere fragments" apart from society and the economy:

> [W]e cannot overcome, nor should we wish to, our dependence on others. . . . It is a feature of human sociability that we are by ourselves but parts of what we might be. We must look to others to attain the excellences that we must leave aside, or lack altogether. . . . [T]he good attained from the common culture far exceeds our work in the sense that *we cease to be mere fragments* . . . The division of labor is overcome not by each becoming complete in himself, but by willing and meaningful work within a just social union of social unions . . .[82]

Elsewhere, he states that "persons need one another since it is only in active cooperation with others that one's powers reach fruition," concluding that "[o]nly in a social union is the individual *complete*."[83]

Contrast Rawls' account with an observation that Wendell Berry made about the "crisis of character" that he perceived in the United States thirty years ago. He attributed that crisis to the trend toward specialization, in other words, to the observation that people increasingly lived their lives as parts of larger human endeavours:

> . . . Th[e] supposedly fortunate citizen . . . earns money, typically, as a specialist, working . . . at a job for the quality or consequences of which somebody else—or, perhaps more typically, nobody else—will be responsible. . . .
>
> . . . He has not the power to provide himself with anything but money, and his money is . . . subject to historical circumstances and the power of other people. . . . He does not know what he would do if he lost his job, if the economy failed, if the utility companies failed, if the police went on strike, if the truckers went on strike, . . . if he should be found incurably ill. . . .
>
> . . . It is rarely considered that this average citizen is anxious because he *ought* to be . . . He ought to be anxious, because he is helpless. That he is dependent upon so many . . . can only mean that he is a captive, a potential victim. If he lives by the competence of so many other people, then he lives by their indulgence; his own will and his own reasons to live are made subordinate to the mere tolerance of everybody else. He has *one* chance to live what he conceives to be his life: his

[82] RAWLS, A THEORY OF JUSTICE 464 (1999) (emphasis added).
[83] *Id.* at 460-61 n.4 (emphasis added).

> own small specialty within a delicate, tense, everywhere strained system of specialties.
>
> . . . The specialist system fails from a personal point of view because a person who can do only one thing can do virtually nothing for himself. In living in the world by his own will and skill, the stupidest peasant or tribesman is more competent than the most intelligent worker or technician or intellectual in a society of specialists.[84]

The passage describes the incompleteness of a life in which an individual's achievement of their good is thoroughly dependent on innumerable others pulling causal levers beyond the reach of the individual. The individual's developed skills are limited to those that are only of use when combined with those of others. "[A] person who can do only one thing can do virtually nothing for himself." In the terms often associated with individualism, it describes what a life without self-reliance, individual resourcefulness, independence, and individual responsibility looks like. Furthermore, it implicitly takes the view that we have *created* at least some of the incompleteness that Rawls seems to see as an inevitable characteristic of human existence.[85]

There could not be a starker contrast than between these two visions of what the good life does and does not entail. Let us now discuss some of the critical components of individualism, many of which are reflected in the quote from Berry immediately above.

2. What an Individualist Values.

The introduction to this article introduced the idea of fitness for individual responsibility. This concept is the flip-side of individual agency.

The idea of individual capabilities is helpful in explaining what we mean by individual agency. What it means to be an individualist, in addition to valuing fitness for individual responsibility, is valuing individual capabilities over collective capabilities. Importantly, an individualist cherishes individual

---

[84] WENDELL BERRY, THE UNSETTLING OF AMERICA: CULTURE AND AGRICULTURE 20-21 (1977) (emphasis in original).

[85] Berry is not arguing that an individualist life includes less anxiety or is proof against misfortune. Berry's subject in *The Unsettling of America* was the virtues of family farming. *See generally id.* He does not assert in that book that the self-reliant farmer lives a life free of setbacks, and there is no reason to think that he sees freedom from misfortune as a characteristic of the life of the family farmer that he admires.

In any case, a deeply individualist life might be, in a sense, less secure and would in any event undoubtedly include some kinds of stress not experienced by the "fortunate citizen" Berry describes. The point in offering this description of modern life instead is about completeness. Individualist values are constituents of the life of an individual who is whole in a sense that the "fortunate citizen," who desperately needs the help of others to compensate for the narrowness of their own capabilities and complete themselves, is not.

capabilities not only in herself ─that would be a form of egoism─but in others as well. Accordingly, she would like to see a world in which individual capabilities thrive; on the flip-side, she is opposed to the collectivization of capabilities.

Each of us is equipped with innumerable individual capabilities that enable us to cope, "on our own," with the external world. These include some capabilities that people tend to revere far above all others, some that they tend to denigrate, and many of which in the ordinary course of life they are not at all conscious. We tend to focus on those capabilities that we revere the most, those that are most distinctive of human beings such as our "higher" capability for thought.

Even the most mundane of our individual capabilities, though ─ perhaps even especially the mundane, especially what we think of as our "biological" capabilities ─ are important to individualism. Each of us can walk and run on our own. We have eyes with which we can see the world, and our minds unconsciously and endlessly process vast amounts of information from the surrounding world. Our lungs and circulatory systems exchange oxygen and carbon dioxide between our cells and the atmosphere, and the mitochondria of our cells, making use of the oxygen transported by the circulatory system, play a part in transforming our food to useable energy.[86]

These are capabilities *of an individual*.[87] Your or my muscular-skeletal system, heart, lungs and mind are *yours* or *mine* in a constitutive, not

[86] We seem to have an inherited cultural disdain for mundane capabilities, in particular capabilities that do not seem unique to human beings. This disdain is taken to further extremes by philosophers who try to disown non-mental capabilities that are not unique to human beings (and, perhaps, not uniquely important to philosophers). Thus, for example, Samuel Fleischhacker, whose reflections on judgment I admire and whose work I find extremely thought-provoking, tries to make the case that judgment has unique importance for individualism over our other capabilities. In discussing our sensory capabilities, he argues: "We say 'Use your own judgment,' but never, 'Use your own senses' . . . 'Use your own senses' . . . sounds otiose─whose senses could I use, other than my own? There's . . . no choice about using my own sensibility . . ." SAMUEL FLEISCHHACKER, A THIRD CONCEPT OF LIBERTY: JUDGMENT AND FREEDOM IN KANT AND ADAM SMITH 81 (1999).

Judgment is an important individual capability. But it does not matter, for purposes of identifying what capabilities constitute and define us, whether we have a choice about the capabilities in question. Whether we have a choice is only relevant to whether the capability is one for which we show a particular protectiveness, in order to protect our individualism. And, indeed, we are faced with the choice of whether to rely on our own senses all the time. Thus, we do refer to an individual's "own senses," as in, "ultimately you should rely on your own senses, not the computerized carbon monoxide detector, in determining whether the building is on fire." Reliance "on one's own senses" identifies one of a number of possibilities, including reliance on senses (or sensors) that are not "our own."

[87] Some may instantly object, on metaphysical grounds, to the suggestion that the individual fully owns these capabilities, pointing out that they are inherited, evolved traits or at a much more general level, they are all "caused" by something external to the individual, and that this suffices to undermine individualism. But so much the worse for our modern way of thinking about such things

merely possessory, sense. We each have character, talents and faults that are constitutive of the particular individual.

The types of capabilities on which we focus above are also "individualist" in a further sense. Everything in the world is a matter of degree, and we have evolved to depend in significant respects on others. But there is a meaningful sense in which, using our individual capabilities, we each can cope and indeed thrive in this world "on our own."

D. Individualism and the Perils of Climate Change Adaptation.

Now consider the threat posed for an individualist from the various forms of climate change adaptation on which experts have predicted humankind will rely.

1. Geoengineering and Individualism.

The threat to individualism from geoengineering is obvious. Geoengineering entails proposals to "rearrang[e] the earth's environment on a large scale to suit human needs and promote habitability."[88] In the context of climate change, geoengineering would entail "large-scale engineering to offset the warming effect of greenhouse gases,"[89] aimed not at decreasing emissions, but rather at allowing emissions to continue unabated but then "directly chang[ing] temperature regimes or atmospheric GHG [greenhouse gas] levels for the world."[90]

---

if it calls into question that the respiratory function of the lungs in one's body is a capability "of" that individual, that it is a part of him or her.

The point of the objection is that, because the attributes of each individual's body, as well as all his or her talents, character attributes, and faults are inherited from others and/or are the product of environment, they are not really "hers" or at least do not constitute the individual. That one or the other of us is smart or dumb, healthy or unhealthy, courageous or not courageous seems too contingent, too attributable to chance, to be attributable to them. But this view is a little too clever, or perhaps sophisticated, for its own good. No man or woman is an island. And it is true that there are continuities with the external world. But so what? The universe is lumpy. Each of us is not just part of undifferentiated space, part of background noise in a world with no foreground. Each of us is something that does stand "apart" from the environment. Even if that something is just a coincidence of conditions, that coincidence is one that has a particular persistence. In fact, that persistence is attributable to those conditions acting together as an intentional system that has as one of its intentions maintaining a boundary between self and other. *Cf.* DANIEL C. DENNETT, FREEDOM EVOLVES 56-62 (2003) ("the birth of evitability") (offering an account of evolution of distinct entities characterized by the capability to maintain themselves and avoid hazards that would undermine their independent existence).

[88] Broad, *How to Cool A Planet (Maybe)*, *supra* note ___.

[89] NORDHAUS AND BOYER, WARMING THE WORLD, *supra* note ___, at 126.

[90] *See*, *e.g.*, Carlin, *Global Climate Change Control*, *supra* note ___, at 1413.

The asserted viability of geoengineering has been cited by individuals in positions of influence[91] as well as by influential academics[92] as a potential reason why adaptation may be a viable alternative to abatement of greenhouse gas emissions. The significance to economists is not hard to see: geoengineering measures might be implemented at very low cost, relative to mitigation ─ so low relative to mitigation costs, in fact, that the studies arguably justify "calculations [that] . . . assume that geoengineering is costless."[93] Attempts at geoengineering may experience significantly diminishing marginal costs: to take the example of mirrors in space, according to the theory, once you start manufacturing and launching such mirrors and achieve the basic capacity to lower global average temperatures, the marginal cost of incremental decreases in temperature may fall practically to zero.[94]

From the perspective of many experts, the assumption that geoengineering would "costless[ly]" take care of the problem is "useful as a benchmark to determine the overall economic impact of greenhouse warming and of policies to combat warming."[95] At least one prominent economist has concluded that, "from a pure economic standpoint, . . . [t]he advantage of geoengineering over other policies is enormous."[96] Indeed, a way of adapting to a world with increasing greenhouse gas concentrations that is for all practical purposes costless could, in a certain framework of thinking, make concerns about such emissions seem to be ill-conceived or even irrational.[97] At the very least, a costless alternative makes mitigation look like a bad bargain.

---

[91] *See*, *e.g.*, *id.* (senior economist in the Environmental Protection Agency, advocating geoengineering).

[92] *See*, *e.g.*,, NORDHAUS AND BOYER, WARMING THE WORLD, *supra* note ___, at 176 (leading climate change economist and collaborator, arguing that "much more attention should be devoted to geoengineering options"); William Nordhaus, *Rolling the 'DICE': An Optimal Transition Path for Controlling Greenhouse Gases*, 15 RESOURCE AND ENERGY ECONOMICS 27, 40 (1993) (arguing that, if geoengineering turns out to be technologically feasible and as low cost as it appears, there would be an economic argument for not worrying about greenhouse gas emissions); BJORN LOMBORG, THE SKEPTICAL ENVIRONMENTALIST: MEASURING THE REAL STATE OF THE WORLD 323 (2001) (social scientist and best-selling author, acknowledging the seriousness of climate change, but arguing that "we should be much more open towards . . . geoengineering" as a less costly alternative to reducing greenhouse gas emissions).

[93] NORDHAUS AND BOYER, WARMING THE WORLD, *supra* note ___, at 127. Nordhaus refers to geoengineering as a form of mitigation, whereas this Article treats it as a form of adaptation. Depending on the point of one's inquiry, one can sensibly come up with a variety of dividing lines between "mitigation" and "adaptation." For reasons explained below, the term "mitigation" in this analysis refers only to proposals that would limit the greenhouse gases that we produce, reserving the term "adaptation" for attempts to cope with the effects of increased greenhouse gas concentrations. *See infra* at ____.

[94] Keith, *Geoengineering the Climate*, *supra* note __, at 272-73.

[95] NORDHAUS AND BOYER, WARMING THE WORLD, *supra* note ____, at 127.

[96] Nordhaus, *Rolling the 'DICE'*, *supra* note ___, at 48.

[97] *See*, *e.g.*, *id.* at 40 (arguing that geoengineering, if it provided a zero cost method for offsetting the climate effects of greenhouse gases, would have the same policy implications as an assumption "that the greenhouse effect has no harmful economic effects"); LOMBORG, SKEPTICAL

In response, let us first address a practical consideration about how humankind's implementation of geoengineering would likely play out and then, drawing on the discussion of individualism above, explain why the technological fix of geoengineering is fundamentally inconsistent with individualism.

With respect to practical considerations, geoengineering is unlikely to be implemented as a temporary measure for a number of reasons. First, if geoengineering were implemented as a substitute for serious efforts to abate emissions, global greenhouse gas concentrations would continue to rise. Abandonment of geoengineering then might be impossible, given the catastrophic consequences that could occur if those high greenhouse gas concentrations were not counter-balanced by geoengineering.

Second, once it was proven that it could work and the genie was out of the bottle, too many countries and individuals would have a vested interest in its continued use. Any climate parameters that those in control of the geoengineering mechanism set would significantly benefit certain regions, businesses, and activities over others.

An example, even if unrealistic, will illustrate the problem. We will refer to those who are in control of setting climate parameters as "the climate control agency," with the understanding that are not assuming the existence of a government agency. Assume the climate control agency set parameters such that the average global temperatures were high enough to keep the Arctic Ocean clear of ice year round, thereby opening up new shipping routes. This might fundamentally change the economic and geopolitical position of Russia and other countries bordering the Arctic, to their great advantage. They would have a significant vested interest in maintaining the conditions created by geoengineering.[98] Any move to eliminate geoengineering would be met with stiff opposition and might lead to global instability.

Finally, geoengineering probably can be implemented unilaterally.[99] Placing mirrors in space may be no more beyond the capability of an individual nation than placing satellites in space. The same probably holds with respect to current proposals such as injecting aerosols into the atmosphere. This makes it even more likely that implementation of geoengineering would be irreversible.

An irreversible decision to implement geoengineering would have grave consequences for individualism. The parameters set by the climate

---

ENVIRONMENTALIST, *supra* note ____, at 323 (acknowledging the seriousness of climate change, but arguing that "we should be much more open towards . . . geoengineering" as a less costly alternative to mitigation).

[98] To be sure, if one had to bet, it might be wise to bet instead that the climate parameters that would be set would favor the major industrial powers of the temperate zone, and in that case it is less easy to predict the average global temperatures that those countries would favor. But the basic point is that the countries of the temperate zone would have a vested interest in preserving what they perceived as their optimal temperature, just as Russia would with its optimal temperature maintained by geoengineering.

[99] Carlin, *Global Climate Change Control*, *supra* note __, at 1413-1414, 1487.

control agency would have significant consequences not only for nations, but for individuals as well. The success of individuals in achieving their good could very well depend more on the decisions made by the climate control agency than on any exercise of individual capabilities. This is obvious with respect to farmers. Any adjustment of the climate parameters could lead either to bountiful crops or disastrous conditions. Of course, we are all affected by weather, so the dependence on the climate control agency would be far more widespread than just farmers. The parameters set could influence, among others, the habitability of coastal land, disease patterns, storm activity, the availability of water, and the distribution and even survival of other species.

One can predict numerous ways in which individuals would have to look more to the climate control agency for the success of their endeavors than to their own individual capabilities. That being the case, fitness for individual responsibility would be seriously undermined. The farmer whose crop failed because the climate control agency created unfavorable conditions could rightly claim that it was not natural to attribute responsibility to her for the failure. On the flip side, a banner crop might be attributable as much or more to favorable decisions of the climate change agency than to the individual farmer.

2. Alternative Adaptations and Individualism.

Other, less drastic forms of adaptation pose a similar, though more local rather than global, threat to individualism. Recall the examples discussed in Part II. To adapt to sea level rise, experts predict that humankind would have to invest in large infrastructure works such as levees, sea walls and dikes. The response to loss of natural sources of water such as meltwater from mountains also would likely be large scale infrastructure projects, in this case reservoirs and artificial waterways. To cope with extreme weather events, reliance on insurance and government programs such as disaster relief would likely expand. Farmers would likely have to turn to agri-businesses for crop varieties suitable to changing conditions and increasingly to government programs established to manage risk. With respect to the potential extinction of other species, humankind would likely have to attempt to engineer habitats suitable to threatened species and transport them to the new habitats. Finally, in response to ocean acidification, humankind would have to engage in (or attempt) ongoing regulation of the oceans, perhaps by fertilizing the oceans to promote carbon dioxide absorbing plankton or by dumping of limestone into the oceans.

The way in which these coping mechanisms were implemented would be essential to the success of individual projects, yet the relevant causal levers would be pulled by others. There is little or no place for individual capabilities in any of these endeavors. Whether or not one could live in a low-lying region threatened by sea level rise would depend on bureaucrats and the political process. These would decide whether and with what specific means to protect

the region in question.[100] Similar analyses apply to the other adaptation mechanisms identified above.

It should not be surprising that disruption of a major earth system like the climate system should create a need for a vast expansion of collective capabilities and a corresponding loss of fitness for individual responsibility. Prior to human beings perturbing the basic parameters of the global climate system by unprecedented greenhouse gas emissions from the industrial revolution on, the climate system was self-regulating, in the useful sense that relatively stable conditions were maintained by forces and feedbacks wholly uncontrolled by humankind. Those conditions may not be considered by everyone to be ideal, but we are that which survived in, and managed to adapt to, the natural conditions that we have begun to disrupt. As a consequence, our individual capabilities are, unsurprisingly, well suited to cope with those conditions—not just the state of affairs we experience at any particular moment but also the volatility and rate of change of climate conditions that persisted until recently. In short, the climatic conditions that we are in the process of perturbing are conditions in which we should expect individual capabilities to suffice.

Humankind's significant alteration of greenhouse gas concentrations in the atmosphere—to the point where, with business as usual, we could see a tripling of those concentrations in the next century[101]—may mean that the global climate system will be pushed to equilibrium conditions that are far outside the norm of anything that has existed at any time during our species' existence, if ever.[102] Perhaps even more importantly from an individualist perspective, those shifts in equilibria may occur so rapidly that only the most sophisticated computer models could have a chance of predicting them. They will be beyond the ability of an individual human being, relying on individual capabilities, to predict and cope with. So, absent measures to reduce greenhouse gas emissions, we may not be able to rely on the climate system's self-regulation to provide conditions that individual human beings can cope with, on their own. Instead,

---

[100] *See* JOHN MCPHEE, THE CONTROL OF NATURE 20-26, 80-86 (1989) (discussing ongoing dependence of individuals around the Mississippi River delta on decisions of the Corps of Engineers).

[101] **Error! Main Document Only.**IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note___, at 12, 14, 18.

[102] It is estimated that our species has existed for approximately100,000 years. JEFFREY D. SACHS, COMMON WEALTH 57-58 (2008). Leaving aside for the moment whether a tripling of current greenhouse gas concentrations would be unprecedented, concentrations already are at levels that scientists confidently say have not been exceeded in the past 650,000 years. IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note __, at 2. *See also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: SYNTHESIS REPORT. SUMMARY FOR POLICYMAKERS 155 (2001) (earlier estimate that concentrations had not been experienced in over 420,000 years and that they likely had not been exceeded in 20 million years). We have not found scientific estimates of whether the earth has ever experienced greenhouse gas concentrations at *triple* the current level and, if so, how far back before human existence one would have to go to find such levels.

humankind may have to manage the climate system and the various natural subsystems that depend on it.

3. Substitutes for the Natural World and the Ethics of Individualism.

The danger to individualism can be further clarified by looking beyond degradation of the climate system to degradation of natural systems more generally.[103] An important question for our age is whether we believe that there is anything intrinsically important about the natural world and, in particular, any deep reason to preserve its naturalness. Another way to put this is whether when we degrade natural systems we lose anything that is impossible to replace.

Some think that there is not. The lawyer-engineer Peter Huber, in what he styles a "conservative" manifesto, provides an extreme example of the perspective:

> There are no limits to humanity's growth, at least none set by the external environment. . . . Yes, we will run out of what we consume now, eventually. Before we do, we will grow, find, or invent other things.[104]

Natural fish populations may collapse from overfishing. Regions of the world may deplete their natural water systems. But we will "invent other things" to substitute for the old practices of catching wild fish in the seas and drinking water from a local stream or well. He sees no ethical problem with such substitution, arguing that all environmental degradation is at most an "aesthetic disaster," and clearly "not a utilitarian one," because—and here he uses a striking turn of phrase — "*[m]odern man can . . . go it alone*."[105]

Huber's rhetoric about the lack of instrumental importance of nature is particularly strident. And his optimism about technology is markedly extreme. But the underlying premise—that there is nothing really special about nature—is one that seems to be increasingly accepted. Discussions of the value of ecosystem services have undoubtedly been of practical importance in providing justifications for limits on environmental degradation. The argument, though, has serious limits. It narrows the assessment of environmental degradation to questions of the following kind: can the services be provided in some other way,

---

[103] This is a subject that we can only briefly touch on here, but that warrants further work.

[104] PETER HUBER, HARD GREEN: SAVING THE ENVIRONMENT FROM THE ENVIRONMENTALISTS. A CONSERVATIVE MANIFESTO xxiii (1999).

[105] *Id.* at 161 (emphasis added). Huber does qualify this statement by saying that "in all likelihood" man can go it alone. This article assumes for sake of argument that humanity's ingenuity in fact is as great as Huber and other like-minded theorists hope, in order to investigate the normative implications of living in a world that would, by their lights, be considered a great success.

including by artificial substitutes, and will it be more or less expensive to turn to such substitutes than to stop the environmental degradation? Of course, the analysis may lead us to conclude that the environmental services are quite valuable, and so the natural systems that provide them should be preserved. But in the end the fate of the natural systems is determined by the same criteria as the fate of an individual in a commercial firm, who will lose her job if her services are made redundant or otherwise unnecessary.

One has to be blind to individualist ethical concerns in order to see the question of environmental degradation the way that Huber and some of the literature on ecosystem services does.[106] When we degrade natural systems and turn to artificial substitutes, we suffer a further erosion of the possibility of living an individualist life.

The point can be illustrated by turning Huber's rhetoric against him. When he says that "man" can "go it alone," he is at least rhetorically echoing an individualist virtue: the line conjures up images of the frontiersman or frontierswoman capable of "go[ing] it alone." It sounds like he is talking about an individual relying on individual capabilities, an individual fit for individual responsibility. But Huber's rhetorical pitch is in fact the opposite of an individualist one. When Huber says "man" can go it alone, he obviously is not referring to an *individual* man or woman.

In Huber's utopian, artificial world, no individual man or woman would be able to "go it alone." In a world of functioning natural systems, each individual, just by using individual capabilities and without relying on her fellow humans, is equipped to breathe, grow, gather or catch food, and find potable water. But the *reductio ad absurdum* of Huber's vision is a space station-like existence for humankind. Taken to this extreme of an artificial environment in which there has been pervasive substitution away from degraded natural systems to ones that have been invented and produced by humankind,[107] each *individual* human being would be dependent on other people for all the essentials of life: a breathable atmosphere, conversion of solar energy into nutrients, potable water, and so on.

Huber's "going it alone" would in fact represent a profound expansion of the extent to which we are forced to "go it together." Each individual's success, indeed their existence, would be profoundly dependent on others' pulling causal levers necessary to that success. Fitness for individual responsibility would be severely undermined.

Other scholars have focused on the loss of the natural attributes of humankind, yet without recognizing the damage to individual agency that we

[106] The ethical values of the authors lead to the conclusion that we do suffer irreversible loss when we degrade natural systems. They are the kind of values that peg one as a tree hugger: we see the biotic and even the abiotic natural world as having intrinsic value, wholly apart from what we get from nature.

[107] Or just about everything. We are assuming Huber does not know of any immediate plans to refashion or control the sun or other extraterrestrial parts of the solar system for our collective betterment.

seek to articulate here. Michael Sandel contends that our culture does not adequately value the "giftedness" of the natural. Focusing on the enhancement of the natural attributes of our bodies by technological means, he thinks that the problem with our substitution of artificial capabilities for the gifted attributes we are born with is that it is part-and-parcel of a culture of "hyper-agency," a "drive to mastery."[108] While his focus is on bioethics, the idea is relevant to environmental degradation as well.

The connection Sandel draws between lack of appreciation for giftedness and hyper-agency is a thought-provoking one. Our culture places inadequate value on giftedness, and Sandel is right to focus on agency. The problem, however, is not necessarily (or at least exclusively) excessive agency, but rather a kind of *substitution* of agency—a substitution of collective agency for individual agency.

What is lost when fishermen become workers in fish farming operations? When fishermen who previously lived off of fish populations close to shore, which could be caught from small boats using simple gear, are forced to rely on the kind of technology necessary for commercial fishing in ever greater depths of the ocean—larger fishing vessels, factory ships for processing fish caught far from shore, military-style scanning equipment, and so on?[109] Likewise, what is lost when, instead of drawing water from local wells and acquifer-fed surface bodies of water, people must rely on de-salinization plants, public works programs that transport water from a distance, and bottled water?

One answer is individualist agency and fitness for individual responsibility. The people in question no longer are in the position to pull the critical causal levers that allow them to produce their own good. The kind of fish farming that is being discussed as a substitute for the catching of wild fish is not likely to be a one-man (or, for that matter, family) operation. Rather, it is likely to require complex organization to produce and maintain all the conditions (previously produced, with no demand for anything in return, by the natural forces in the ocean) that will be necessary for high volume production of fish. The model will be agri-business, not the family farmer.[110] Indeed, even the turn to commercial deep sea fishing will tend to require such organization: commercial deep sea fishing is a high tech operation, requiring much larger

---

[108] MICHAEL J. SANDEL, THE CASE AGAINST PERFECTION: ETHICS IN THE AGE OF GENETIC ENGINEERING 26-27 (2007).

[109] *Cf.* CHARLES CLOVER, THE END OF THE LINE: HOW OVERFISHING IS CHANGING THE WORLD AND WHAT WE EAT 81-85 (2006) (hereinafter, "CLOVER, END OF THE LINE") (discussing technology used for deep sea commercial fishing).

[110] Rebecca Goldburg and Rosamund Naylor, *Future Seascapes, Fishing, and Fish Farming*, 3 FRONTIERS IN ECOLOGY AND THE ENVIRONMENT 21, 25 (2005) ("Most marine aquaculture is modeled after terrestrial feedlots or 'industrial' farms used to raise hogs and poultry in the US and elsewhere. . . . Industrial animal facilities typically cluster geographically to take advantage of economies of scale . . .").

vessels, far more complex and expensive equipment, and information beyond the reach of an individual.

Likewise, the delivery of water to locations where local aquifers have been depleted entails human organization to design, maintain and direct the kinds of artificial systems necessary for such delivery. No more taking a bucket to the well. River systems are channeled. Dams are built to create artificial storage reservoirs. Springs are tapped, the water bottled in factories by factory workers, and the bottles transported long distances by shipping companies.

All of this requires a multiplication of causal levers beyond the reach of the individual. Granting, for the sake of argument, Huber's claim that environmental degradation may not lead to *economic* scarcity, does not preclude the possibility that it still will lead to what we would call *individualist* scarcity. Individualist scarcity is the loss of a world of individual agency, a world in which we rely on our individual capabilities, where each can pull the critical causal levers to produce her own good, and each is fit for individual responsibility.

III. Negative Responsibility and the Climate Change Debate

Whether or not one finds appealing the account of individualism offered in the previous section or is persuaded by the argument that unabated climate change poses a serious threat to individualism, the previous section raises an important issue: whether it is a good development that the causal levers necessary for an individual human being to produce her own good are becoming increasingly too remote for the individual to pull. Each of us is in danger of becoming ever more dependent on others to pull those causal levers. Yet scholars and policymakers engaged in the conventional debate on climate change fail to register this as an issue.

It is not that the experts are unaware of the relevant facts. They quite consciously contemplate a host of new causal levers that will have to be pulled by others to produce (or preserve) our good, as illustrated by the lengthy discussions of that fact in the IPCC's *Climate Change 2007: Impacts, Adaptation and Vulnerability* report. For example, all of the following are freely discussed: if we live in an area subject to flooding, whether or not we can successfully live and farm will depend on lining up support for government action to create and maintain levees and other flood protection; or our ability just to survive may require turning to aid programs. If agricultural conditions change just from the shifting of average temperatures or precipitation, continuing to successfully farm may require purchasing of new seed varieties engineered by agri-business. These are factual predictions discussed in the IPCC's report. These predictions are taken into account in expert analyses. Those analyses, however, take no account of the significance of these facts for individualism.

This Part explores why the conventional debate over climate change fails to see anything interesting here. Our conclusion is that there is a broad

commitment among the participants in the conventional debate to a particular framework of analysis. That framework of analysis is based on a particular version of negative responsibility that is welfarist and views humankind as a joint venture, two concepts that we will explore in some depth below. The upshot of that perspective is that the debate focuses almost exclusively on two goals, economic growth and distributive justice. Another way to put this—one that ties into the discussion of individualism above—is that the framework of analysis in question values the expansion of humankind's capabilities and looks to identify fair terms for the disposal of the fruits of those capabilities.[111]

That framework of analysis does effectively advance some important moral values. But in its exclusive focus on expansion of capabilities as such and on the principles by which humankind will dole out their benefits, it is blind to individualist ethical concerns.

We start by giving an overview of the conventional climate change debate. We then take a step back from the climate change debate and explore how some of the foundational moral assumptions that a range of experts bring to their analyses help to explain the lack of interest in individualist concerns.

A. The Terms of the Climate Change Debate

In the debate among experts, there are certainly those who advocate aggressive action to abate greenhouse gas emissions. A notable example is Sir Nicholas Stern and the team of collaborators who prepared the *Stern Review* for the British government. Stern notes projections that, under a business as usual scenario, there may be changes in natural systems that "would take us way outside the realm of human experiences and will challenge the fundamentals of life in many regions," including changes that may make whole regions of the globe "uninhabitable because of peak temperatures, desertification and drought or eventual sea level rise."[112] His basic message is that "strong action" is warranted, because "the benefits of strong action clearly outweigh the costs."[113] By strong action, the *Stern Review* targets emissions reductions sufficient to stabilize greenhouse gas concentrations within the range of 450 ppm to 550 ppm CO_2 equivalent.[114] The lower end of that range would be approximately one and

[111] This, roughly, is how the economist Amartya Sen views the proper focus of economic policy. *See generally* AMARTYA SEN, DEVELOPMENT AS FREEDOM (1999) (arguing that the point of economic growth is properly understood as the expansion of the capabilities put at individuals' disposal, with particular emphasis on ensuring basic capabilities).

[112] Nicholas Stern, *Reaction to the Panelists: Sir Nicholas Stern*, in YALE SYMPOSIUM ON THE STERN REVIEW 126 (Yale Center for the Study of Globalization, February 2007), www.ycsg.yale.edu/climate/forms/FullText.pdf.

[113] STERN, THE STERN REVIEW, *supra* note ___, at 320.

[114] *Id.* at xvi, 318-319.

a half times the maximum natural level experienced over at least the past 650,000 years.[115]

Other economists favor far less aggressive action. Leading the charge to do little, William Nordhaus has concluded that to follow the *Stern Review*'s recommendations would be a "worse-than-nothing" solution.[116] He opposes any policies aimed at stabilizing greenhouse gas emissions any time in the next couple of centuries, instead favoring one that would permit carbon dioxide concentrations to rise to 586 parts per million by 2100 and 659 parts per million by 2200—that is, to almost twice and then two and a half times the levels experienced over the past 650,000 years.[117]

These are significant differences. There is, however, a more interesting commonality between the two sides of the debate. Experts who favor aggressive abatement of greenhouse gases accept certain premises of their opponents, though they object to specific conclusions on technical grounds.

Within the conventional debate, one of the most powerful retorts to those who would like to see aggressive action to abate greenhouse gases is that adaptation might not be as bad as we think. Nordhaus's analysis is premised on this position. He and the other adaptationists are unimpressed by the litany of impacts that will occur in the natural world.

Specifically, the adaptationist's response to the scientific predictions of dire changes in natural systems is that the predictions may be correct, but we have to keep our eye on the ball, and the ball is wealth. Of course, the inequities of climate change have been noted: poorer regions of the world also happen to be those most likely to suffer the worst natural impacts; and also, future generations will be the ones to bear the most serious consequences, primarily because concentrations of greenhouse gases are increasing and impacts increase with those concentrations.[118] But adaptationists like Nordhaus respond that, if fairness in distribution of wealth is the concern, then at most that argues for addressing the redistributional issue separately.

Thus, to the possibility we may be leaving *future* generations with severely degraded natural systems and resources, the adaptationist responds that we will more than compensate them by leaving them with more of the things that we have come to value; we will leave them with more accumulated technological, social, and physical capital, which will make them wealthier than

---

[115] IPCC, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, *supra* note___, at 2.

[116] WILLIAM NORDHAUS, A QUESTION OF BALANCE: WEIGHING THE OPTIONS ON GLOBAL WARMING POLICIES 88 (2008).

[117] NORDHAUS, QUESTION OF BALANCE, *supra* note ___, at 103. Whereas the *Stern Review* cites 450 ppm carbon dioxide equivalent as the lower end of its stabilization target, Nordhaus cites the *Stern Review* as advocating stabilization at 417 ppm carbon dioxide. *Id.* The difference appears to be that Nordhaus is not including greenhouse gases other than carbon dioxide, thus the difference in units (ppm carbon dioxide equivalent versus ppm carbon dioxide).

[118] *See*, *e.g.*, STERN, THE STERN REVIEW, *supra* note __, at 201 (rising emissions), 487 (greater impacts on developing countries); Michael Grubb, *Seeking Fair Weather: Ethics and the International Debate on Climate Change*, 71 INTERNATIONAL AFFAIRS 463, 467 (1995) (listing reasons developing countries will suffer greater impacts).

we are, and wealthier than they would be if we limited our economic activity in order to curtail greenhouse emissions. It thus seems perverse to the adaptationist to forego the enjoyment of wealth in the present to spare future generations what is just an economic cost, and, at that, a cost which we will leave them able to bear easily. As summarized by Sir Nicholas Stern, the argument in the climate change context is that "[w]e'll make these wonderful rates of return on [other] investments that we can see, and we'll sort out climate change later on."[119] The economist William Nordhaus exemplifies this adaptationist position when he asks what he sees as a rhetorical question, "how persuasive is the ethical stance that we have a duty to reduce current consumption by a substantial amount to improve the welfare of the *rich future generations*?"[120]

The adaptationist has a similar answer to the question of inter-regional, as opposed to inter-generational, equity, in particular the possibility that the climate change brought about by the economic activity of the industrialized world may inflict particularly severe harms on developing countries in the form of degradation of natural systems. To be sure, the adaptationist is less certain that our inaction, and the wealth creation that we think we would have foregone if we had done something about greenhouse gas emissions, will *necessarily* benefit developing countries. But she thinks that, at most, this is just a problem of having the right institutions for wealth transfer in place.

The adaptationist asserts that humankind will amass significant wealth if it can continue to emit greenhouse gas emissions without significant constraint. That wealth, she thinks, should be adequate to compensate disadvantaged regions for the damages inflicted by climate change, such as loss of natural water sources, desertification of land, and loss of land to sea rise. Rather than address the cause of the problem by abating greenhouse gas emissions, we should shift humanity's wealth to address unequal gains and losses from climate change through international aid programs.[121]

---

[119] Stern, *Reaction to the Panelists, supra* note ___, at 120; *see also* NORDHAUS, QUESTION OF BALANCE, *supra* note ___, at 76 (criticizing *Stern Review* on grounds that it "leads to major inefficiencies because the low-return climate investments . . . crowd out high-return investments in nonclimate capital").

[120] NORDHAUS, QUESTION OF BALANCE, *supra* note __, at 179 (emphasis added); *see also, e.g.*, Robert Mendelsohn, *Comments on the Stern Review: Chapter 8*, in YALE SYMPOSIUM ON THE STERN REVIEW 96 (Yale Center for the Study of Globalization, February 2007) (arguing that the case for aggressive abatement action presumes an obligation to save to increase the wealth of future generations, but arguing that such an obligation to future generations makes "every generation . . .worse off" in the amount of wealth they enjoy, which "[c]learly [is] . . . not a morally superior outcome"); Scott Barrett, *Chapter 9*, in YALE SYMPOSIUM ON THE STERN REVIEW 105 (Yale Center for the Study of Globalization, February 2007) (noting economists' belief that future generations will be wealthier, and thus asserting that "the question is how much the current generation should assist the future, when the future is expected to be better off").

[121] Bjorn Lomborg, the "skeptical environmentalist," exemplifies but is certainly not alone in asserting this "maximize wealth and redistribute" position. *See* LOMBORG, SKEPTICAL ENVIRONMENTALIST, *supra* note ____, at 322 (arguing that we should forego costs of emissions

In short, the adaptationists believe that, though we may be leaving various regions of the world and future generations with severely degraded natural systems and thus imposing losses, we can compensate both by inherited or transferred wealth. That wealth, the adaptationists believe, can provide more of everything that we have come to value, including accumulated technological, social, and physical capital.

Adaptationism does not go unchallenged. But the ordinary line of attack against adaptationism, exemplified by the *Stern Review*, does not stray very far from the foundations of the adaptationists' own analyses. To be sure, the *Stern Review* does, at one point, tentatively challenge the idea that wealth can be freely substituted for nature, that is, that nothing essential is lost if we substitute the artificial for the natural. Thus, it notes that the ordinary interpretation of the concept of sustainable development considers only whether we are leaving future generations with chances for an equal standard of living. It does not treat nature as special:

> Expressed in this form, the principle [of sustainable development] need not imply that the whole natural environment and endowment of resources should be preserved by this generation for the next generation in a form exactly as received from the previous generation. The capital stock passed on to the next generation consists of many things, mostly in the form of stocks covering, for example, education, health, capital equipment, buildings, natural resources, and the environment. The standard of living depends on this whole collection of stocks. A decline in one of them, say copper, might be compensated by another stock, say education or infrastructure, which has increased.[122]

The *Stern Review* qualifies its support for this approach in the case of global natural systems: "it seems quite clear that, at a basic level, the global environmental and ecological system, which provides us with life support functions such as stable and tolerable climate conditions, cannot be substituted."[123]

It appears, though, that this observation plays no part in the analysis of the report. The report looks at ordinary economic data to determine the effects of various policies on overall wealth. In other words, even the *Stern Review* implicitly accepts Peter Huber's claim that, given sufficient technological advances, humankind could "go it alone," that is, without natural sources of the things we need—notwithstanding a brief protest to the contrary.

---

abatement and instead invest the money in third world development aid); Mendelsohn, *Comments on the Stern Review, supra* note ___, at 98 ("[u]sing funds that could be used for compensation to fund mitigation instead not only earns a low return but makes poor victims worse off").

[122] STERN, THE STERN REVIEW, supra note ___, at 48.

[123] *Id.*

Instead of attacking the premise of free substitutability of wealth for nature, challenges to the adaptationists are limited to their empirical predictions, or the relative weight given to the advantages and disadvantages of particular groups in the social calculus, and ultimately data is amassed to show that the net benefits of acting likely will be greater than the net benefits of not acting. So, for example, there seems to be general agreement that the differences between the *Stern Review*'s and Nordhaus's optimal policies turn on the fact that the *Stern Review* does not discount the benefits and harms to future generations just because they are future generations,[124] whereas Nordhaus does.[125] As a consequence, in Nordhaus's analysis damages suffered in future generations are given less weight than in the *Stern Review*'s analysis, leading to the conclusion that the current generation has less reason to incur costs to avoid those impacts.[126]

These different stances on discounting produce significantly different results. But otherwise the approach is methodologically similar—proceeding from common premises and sharing a common framework of analysis.[127] Essential to the experts' assessment of the relative advantages and disadvantages of a predominant focus on aggressive abatement versus adaptation is the idea that the natural impacts that are predicted are less dire than the social welfare impacts. The reason, accepted by both sides, is the litany of ways that human beings might cope with natural impacts. To the participants in the debate, these coping mechanisms unequivocally strengthen the adaptationist's case. They are seen merely as means to decrease the disadvantages from climate change, and perhaps even to create some advantages. Where the participants in the debate expressly invoke cost-benefit analysis, the significance of the various coping mechanisms available to humankind is simply that they lower the cost of failing to abate greenhouse gas emissions.[128]

---

[124] *Id.* at 35 ("we treat the *welfare* of future generations on a par with our own") (emphasis in original).

[125] *See generally* NORDHAUS, QUESTION OF BALANCE, *supra* note __, at 191 (criticizing *Stern Review* for not discounting).

[126] *See id.* at 169 (arguing that the *Stern Review*'s low discount rate "magnifies impacts" in the distant future), 186 (using computer modeling to show that choice of time discount rate explains differences in results). Of course, the authors of the *Stern Review* could argue in return that treating the interests of future generations as of equal concern with our own does not "magnify" those interests, it simply treats them equally.

[127] A growing body of work demonstrates that the common premises of welfare economics can point in significantly different directions than those to which we are accustomed. In particular, although economics often has been invoked to limit environmental regulation, recently analysts have argued that economic analysis generally shows environmental regulation to be a better deal than expected. *See*, *e.g.*, Hsu, Shi Ling, *Fairness versus Efficiency in Environmental Law*, 31 ECOLOGY L.Q. 303, 342-43 (2004) (discussing cost-benefit studies showing that, with respect to a number of environmental regulatory schemes, "the costs of regulation are dwarfed by the monetized benefits of regulation").

[128] *See*, *e.g.*, STERN, THE STERN REVIEW, *supra* note ___, at 345-346; IPCC, IMPACTS, ADAPTATION AND VULNERABILITY, *supra* note ___, at 725, 737 (noting that there is little research on the costs and

E. The Individualist Critique

From an individualist standpoint, the analysis is deeply flawed on both sides. An individualist will find morally unpersuasive Lomborg's assurances to more heavily impacted regions that the world economic system can produce enough surplus to provide for those who lose their livelihoods from global climate impacts. Lomborg's analysis overlooks the insight that producing one's own good and being fit for individual responsibility are important aspects of human life and, indeed, the moral character of individuals around the world. He seems to envision Bangladeshis, unable to farm the submerged lands they previously had, happily lining up for aid from the industrialized countries. Furthermore, while he is completely untroubled by the need for international bureaucracies to implement a worldwide redistribution of wealth to even out the gains and losses from unabated climate change, an individualist would be.

An individualist also will find unpersuasive the insistence of Nordhaus and others that we can disrupt the natural climate system with a good conscience because, in the process, we are creating massive amounts of artificial wealth that future generations will inherit. There are good reasons to think, even if one stays within the terms of the conventional debate, that the disruption of the global climate system will seriously undermine humankind's net wealth, natural and artificial. But assume instead that the adaptationists are right, and that economic scarcity will decrease if humankind follows a soft approach to climate change that declines to put serious restrictions on greenhouse gas emissions.

Even if this were so, the prediction of decreasing economic scarcity says nothing of individualist scarcity.[129] In degrading natural systems such as the climate system, we will deprive future individuals of the opportunity to be fit for individual responsibility, to use individual capabilities to cope with an environment that, though often difficult, is one in which an individual can contend and in which success or failure can be said to rest naturally with the individual.

What, in return, will future generations receive by virtue of the fact that our wise decision to do nothing has made them the "rich future generations"[130] that they will be? A world of artificial wealth. That wealth will principally be in the form of collective capabilities. It will be a world in which others pull the causal levers essential to the individual's pursuit of the good. The rich future descendant can sit and admire the systems of levees that hold back waters that previously did not need to be held back, dams and other artificial water storage

benefits of adaptation practices, but that in areas where research has been done, such as coastal defenses against rising sea levels, the literature argues that adaptation practices will significantly reduce the costs of natural changes).

[129] *See supra* Part IIIB.

[130] William Nordhaus, *The Stern Review on the Economics of Climate Change*, (May 3, 2007) http://nordhaus.econ.yale.edu/stern_050307.pdf (published as *A Review of the Stern Review on the Economics of Climate Change*, 45 J. Econ. Lit. 3 (2007)).

and transportation projects that supply water that once flowed from mountain snowcaps and could be drawn from a well, and agri-business catalogues of genetically-engineered seed varieties that promise high yields under the latest climate conditions, where once local seed varieties adapted to the relatively stable local conditions were adequate. Our rich future descendant will likely have us to thank for a guarantee of a life fitting Wendell Berry's description of the "fortunate citizen," dependent on a network of other actors—with impressive collective capabilities at their disposal, to be sure—to advance and preserve his prospects.[131]

Finally, an individualist is likely to think that the *Stern Review*, while correct to advocate for aggressive abatement action, reaches that result without taking into consideration one of the most significant reasons aggressive action is warranted: the individualist concerns. The *Stern Review* concludes that aggressive action is a good deal even after accepting that by re-engineering aspects of the environment, humankind can avoid comparably severe economic impacts from severe natural impacts. But by failing to question whether it is morally desirable to re-engineer our environment, the *Stern Review*'s analysis is seriously limited.

IV. Legal Responses to Climate Change

The identification of individualism as an alternative to the perspectives that dominate the conventional climate change debate and the nature of the individualist diagnosis of the problem are the primary contributions of this article. With respect to the implications of this alternative for the appropriate legal response, this article has a more modest goal. It may be that at present there is no pragmatic alternative to the expert solutions currently being offered, but that does not mean that a more ambitious goal cannot be the ultimate goal.

Individualism calls for a very different response than negative responsibility. As a practical matter, it looks likely that the basic framework of any legal responses to climate change will start with some type of cap-and-trade or cap-and-dividend program. This, though, leaves much detail to be worked out.

At least as an initial matter, experts wielding the code of negative responsibility will have the upper hand in working out many of the details. The cap that is set will likely be set based on some form of cost-benefit analysis, which finds a point where further emissions cause more harm than good and caps emissions there. The trading of allowances under the cap will then, on one view, efficiently implement that cap. Adjustments to the cap will be made based on expert re-analysis of costs and benefits, for example, how much the economic

[131] **Error! Main Document Only.**WENDELL BERRY, THE UNSETTLING OF AMERICA, *supra* note__, at 20-21.

value of Bangladeshi farming has been over- or under-estimated in comparison, say, to the economic value of continued unabated use of coal-fired power plants.

The individualist, though, need not accept the implementation of a cap-and-trade system in accordance with cost-benefit analysis or, more generally, efficient implementation of negative responsibility. She can push for a cap-and-trade system that moves us in the direction of eliminating moral wrongs. Ideally, that is the point where natural climate conditions are restored and it can no longer be said that emissions are making anyone unfit for individual responsibility.

The key to the individualist's modification of cap-and-trade is that, with respect to the treatment of the global climate system as a common resource to be used according to the dictates of the common good, individuals should have the ability to draw the line, to say enough is enough, to say that we may have agreed to share one another's fate in many ways, but not by tinkering with and optimizing the globe's climate system for maximum social welfare.

Now, it might be thought that there is no one left who in good faith can take this stand. It might be thought that we have all bought in so completely to the economic system that produces greenhouse gas emissions that we have fully acquiesced in the natural moral code for that system, efficient implementation of negative responsibility. But this is based on a misapprehension.

The reality in which we live is somewhere between the reality that would best fit with ideas of negative responsibility and that which would best fit with the individualist perspective. Experts who prefer the innovative, pervasive application of ideas of negative responsibility assume that we have undertaken reciprocal risks comprehensively. Their motto might as well be, in for a penny, in for a pound. This serves as justification for the view that we have all offered a certain form of consent to what on the face of things look like decisions to which we have not been a party.

But this is not the whole picture. There are significant asymmetries among the risks we impose on one another.[132] Just as importantly, many of us are deliberate in looking for ways to impose less risk on others. That is not generally because we have conducted some social calculus, deciding that we will avoid more (in some sense) global harm than the good we would have created by engaging in risk creation, but rather because we want to respect others and think it wrong to impose risks on others, particularly if it prevents them from producing their own good. One sees this increasingly in the context of climate change: individuals deliberately adopt lifestyles that, though not reducing their emissions to zero, nonetheless represent a significant departure from the lifestyles of others.

[132] This point is discussed extensively in the literature on torts. *See generally* JULES COLEMAN, RISKS AND WRONGS 234-269 (1992); GEORGE P. FLETCHER, TORT LIABILITY FOR HUMAN RIGHTS ABUSES 85-104 (2008); WEINRIB, THE IDEA OF PRIVATE LAW 145-170, 187-190 (1995); George P. Fletcher, *Fairness and Utility in Tort Theory*, 85 HARV. L. REV. 537 (1972).

These asymmetries should lie at the heart of an individualist legal response to climate change. If the law attributes significance to such asymmetries, one ends up with a bottom-up generation of law, rather than the top-down generation favored by advocates of efficient implementation of negative responsibility. The individual, not the expert, can in a sense become the law. Naturally, there are other considerations that prevent a legal system in which every individual can make a direct claim that she has discovered a path that everyone else can follow, and so must follow. But, there are practical ways to build from individual demonstrations of how life can be lived without environmental destruction to broader legal regimes.

A simple way is to use lower levels of government not just generally as a source of democratic experimentation, but more specifically as springboards for demonstrating what is morally possible. For example, currently there are intensive state efforts to regulate greenhouse gas emissions within state and regional borders. These efforts are predicated on the commitment of individuals within these states to go beyond what others are willing to do. To the extent they result in significant reductions, they are a demonstration of these individuals' ability to live a life that reduces moral wrongs.

Any cap-and-trade system should permit these state efforts to proceed. Furthermore, there should be procedures whereby states that forge ahead of the rest of the country, and can demonstrate the broader applicability of their means of reducing emissions, can demand that national standards be made as stringent as the state or regional standards. From the perspective of negative responsibility, such a system looks certain to lead to socially sub-optimal results. But from an individualist perspective, the aim is not social optimality. It is eliminating wrongs where we find we can rise to the challenge, and promoting fitness for individual responsibility. It is a commitment not to wrong others, as opposed to a cost-benefit calculus.

One final point about the proper legal response. It might be asked how, if we have rendered ourselves largely unfit for individual responsibility, an individualist legal response has anything with which to work. Concretely, if it is true that we have enmeshed ourselves in such a complicated network of agents pulling so many causal levers that there's no natural way to attribute responsibility, what is an individualist to do? As we have suggested above, many individuals do jealously guard the causal levers that allow them, in many dimensions of their lives, to produce their own good and define the effects they will have in the world. But leave that point aside. It probably is the case that the activities most responsible for climate change are precisely those conducted in a way that makes us unfit for individual responsibility. So assume that it is true that humans, in the ways that they use fossil fuels and pursue the other activities that cause climate change, have rendered themselves entirely unfit for individual responsibility.

This is not a new problem in the law. The law has repeated occasion to deal with an alleged wrongdoer who has engaged in activities in a way that

make it difficult naturally to attribute responsibility to her or anyone else. Consider the case of *Summers v. Tice*,[133] in which two hunters accidentally fired in the direction of a third, with no conclusive evidence of whose bullet had caused which injuries to the plaintiff. The court held that each could be held fully responsible, unless one of them could demonstrate that the other had caused the injuries.[134] That result is mirrored in a variety of areas of the law, from the closely related concept of joint and several liability in tort and environmental cases to the more distant doctrine of felony murder, in which one participant in a group crime can be held responsible for the worst actions that his co-criminals commit in furtherance of the crime.

The individualist justification for such doctrines is simple. One may have rendered oneself unfit for individual responsibility with respect to specific consequences or specific actions. But it is still often natural to say of such an individual that she bears a broader responsibility. She remains responsible for having rendered herself unfit for individual responsibility with respect to the specific consequences of her actions. As a consequence, the person who renders herself unfit for individual responsibility reaps the worst disadvantages of the doubt that is created by her doing so. From an individualist perspective, it is right to hold an individual responsible for the worst consequences and acts that might have been caused by the individual, if she had attempted to further her ends in a way that eroded fitness for individual responsibility.

This line of thinking has great significance for climate change. It puts many of the complaints of utility companies and car manufacturers, for example, in a decidedly unsympathetic light. From the individualist perspective, the burden is on such massive collective enterprises to show that they are doing everything possible to cease the moral wrongs they are committing. That there are other potentially responsible parties will be unsurprising in a world in which fitness for individual responsibility has been undermined. But, from an individualist perspective there is little trouble in singling out certain actors who contribute and encourage such loss of fitness for individual responsibility.

V. Conclusion

Human-induced climate change is creating conditions that will undermine our fitness for individual responsibility, making it less and less natural to attribute responsibility to individuals. This is significant because that loss of fitness becomes a profound modification in our character, central to who we are and who we aspire to be.

The recent United Nations conference in Copenhagen highlights the deep conflicts that are hindering efforts to address climate change. Who should pay for any costs associated with curbing greenhouse gas emissions? What are

[133] 199 P.2d 1 (Cal. 1948).
[134] *Id.* at 3-5.

the obligations of developing vs. industrialized nations? Won't technology save us?[135]

Of this last question, the prevailing view places great faith in human ingenuity to solve our environmental predicaments, an "essential religiosity" that humans will overcome whatever nature serves up.[136] Danish statistician Bjorn Lomborg believes we should create a fund, using 0.02 percent of global GDP, and devote it toward finding a "silver bullet" such as geoengineering to "fix climate change".[137] Since future generations will be wealthier, any current efforts to reduce emissions are wasteful from a cost-benefit perspective.

Lomborg's analysis epitomizes the narrowness of the arguments dominating the wider climate change debate, as seen in both welfare economics and contractualism. Notwithstanding the questionable assumptions involved in finding a technological fix, even if the research comes to fruition, the degree to which the world would then need to rely on collective capabilities is inescapable, jeopardizing individualist concerns.

This article defends the position that climate change is a question of moral wrongs, attributable to individuals, and that a proper response should be focused on the cessation of those wrongs. The race to the top should be one of mitigation, not adaptation, in order to restore natural climate conditions and safeguard the individual capabilities that make fitness for individual responsibility possible.

[135] *See* Tom Zeller, *Negotiators at Climate Talks Face Deep Set of Fault Lines*, N.Y. TIMES (December 6, 2009) http://www.nytimes.com/2009/12/06/weekinreview/06zeller.html?_r=1.
[136] BILL MCKIBBEN, THE END OF NATURE 153 (1989).
[137] David Kestenbaum, *Economically Speaking is Climate Change a Priority?* (December 15, 2009), http://www.npr.org/templates/story/story.php?storyId=121452507.