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Climate Change Triage

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ARTICLES

CLIMATE CHANGE TRIAGE

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Climate change is the first global triage crisis. It is caused by the overuse of a severely limited natural resource—the atmosphere's capacity to absorb greenhouse gases—and millions of lives depend on how international law allocates this resource among nations.

This Article is the first to explore solutions for climate change mitigation through the lens of triage ethics, drawing on law, philosophy, moral theory, and economics. The literature on triage ethics—developed in contexts such as battlefield trauma, organ donation, emergency medicine, and distribution of food and shelter—has direct implications for climate change policy and law, yet it has been overlooked by climate change scholars. The triage lens rules out climate policies—including the current emissions path—that will lead to catastrophic warming, and it puts options on the table that are marginalized in the current United Nations negotiations on a climate change agreement.

This Article examines three allocation principles that could potentially apply in climate change triage—utilitarianism, egalitarianism, and a market-based distribution—and it concludes that

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egalitarianism is the preferable allocation principle from the standpoint of ethics and international law. This Article ends by exploring four major policy implications that emerge from viewing climate change through the lens of triage.

I. INTRODUCTION

As the earth warms this century, governments will confront tragic choices, and new frameworks of law and ethics will be needed to govern our relationship to the natural world and to each other. Global climate change will cause severe food and water scarcity, resource conflict, and sea-level rise that will threaten major cities.[1] Many nations will become overwhelmed

[1] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, MANAGING THE RISKS OF EXTREME EVENTS AND DISASTERS TO ADVANCE CLIMATE CHANGE ADAPTATION 15–16 (Christopher B. Field et al. eds., 2012); Anthony Oliver-Smith, *Climate Change and Population Displacement: Disasters and Diasporas in the Twenty-First Century*, *in* ANTHROPOLOGY AND CLIMATE CHANGE: FROM ENCOUNTERS TO ACTIONS 116, 132 (Susan A. Crate & Mark Nuttall eds., 2009); François Gemenne, *Climate-Induced Population Displacements in a 4°C+ World*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y A 182, 182–85 (2011), *available at* http://rsta.royalsocietypublishing.org/content/369/1934/182.full. *See also* OFFICE OF THE UNITED NATIONS HIGH COMM'R FOR REFUGEES (UNHCR), FORCED DISPLACEMENT IN THE CONTEXT OF CLIMATE CHANGE: CHALLENGES FOR STATES

by these impacts, and some nations will likely be destroyed. Already, Pacific island nations are evacuating their citizens as they lose their territory to the rising seas.[2] Warming at the high range of estimates for this century, five to six degrees Celsius (9 to 10.8 degrees Fahrenheit), would be civilization-altering.[3] It would constitute more than a 35% increase in the average surface temperature of the planet since the middle of the twentieth century.[4]

These massive ecological changes will likely give rise to new legal regimes and ethical values that we can scarcely envision. Older, twentieth century frameworks for human interaction with nature, such as Garret Hardin's tragedy of the commons[5] or Aldo Leopold's land ethic,[6] provide little guidance for the hard choices on resource allocation and survival that we face in a warming world.

Triage provides a new, twenty-first century framework. Triage comes from the French *trier*, which means to pick or cull.[7] It refers to allocation of

UNDER INTERNATIONAL LAW 3–4 (2009), *available at* http://unfccc.int/resource/docs/2009/smsn/igo/049.pdf (citing rising sea levels, threats to livelihood, and environmental degradation as reasons for population displacement).

2 *See* Paul Chapman, *Entire Nation of Kiribati to be Relocated Due to Sea Level Threat*, THE TELEGRAPH, Mar. 7, 2012, http://www.telegraph.co.uk/news/worldnews/australiaandthepacific/kiribati/9127576/Entire-nation-of-Kiribati-to-be-relocated-over-rising-sea-level-threat.html (last visited Nov. 22, 2014) (discussing relocation of the population of Kiribati to Fiji); Jo Confino, *Climate Change May Force Evacuation of Vulnerable Island States Within a Decade*, THE GUARDIAN, Oct. 4, 2012, http://www.guardian.co.uk/sustainable-business/blog/polar-arctic-greenland-ice-climate-change?newsfeed=true (last visited Nov. 22, 2014) (noting that Pacific island nations like Tuvalu will contend with evacuation decisions within a decade); *see also* UNHCR, CLIMATE CHANGE AND STATELESSNESS: AN OVERVIEW 2 (2009), *available at* http://www.refworld.org/pdfid/4a2d189d3.pdf ("Low-lying island States are thus very likely to be entirely uninhabitable long before their full submersion, causing entire populations and the governments to be externally displaced.").

3 INT'L ENERGY AGENCY, REDRAWING THE ENERGY-CLIMATE MAP: WORLD ENERGY OUTLOOK SPECIAL REPORT 9 (2013), *available at* http://www.iea.org/publications/freepublications/publication/WEO_Special_Report_2013_Redrawing_the_Energy_Climate_Map.pdf; POTSDAM INST. FOR CLIMATE IMPACT RESEARCH AND CLIMATE ANALYTICS, TURN DOWN THE HEAT: CLIMATE EXTREMES, REGIONAL IMPACTS, AND THE CASE FOR RESILIENCE xv, xvii (2013), *available at* http://www.worldbank.org/content/dam/Worldbank/document/Full_Report_Vol_2_Turn_Down_The_Heat_%20Climate_Extremes_Regional_Impacts_Case_for_Resilience_Print%20version_FINAL.pdf; *see also* MET OFFICE HADLEY CENTRE ET AL., ADVANCE: IMPROVED SCIENCE FOR MITIGATION POLICY ADVICE 7–8 (Vicky Pope et al. eds., 2010), *available at* http://www.metoffice.gov.uk/media/pdf/n/c/advance.pdf (discussing the effect on ecosystems and agriculture resulting from future temperature changes, the high end of which is five to six degrees Celsius); Richard A. Betts et al., *When Could Global Warming Reach 4°C?*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y A 67, 78–82 (2011) (discussing numerous studies indicating five to six degrees Celsius as the high end of temperature increase by the end of the century).

4 Nat'l Aeronautics and Space Admin., *NASA Finds Sustained 2013 Long-Term Climate Warming Trend*, http://www.giss.nasa.gov/research/news/20140121/ (last visited Nov. 22, 2014) (noting that the average surface temperature of the earth was 14.6 degrees Celsius in 2013, about 0.6 degrees higher than the mid-twentieth century baseline).

5 *See* Garret Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244 (1968).

6 *See* ALDO LEOPOLD, A SAND COUNTY ALMANAC AND SKETCHES HERE AND THERE 224–25 (1949) ("A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.").

7 2 HARRAP'S NEW STANDARD FRENCH AND ENGLISH DICTIONARY T:51 (1972).

scarce resources under life-and-death conditions—disaster, war, medical emergency, or calamity—where the needs of all claimants exceed the available resource supply.[8]

The literature on triage ethics, which has emerged from disparate fields such as military medicine, organ donation, and disaster response, is directly relevant to the allocation dilemmas of climate change. Indeed, the triage ethics literature addresses one of the central questions of the climate change era: How can just policy solutions be implemented in situations of immense scarcity? No scholar, however, has engaged with this triage ethics literature for insights into climate change policy.[9]

This Article is the first to explore solutions for climate change mitigation through the lens of triage ethics, bringing together perspectives from law, philosophy, moral theory, and economics. The politics of climate change have been thoroughly dominated by economic considerations,[10] especially in the United States, and the triage framework I develop here helps to widen the discourse: It squarely highlights the need for moral accountability and allocative fairness. Climate negotiators from over 190 countries are slated to meet in Paris in 2015 to finalize a new global climate change agreement,[11] and new perspectives on the core allocation dilemmas of the treaty are urgently needed.

To slow the rate of warming, policy makers need to triage a scarce resource, the atmosphere's capacity to absorb greenhouse gases. The Intergovernmental Panel on Climate Change (IPCC) has estimated that the atmosphere can absorb no more than 3,670 billion tons of carbon dioxide since the middle of the nineteenth century if warming is to remain within

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8 RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 1392 (1999).

9 There is growing scholarly interest in equity and justice issues in climate change policy, but none of these works have drawn on the triage ethics literature. *See, e.g.*, STEPHEN M. GARDINER, A PERFECT MORAL STORM: THE ETHICAL TRAGEDY OF CLIMATE CHANGE 420–21 (2011); JAMES GARVEY, THE ETHICS OF CLIMATE CHANGE: RIGHT AND WRONG IN A WARMING WORLD 68–69 (2008); Jonathan C. Carlson, *Reflections on a Problem of Climate Justice: Climate Change and the Rights of States in a Minimalist International Legal Order*, 18 TRANSNAT'L L. & CONTEMP. PROBS. 45, 45 (2009); Daniel A. Farber, *The Case for Climate Compensation: Justice for Climate Change Victims in a Complex World,* 2008 UTAH L. REV 377, 377 (2008).

10 *See* 159 CONG. REC. S926-27 (daily ed. Feb. 27, 2013) (statement of Sen. Whitehouse); 155 CONG. REC. H6542 (daily ed. June 11, 2009) (statement of Cong. Tsongas); INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866, at 2 (2013); DAVID W. KREUTZER ET AL., HERITAGE FOUNDATION, ISSUE BRIEF NO. 3978, COST OF A CLIMATE POLICY: THE ECONOMIC IMPACT OF OBAMA'S CLIMATE ACTION PLAN 1 (2013), *available at* http://www.heritage.org/research/reports/2013/06/climate-policy-economic-impact-and-cost-of-obama-s-climate-action-plan; NAT'L RESEARCH COUNCIL, LIMITING THE MAGNITUDE OF FUTURE CLIMATE CHANGE 6–7 (2010); WILLIAM NORDHAUS, A QUESTION OF BALANCE: WEIGHING THE OPTIONS ON GLOBAL WARMING POLICIES 17–19 (2008); WILLIAM NORDHAUS & JOSEPH BOYER, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 4 (2000) (describing development of integrated-assessment economic models for global warming).

11 Laurence Boisson de Chazournes, *The Climate Change Regime—Between a Rock and a Hard Place?*, 25 FORDHAM ENVTL. L. REV. 625, 633 (2014); Editorial, *Running Out of Time*, N.Y. TIMES, Apr. 20, 2014, http://www.nytimes.com/2014/04/21/opinion/running-out-of-time.html (last visited Nov. 22, 2014).

two degrees Celsius,[12] the warming limit identified by most climate scientists as reasonably safe.[13] Because we have emitted about 1,890 billion tons since that time, we have already used half of the available carbon budget, and emissions are rising fast.[14] Many analysts have concluded that humanity will exhaust the remaining carbon budget within three decades if the current intensive path of greenhouse gas emissions continues.[15] Indeed, in a finding that clearly demonstrates the triage situation we face, the IPCC recently concluded that global greenhouse gas emissions must reach "near zero" by 2100 to keep warming below two degrees Celsius.[16]

Governments now face a two-fold challenge as they debate a new climate change agreement: first, they need to preserve this scarce atmospheric resource as long as possible by limiting global emissions; and second, they need to allocate this scarce atmospheric space fairly among themselves.

Seen in this light, the climate crisis is the first global-scale triage crisis, yet we are failing to recognize it in these terms.[17] If policy makers were to

12 *See* IPCC, FIFTH ASSESSMENT REPORT: THE PHYSICAL SCIENCE BASIS, SUMMARY FOR POLICYMAKERS 27–28 (Stocker et al. eds., 2013), *available at* http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf. The IPCC concluded that an emissions budget of 3,670 billion tons of carbon dioxide would provide more than a 66% chance of keeping warming within the two degree limit. *Id.*

13 *See* GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE, CLIMATE PROTECTION STRATEGIES FOR THE 21ST CENTURY: KYOTO AND BEYOND 1–2 (2003), *available at* http://eesc.columbia.edu/courses/v1003/readings/Dangerous.climate.change.2003.pdf (defining "acceptable" warming as two degrees Celsius); Malte Meinshausen et al., *Greenhouse-Gas Emission Targets for Limiting Global Warming to 2°C*, 458 NATURE 1158, 1159 (2009); *see also* M.G.J. DEN ELZEN & M. MEINSHAUSEN, MEETING THE EU 2°C CLIMATE TARGET: GLOBAL AND REGIONAL EMISSION IMPLICATIONS 6 (2005), *available at* http://www.pbl.nl/sites/default/files/cms/publicaties/728001031.pdf (noting that even the two degree threshold cannot be regarded as a "harm-free"); Rachel Warren, *Impacts of Global Climate Change at Different Annual Mean Global Temperature Increases*, *in* AVOIDING DANGEROUS CLIMATE CHANGE 93, 93–94 (Hans Joachim Schellnhuber et al. eds., 2006) (summarizing climate change impacts at a range of different levels of warming).

14 IPCC, *supra* note 12, at 27–28.

15 *See* Kelly Levin, *World's Carbon Budget to Be Spent in Three Decades*, WORLD RESOURCES INST., Sept. 27, 2013, http://www.wri.org/blog/2013/09/world%E2%80%99s-carbon-budget-be-spent-three-decades (last visited Nov. 22, 2014); Gayathri Vaidyanathan, *World May Blow Through Global Warming Pollution Limit in Thirty Years*, SCIENTIFIC AM., Sept. 22, 2014, *available at* http://www.scientificamerican.com/article/world-may-blow-through-global-warming-pollution-limit-in-30-years/; *see also* Meinshausen et al., *supra* note 13, at 1158 (estimating that a 1,000 billion ton carbon budget between 2000 and 2049 would provide a 75% chance of keeping warming within the two degree goal).

16 IPCC, FIFTH ASSESSMENT SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS 21 (2014), *available at* http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_SPMcorr1.pdf.

17 Some policy makers have explicitly stated that they will not confront the hard choices posed by a limited carbon budget. In 2013, for example, Christiana Figueres, Executive Secretary of the UN Framework Convention on Climate Change (UNFCCC), stated that a carbon emissions budget could not be the basis for UN negotiations because a carbon budget is a "zero sum game" and "politically it would be very difficult" to negotiate based on the budget. Fiona Harvey, *IPCC's 'Carbon Budget' Will Not Drive Warsaw Talks, Says Christiana Figueres*, THE GUARDIAN, Oct. 24, 2013, http://www.theguardian.com/environment/2013/oct/24/ipcc-carbon-budget-warsaw-climate-change-christiana-figueres (last visited Nov. 22, 2014).

follow triage principles, they would be forced to confront hard questions: Is there a sustainable use of the limited atmospheric resource? If so, who should have access to it? And what formula or principle should guide the allocation?

The triage framework outlined in this Article addresses these questions and takes seriously the finite carbon emissions budget. This framework offers normative guidance for climate treaty negotiators from the United States and other countries and rules out policies, including the current path of global emissions, that would tolerate warming far beyond two degrees Celsius. It also puts options on the table, such as per capita distribution of emissions rights, that are currently marginalized in the United Nations talks.[18] The triage lens generates a climate change discourse focused on ecological preservation and public health. It forces us to think socially rather than individually. It therefore serves as an important framework for advancing justice during the "long emergency" of climate change.[19]

In surveying the triage ethics literature, I identify three principles that could potentially serve as a basis for allocating scarce atmospheric space: utilitarian principles, traditionally applied in contexts such as battlefield and emergency medicine; egalitarian principles, traditionally applied in contexts such as distribution of emergency food and shelter; and a market-based distribution, the most common way that societies allocate scarce goods in non-emergency situations.[20]

In allocating scarce emissions rights through an international treaty, I argue, the dominant principle of justice should be egalitarianism. Every person on earth is a legitimate claimant on the atmosphere's capacity to absorb emissions, regardless of race, geography, wealth, or nationality. In allocating a vital natural resource like the atmosphere—owned by no one and held in common—an equal per capita distribution should be the starting point for discussion.

The other two alternatives have serious drawbacks as principles to guide climate change law. A market-based distribution of emissions rights, based on ability to pay, would cripple the development of poor nations and privilege the wealthiest nations, which have become wealthy in large part by burning fossil fuels—the largest source of greenhouse gases. Utilitarian approaches to the allocation dilemma are problematic because there is no globally agreed upon conception of the good we are trying to promote in allocating scarce atmospheric space. Contenders might include gross domestic product (GDP) growth, per capita GDP growth, other indicators of

18 ASIM ZIA, POST-KYOTO CLIMATE GOVERNANCE: CONFRONTING THE POLITICS OF SCALE, IDEOLOGY AND KNOWLEDGE 132 (2013) (noting that per capita distributions of emissions rights are "not acceptable" to developed countries); Andrew Light, *An Equity Hurdle in International Climate Negotiations*, PHIL. & PUB. POL'Y Q., Spring 2013, at 28, 33.

19 *See generally* JAMES HOWARD KUNSTLER, THE LONG EMERGENCY: SURVIVING THE END OF OIL, CLIMATE CHANGE, AND OTHER CONVERGING CATASTROPHES OF THE TWENTY-FIRST CENTURY (2005).

20 *See infra* text accompanying notes 109–131.

human development, environmental preservation, religious commitment, or even a vague goal such as human happiness.[21]

My support for egalitarian allocation principles challenges the work of scholars such as Cass Sunstein, Eric Posner, and David Weisbach, who have argued that a just solution for climate change can be derived from welfarist principles aimed at maximizing net monetized return for negotiating parties.[22] Their perspective is unduly narrow and ignores important issues of equity. Their welfarist approach, grounded in utilitarianism, suggests that some nations or populations are more deserving than others of atmospheric space, yet attempts to engage in a sorting of the deserving would eviscerate international support for a climate change treaty.

While analyzing the merits and drawbacks of these three approaches to climate change triage, I also show that current climate change policies reflect none of these approaches. We are instead engaging in a global free-for-all of greenhouse gas emissions, proceeding along no principled path. Collectively, we are engaging in a chaotic run on the available supply of the atmosphere's capacity to absorb emissions.[23]

There are many differences, of course, between traditional triage contexts and the "super wicked problem" of climate change.[24] Atmospheric space is not, strictly speaking, a life-saving resource. Rather, it is the misuse or failure to conserve this resource that threatens human life. Moreover, because there are no duly empowered global triage personnel, no allocation system for climate change mitigation can be imposed by fiat, unlike in emergency room or battlefield triage contexts.[25]

These are important limitations on the use of triage ethics in climate change law, and they are discussed further in this Article. The point of this Article, however, is not to suggest that triage ethics can dictate all the innumerable details of a climate change treaty, but rather it is to offer a framework for considering the resource allocation decisions we face. By examining the ethical principles that have historically governed triage, I aim

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21 *See* BEDRICH MOLDAN ET AL., ORG. FOR ECON. COOPERATION & DEV., COMPOSITE INDICATORS OF ENVIRONMENTAL SUSTAINABILITY (2004) (discussing GDP as a measure of development progress in comparison to other, broader indicators of development progress such as health outcomes and literacy).

22 *See* Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565, 1572 (2008); ERIC A. POSNER & DAVID WEISBACH, CLIMATE CHANGE JUSTICE 6 (2010). Posner and Weisbach note that countries will not join a climate change treaty unless they believe the treaty makes them better off, a concept they call International Paretianism. *Id.* In their view, "all states must believe themselves better off by their lights as a result of the climate [change] treaty." *Id.* While their use of the term "by their lights" seems to encompass many different conceptions of the good, Posner and Weisbach focus most of their argument on monetary definitions of the good, which countries would optimize through cost–benefit analysis. *See id.* at 11–13; *see also* Dale Jamieson, *Climate Change, Consequentialism, and the Road Ahead*, 13 CHI. J. INT'L L. 439, 454–58 (2013) (discussing Posner and Weisbach's definitions of welfarism and International Paretianism).

23 POSNER & WEISBACH, *supra* note 22, at 29–33.

24 *See* Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1160 (2009).

25 *See id.* at 1160–61.

to highlight alternatives to the laissez-faire status quo, illustrating how we can use scarce atmospheric resources effectively—and justly—in the coming decades.

This Article proceeds as follows. Part II overviews the scarcity and allocation dilemmas presented by climate change, drawing the connections between climate change and traditional triage contexts. Part III examines the literature on triage ethics, outlining some of the core principles that have emerged from battlefield medicine, emergency medicine, disaster response, organ donation, and other contexts. This Part highlights three potential allocation principles for scarce goods and shows how policy makers and disaster responders have struggled to maintain ethical standards in the midst of grave emergencies. Finally, Part IV outlines four major policy implications of using a triage framework to address the climate change crisis and explores how triage ethics can help shape the international law of climate change.

II. A TRIAGE FRAMEWORK FOR CLIMATE CHANGE MITIGATION

The demanding task of allocating the atmosphere's capacity to absorb greenhouse gas emissions is undoubtedly a triage challenge. According to the IPCC, greenhouse gas emissions must be brought down significantly by 2050, 80%–90% in the developed world, to avert the worst consequences of warming,[26] and then reach "near zero" by 2100.[27] An effective climate change treaty must somehow enforce, or incentivize, that dramatic reduction in oil, coal, and gas consumption, and nations must somehow allocate the difficult burdens among themselves.

To see how triage choices are immanent within the problem of climate change mitigation, it is important to define precisely the resource in short supply. What, exactly, is being allocated in negotiations for a new climate change treaty? What are the limits on the resource? And what are the options for allocation?

A. The Atmosphere As a Scarce Natural Resource

The scarce resource being allocated in the current climate change negotiations is the capacity of the atmosphere to absorb carbon dioxide and other greenhouse gases. The IPCC has calculated that there are about 1,780 billion tons left in the carbon budget if we are to limit warming to two degrees Celsius.[28] The average surface temperature of the earth in the mid-twentieth century was about fourteen degrees Celsius,[29] so even a two degree increase is sizeable.

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26 *See* IPCC, CARBON DIOXIDE CAPTURE AND STORAGE 107 (2014), *available at* http://www.ipcc.ch/pdf/special-reports/srccs/srccs_wholereport.pdf.

27 IPCC, *supra* note 16.

28 *See* IPCC, *supra* note 12.

29 *See* Nat'l Aeronautics and Space Admin, *NASA Finds Sustained Long-Term Climate Warming Trend*, http://www.giss.nasa.gov/research/news/20140121/ (last visited Nov. 22, 2014).

Climate scientists have understood for decades that there is some maximum amount of greenhouse gases that can be added to the atmosphere before warming becomes catastrophic, and the effort to place precise numbers on the carbon budget has intensified in the past five years.[30] Approximately 0.8 degrees of warming has occurred since preindustrial times[31] with devastating consequences,[32] and continued warming is "locked in" from emissions of the past few decades.[33] Consequently, an emissions budget that keeps warming under two degrees is exceedingly small relative to the desires of almost all nations to develop fossil-fuel intensive economies. The urgent challenge for international law, therefore, is to establish a system of allocations and incentives that preserves the scarce resource and avoids the humanitarian catastrophe that lies beyond two degrees of warming.[34]

Although some scholars have questioned the necessity of a two degree threshold,[35] all parties to the United Nations (UN) climate negotiations have pledged to cooperate to stay within the two degree limit,[36] and that goal has been reiterated in numerous fora, including the G8 and G20.[37] In committing

30 *See* IPCC, *supra* note 12; P. Friedlingstein et al., *Persistent Growth in CO2 Emissions and Implications for Reaching Climate Targets*, 7 NATURE GEOSCIENCE 709–15 (2014); Meinshausen et al., *supra* note 13, at 1158.

31 COMM. ON AMERICA'S CLIMATE CHOICES, NAT'L RESEARCH COUNCIL, AMERICA'S CLIMATE CHOICES 15 (2011), *available at* http://www.nap.edu/openbook.php?record_id=12781&page=15 ("The average temperature of the Earth's surface increased by about 1.4°F (0.8°C) over the past 100 years . . . .").

32 *Id.* at 18.

33 *Id.* at 25.

34 *See generally* IPCC, *supra* note 12, at 4 (analyzing the observed and potential impacts of climate change); COMM. ON THE DEV. OF AN INTEGRATED SCI. STRATEGY FOR OCEAN ACIDIFICATION MONITORING, RESEARCH, AND IMPACTS ASSESSMENT, NAT'L RESEARCH COUNCIL, OCEAN ACIDIFICATION: A NATIONAL STRATEGY TO MEET THE CHALLENGES OF A CHANGING OCEAN 16 (2010), *available at* http://www.nap.edu/download.php?record_id=12904 (noting the contribution of global warming to ocean acidification and noting that even under "optimistic scenarios," the mean ocean surface pH will likely drop below 7.9 by the end of the century, impacting ecosystems and ecosystem services); Kerry A. Emanuel, *Downscaling CMIP5 Climate Models Shows Increased Tropical Cyclone Activity Over the 21st Century*, 110 PROC. NAT'L ACAD. SCI. U.S. 12,219, 12,221 (2013), *available at* http://www.pnas.org/content/110/30/12219.full.pdf+html (projecting increased global tropical cyclone activity based on historical conditions and projected emissions).

35 *See* Richard S. J. Tol, *Europe's Long-Term Climate Target: A Critical Evaluation*, 35 ENERGY POL'Y 424, 429 (2007), *available at* http://www.mi.uni-hamburg.de/fileadmin/fnu-files/publication/tol/RM7208.pdf (arguing that the justifications for the two degree target are "inadequate").

36 *See* UNFCCC, Dec. 7–19, 2009, *Copenhagen Accord*, ¶ 1, U.N. Doc. FCCC/CP/2009/11/Add.1 (Mar. 30, 2010) [hereinafter *Copenhagen Accord*], *available at* http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf (noting that the pledge is in recognition of "the scientific view that the increase in global temperature should be below two degrees Celsius . . . ."); UNFCCC, Cancun Agreements, *Decisions Adopted by the Conference of the Parties*, ¶ 4, U.N. DOC. UNFCCC/CP/2010/7/Add.1 (reiterating the goal to "hold the increase in global average temperature to below 2 C above pre-industrial levels").

37 Conference of the Group of Eight, May 18–19, 2012, *Camp David Declaration*, ¶ 13 (2012), *available at* http://www.state.gov/documents/organization/191848.pdf (affirming commitment to address climate change with a goal of keeping warming under two degrees); *see*

to that goal, nations have, in essence, created and defined the scarcity in the atmosphere. They have defined the carbon budget. The scarcity is not absolute. Nations could collectively exceed the two degree limit and postpone, for a while, many of the hard choices of allocation. However, exceeding two degrees of warming would have disastrous consequences for human welfare and global ecosystems.[38] With a two degree goal, the window to maintain the climatic stability of the earth is rapidly closing, and we are headed toward overshoot.

Under a high-emissions pathway for the rest of this century—a plausible scenario given current trends—humanity will pass the two degree red line and reach catastrophic five to six degrees Celsius warming by 2100, with additional warming after 2100.[39] Five degrees of warming represents more than a 35% increase in the average surface temperature of the earth since the mid-twentieth century.[40] Under this high-emissions pathway, sea levels would rise more than a meter.[41] Low-lying areas such as South Florida, Eastern Virginia, and the National Mall in Washington, D.C. will be severely impacted by rising sea levels.[42] Africa and Asia could lose one-third of their food supply.[43] Some climate scientists view warming of that magnitude as "beyond adaptation."[44]

The scarcity in the carbon budget is dire, and staying within the two degree limit will entail wrenching choices and significant changes in how we use energy and land. The International Energy Agency (IEA) has concluded, for example, that if humanity is to remain within the two degree limit, no more than one-third of proven reserves of fossil fuels can be consumed prior

Conference of the Group of Twenty, June 18–19, 2012, *Los Cabos Declaration*, ¶¶ 70–71 (2012), *available at* http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/ec/131069.pdf (affirming commitment to the full implementation of the outcome of the Cancun and Durban agreements).

38 Farber, *supra* note 9, at 382–83.

39 *See* POTSDAM INST. FOR CLIMATE IMPACT RESEARCH AND CLIMATE ANALYTICS, *supra* note 3, at xv; *see also* INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2011, at 210 (2011) [hereinafter ENERGY OUTLOOK], *available at* http://www.iea.org/publications/freepublications/publication/weo2011_web.pdf.

40 Nat'l Aeronautics and Space Admin., *supra* note 4.

41 *See* Robert J. Nicholls et al., *Sea-level Rise and Its Possible Impacts Given a 'Beyond 4°C World' in the Twenty-First Century*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y A 161, 174 (2010), *available at* http://rsta.royalsocietypublishing.org/content/369/1934/161.abstract; W.T. Pfeffer et al., *Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise*, 321 SCI. 1340, 1342 (2008); Stefan Rahmstorf, *A Semi-Empirical Approach to Projecting Future Sea-Level Rise*, 315 SCI. 368, 370 fig.4 (2007).

42 *See* U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS IN THE UNITED STATES, fig. 17.6 (Jerry M. Melillo et al. eds., 2014), *available at* http://ncadac.globalchange.gov/download/NCAJan11-2013-publicreviewdraft-chap17-southeast.pdf.

43 CATRIONA MCKINNON, CLIMATE CHANGE AND FUTURE JUSTICE: PRECAUTION, COMPENSATION, AND TRIAGE 108 (2012).

44 For example, Kevin Anderson, former Director of The Tyndall Center, the U.K.'s leading climate research institution, warned that "a 4 degrees C future is incompatible with an organized global community, is likely to be beyond 'adaptation,' is devastating to the majority of ecosystems, and has a high probability of not being stable." BENJAMIN K. SAVACOOL & MICHAEL H. DWORKIN, GLOBAL ENERGY JUSTICE 74 (2014).

to 2050.[45] In other words, two-thirds of proven reserves of oil, coal, and natural gas, including reserves that firms have paid billions of dollars to acquire, must be left in the ground to stay within the global carbon budget.[46]

Neither international law nor domestic law has ever mandated the stranding of assets of that magnitude. This is clearly new legal and ethical terrain.

Some climatologists contend that the two degree goal is too lax, and nations should aim to limit warming to an even lower number. James Hansen, former head of NASA's Goddard Institute for Space Studies, has argued that 350 parts per million (ppm) is the acceptable safe concentration of carbon dioxide in the atmosphere, which corresponds to roughly 1.5 degrees of warming over preindustrial temperatures.[47] The current concentration of carbon dioxide in the atmosphere is more than 400 ppm.[48] Under Hansen's view, therefore, we have already overshot the emissions budget. We are not in a situation of scarcity, where there is a limited resource to allocate. Rather, we are facing a painful adjustment to a time when the atmosphere has no absorptive capacity left.

Assuming a two degree warming limit, it is clear that the health and welfare of billions of people—living now and in the future—will depend on: 1) whether nations in fact behave in a way that conserves the remaining atmospheric resource to stay within the two degree limit, or close to it; and 2) the distributional question of how to allocate the remaining atmospheric resource among nations.

When the labyrinthine UN climate change treaty negotiations are distilled to these two core issues, a climate change treaty can be understood as a triage protocol. A climate change treaty is, in essence, a blueprint for allocating a scarce resource among claimants, under life and death conditions.

To be sure, the UN treaty negotiations include innumerable sub-issues, such as financing mechanisms, monitoring and verification, emissions trading, differential timetables and commitments for developed and developing states, and the legal architecture of the treaty.[49] The sprawling number of issues is a major reason why negotiations have been so protracted. But the core decision is allocative—the parceling out of a limited natural resource.

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45 ENERGY OUTLOOK, *supra* note 39, at 241.

46 *See id.*

47 *See* James Hansen et al., *Target Atmospheric CO_2: Where Should Humanity Aim?*, 2 OPEN ATMOSPHERIC SCI. J. 217, 229 (2008).

48 Nat'l Oceanic & Atmospheric Admin., *Carbon Dioxide at NOAA's Mauna Loa Observatory Reaches New Milestone: Tops 400 ppm*, http://www.esrl.noaa.gov/news/2013/CO2400.html (last visited Nov. 22, 2014).

49 *See, e.g.*, US CLIMATE ACTION NETWORK, DOHA CLIMATE NEGOTIATIONS BRIEFING BOOK (2012), *available at* http://www.usclimatenetwork.org/resource-database/doha-climate-negotiations-briefing-book; *see generally* DANIEL BODANSKY, INTERNATIONAL CLIMATE EFFORTS BEYOND 2012: A SURVEY OF APPROACHES (2004), *available at* http://www.pewclimate.org/docUploads/2012%20new.pdf (prepared for the Pew Center on Global Climate Change).

It might be argued that the picture of scarcity described here is too static because it ignores human ingenuity and our capacity to develop solutions. Some might argue that major technological or societal changes, such as a design revolution in buildings or transportation or potential breakthrough energy technologies, will avert the hard triage choices. If there is an unprecedented innovation around the corner, it would be a welcome development, but it would not fundamentally alter the scarcity or the allocation dilemmas outlined here.

Time is running very short to avoid catastrophic warming. If global greenhouse gas emissions continue their rise beyond 2020, it will be nearly impossible to keep warming below two degrees Celsius even if nations begin wider deployment of low-carbon energy sources after 2020.[50] If breakthrough technologies in efficiency and low-carbon energy were developed, they might not be able to keep pace with the growing global population and the vast consumer society taking root in the developing world. With new technologies, it might be possible to achieve lower emissions per person, but we will have more people, with higher lifestyle expectations.[51] In the near term, we will likely face what Thomas Homer-Dixon has called an "ingenuity gap,"[52] in which the scale of the problem exceeds our capacity to adjust.

B. Allocating the Scarce Atmospheric Resource

Scarcity alone does not result in a triage situation. Radio spectrum is a scarce resource that governments traditionally allocate through auctions and licenses.[53] Oceanfront real estate is a scarce resource that is allocated through the market. Though these resources are scarce, we do not typically consider these allocation decisions to present what Guido Calabresi and Phillip Bobbitt have called "tragic choices." Tragic choices are situations where "scarcities . . . make particularly painful choices necessary" and where allocations "arouse emotions of compassion, outrage, and terror."[54]

The allocation choices in climate change mitigation are tragic choices. The choices are pregnant with justice concerns because the past consumption of fossil fuel has been so unequal among nations; increases in emissions anywhere in the world cause harm elsewhere; and any limitation on emissions rights could affect the development and aspirations of nations.[55] Climate change allocation is a moral choice, not just an economic

50 *See, e.g.*, Kevin Anderson & Alice Bows, *Beyond 'Dangerous' Climate Change: Emission Scenarios for a New World*, 369 PHIL. TRANSACTIONS ROYAL SOC'Y A 20, 20 (2011).

51 The United Nations predicts that global population will rise from the current 7.1 billion to 9.6 billion by 2050. U.N. DEP'T OF ECON. & SOC. AFFAIRS, WORLD POPULATION PROSPECTS: THE 2012 REVISION, VOLUME I: COMPREHENSIVE TABLES 1 (2013), *available at* http://esa.un.org/wpp/Documentation/pdf/WPP2012_Volume-I_Comprehensive-Tables.pdf.

52 THOMAS HOMER-DIXON, THE INGENUITY GAP 1 (2000).

53 *See* 47 C.F.R. § 2.100–.104 (2014) (addressing allocation, assignment, and use of radio frequencies).

54 GUIDO CALABRESI & PHILLIP BOBBITT, TRAGIC CHOICES 17–18 (1978).

55 Albert Mumma & David Hodas, *Designing a Global Post-Kyoto Climate Change Protocol that Advances Human Development*, 20 GEO. INT'L ENVTL. L. REV. 619, 624–26 (2008).

one. Indeed, the philosopher Stephen Gardiner has referred to climate change as a "perfect moral storm" that challenges both traditional approaches to policy making and traditional theories of justice.[56]

To understand the tragic choices in allocating atmospheric space, it is helpful to examine both the intragenerational and the intergenerational features of climate change triage. These two contexts are considered below.

1. Intragenerational Climate Change Triage

The allocation discussion that has received the most attention in the UN climate talks is intragenerational—allocating emissions rights among nations—subject to the ability of nations to trade these emissions rights once allocated.[57] In this intragenerational context, the parallels to traditional triage practice rest on four main foundations.

First, the allocation of atmospheric space is zero-sum, just as in allocation of physician time in an emergency room or medicine on a battlefield. All nations are dipping into the same common pool resource, and access by one nation is rival to others. If China continues to increase its greenhouse gas emissions by 10% per year, as it has recently,[58] substantially less of the limited atmospheric resource will be available for other nations if the two degree limit is to be maintained. United States emissions have been declining overall since 2007, but even declining use of the carbon budget still uses the budget, leaving less for other nations.[59] In a climate change treaty that respects the physical limits of the atmosphere, a lax emissions reduction target for one nation means a stricter target for another.

Second, life and death are at stake. Millions of individuals living in low-lying coastal areas are at risk from sea-level rise, flooding, and more intense storms, and subsistence farmers across the globe are at risk of starvation from more frequent droughts.[60] Water-scarce cities such as Phoenix will

56 GARDINER, *supra* note 9, at 8. This perfect moral storm, Gardiner argues, "puts pressure on the very terms in which we discuss the environmental crisis, tempting us to distort our moral sensibilities in order to facilitate the exploitation of our global and intergenerational position." *Id.*

57 Mumma & Hodas, *supra* note 55, at 639–40.

58 *See* Jonathan Kaiman, *China's Emissions Expected to Rise Until 2030, Despite Ambitious Green Policies*, THE GUARDIAN, Nov. 26, 2012, http://www.theguardian.com/environment/2012/nov/26/china-emissions-rise-green-policies (last visited Nov. 22, 2014).

59 *See* U.S. ENVTL. PROT. AGENCY, EPA 430-R-13-001, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2011, at ES-5–7, Tbl.ES-2 (2013). While there were years of decline in U.S. greenhouse gas emissions after 2007, between 2012 and 2013 U.S. emissions increased 2.5%. *See* U.S. ENERGY INFORMATION AGENCY, U.S. Energy-Related Carbon Dioxide Emissions, 2013 at 1 (2014), *available at* http://www.eia.gov/environment/emissions/carbon/pdf/2013_co2analysis.pdf.

60 Conference of the Food & Agriculture Organization of the United Nations, Mar. 5–7, 2008, *Climate Change Adaptation and Mitigation in the Food and Agriculture Sector*, 1, U.N. Doc. HLC/08BAK/1 (June 2008); John F. Morton, *The Impact of Climate Change on Smallholder and Subsistence Agriculture*, 104 PROC. NAT'L ACAD. SCI. 19,680, 19,683–84 (2007).

suffer even more scarcity this century.[61] For some island states such as the Seychelles and Micronesia, limiting global emissions is a matter of national survival, as rising seas are decimating their territory.[62] Moreover, with current energy systems, it is impossible to live without emitting *some* greenhouse gases. Even so-called subsistence emissions—emissions from agriculture, cooking, and land clearing by the two billion poorest people[63]—still constitute emissions. For a population to receive *no* allocation of the resource is theoretically to condemn them to death.

Third, as in most triage situations, climate policy makers face a procrastination penalty. Just as delayed action after a natural disaster can exponentially increase the challenges of rescue and medical treatment, climate mitigation will become more expensive, technologically challenging, and politically polarized if serious emissions reductions are postponed until after 2020.[64] For any given carbon budget, the later the date that emissions peak, the more rapidly emissions must decline thereafter.

Finally, like allocation of food or medical care in emergencies, allocation of atmospheric space should be governed by some formula, criteria, or principle.[65] Without some agreed-upon basis for allocation, greenhouse gas emissions will continue to rise unchecked. In triage contexts, such as emergency medicine, written triage protocols are used to ensure fair distribution of scarce resources and avoid ad hoc decision making in a time of crisis.[66] A principled written formula is similarly needed for the allocation of atmospheric space. To be sure, a single numeric formula that allocates atmospheric space among all the nations of the world—a kind

61 *See* Jonathan Overpeck & Bradley Udall, *Dry Times Ahead*, 328 SCI. 1642, 1643 (2010) (citing projections that the average annual flow of the Colorado River will decrease by 20% by 2050 and discussing the impact on southwestern cities).

62 *See* Jon Barnett & W. Neil Adger, *Climate Dangers and Atoll Countries*, 61 CLIMATIC CHANGE 321, 327 (2003) (noting that climate change puts the sovereignty of atoll countries at risk); UNHCR, *supra* note 1, at 2; H.E. Emanuel Mori, President, Federated States of Micr., *Address at the General Assembly of the United Nations*, 67th Sess., (Sept. 27, 2012), *available at* http://gadebate.un.org/67/micronesia-federated-states; Matt Brown, *Rising Sea Level Poses Threat to Seychelles*, THE NAT'L, Feb. 12, 2010, http://www.thenational.ae/news/world/africa/rising-sea-level-poses-threat-to-seychelles (last visited Nov. 22, 2014).

63 *See* Henry Shue, *Subsistence Emissions and Luxury Emissions*, 15 L. & POL'Y 39, 49–58 (1993).

64 *See* Hansen et al., *supra* note 47, at 225; R.H. Socolow & S.H. Lam, *Good Enough Tools for Global Warming Policy Making*, 365 PHIL. TRANSACTIONS ROYAL SOC'Y A 897, 924 (2007), *available at* http://www.princeton.edu/mae/people/faculty/socolow/socdoc/index.pdf; Naomi E. Vaughan et al., *Climate Change Mitigation: Trade-Offs Between Delay and Strength of Action Required*, 96 CLIMATIC CHANGE 29, 39 (2009).

65 *See generally* Kenneth V. Iserson & John C. Moskop, *Triage in Medicine, Part I: Concept, History, and Types* 49 ANNALS EMERGENCY MED. 275, 276 (2007), *available at* http://adventpod.org/school/Triage.Medicine.Part1.pdf (noting that without such a formal criteria for allocation of medical supplies, triage would devolve into "purely ad hoc or arbitrary decisions about distribution of health care resources").

66 *See, e.g.*, Steven D. Salhanik et al., *Use and Analysis of Field Triage Criteria for Mass Gatherings*, PREHOSPITAL & DISASTER MED., Oct.–Dec. 2003, at 347, 347–51; *see also* N.Y. COMP. CODES R. & REGS. tit. 10, § 405.19(b), (e) (2007) (requiring written triage protocols in New York emergency rooms).

of grand solution for climate mitigation—is a remote ideal. Given the economic stakes, allocation in a climate treaty will be politically messy, full of compromises and exceptions, and it will be driven by the political and economic influence of the major powers. Nonetheless, the long-term success of a treaty also depends strongly on whether most nations perceive the allocation to be legitimate and fair.

Climate negotiators have been unable to agree on a principled allocation system, and competing conceptions of fairness, particularly between developed and developing states, have been the central stumbling block to reaching agreement. Large developing nations such as India contend that global warming has been caused largely by affluent developed nations and that it is unjust to limit developing country emissions—and their aspirations for further growth—while hundreds of millions of their citizens still live in poverty.[67] Developed nations contend that these equity claims from the developing world are an obstacle to reaching an agreement and that any agreement must limit developing country emissions because most of the future emissions growth is in the developing world.[68]

In their controversial 2010 book, *Climate Change Justice*, Eric Posner and David Weisbach argue that equity and fairness concerns need to be sidelined in climate change treaty negotiations to convince the major emitters to ratify any treaty.[69] But poor developing states have not allowed that sidelining to occur—equity has been a consistent theme of developing country negotiating positions over twenty-five years of talks.[70] As Amy Sinden has noted, when it comes to climate change mitigation, the "developed world is speaking the language of economics while the developing world speaks the language of justice."[71]

With these four features of the climate crisis—zero-sum allocation, lives at stake, the procrastination penalty, and the need for some principled allocation formula—climate change mitigation strongly resembles triage. Triage accurately describes the choices we face in law, politics, and ethics.

2. Intergenerational Climate Change Triage

The intergenerational aspects of climate change make the triage choices even more complex. Greenhouse gases added to the atmosphere today have a lifetime of several centuries, and the impacts of emissions are

67 POSNER & WEISBACH, *supra* note 22, at 3.

68 *Id.* The largest greenhouse gas emitter in the world is China, followed by the United States, the European Union (excluding Estonia, Latvia, and Lithuania), India, the Russian Federation, Japan, and Canada. U.S. Envtl. Prot. Agency, *Global Greenhouse Gas Emissions Data*, http://www.epa.gov/climatechange/ghgemissions/global.html (last visited Nov. 22, 2014).

69 POSNER & WEISBACH, *supra* note 22, at 4.

70 Paul G. Harris, *Common but Differentiated Responsibility: The Kyoto Protocol and United States Policy*, 7 N.Y.U. ENVTL. L.J. 27, 30–33 (1999) (explaining that the principle of "common but differentiated responsibility" has influenced international environmental agreements since the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer).

71 Amy Sinden, *Allocating the Costs of the Climate Crisis: Efficiency Versus Justice*, 85 WASH. L. REV. 293, 296 (2010).

back loaded. The warming impact of current emissions will be felt decades from now.[72] As a result, the limited carbon budget is zero-sum not just among nations, but also across generations. Ideally, we should be planning for a pathway of declining emissions over the course of a hundred years or more.[73] Without that kind of triage planning, the present generation can easily draw on the benefits of burning fossil fuel and deforesting land today while externalizing the cost to future generations. Since every generation will face the same incentives to keep their own energy cheap and live large while leaving the consequences for the future, there is a serious intergenerational collective action problem. Stephen Gardiner refers to this passing of the buck as a "moral corruption" that plagues our decision making about climate change.[74]

There is a serious question whether international law can help to constrain this moral corruption. Since any climate change treaty will be negotiated and ratified by the present generation, there will always be a tendency to postpone the difficult emissions reductions for decades. With some exceptions, such as the 1963 treaty banning above-ground nuclear testing,[75] international law has not had to confront the interests of the unborn so squarely.

It is beyond the scope of this Article to delve into the numerous issues of intergenerational justice raised by the climate crisis, and these issues have been explored elsewhere.[76] But it is important to view the triage situation clearly: it is not only the presently living, but also descendants yet to come, who are legitimate claimants on the resource of a stable and habitable climate. As the Oxford philosopher Henry Shue has explained, "'[i]ntergenerational equity' is not an additional peripheral aspect of the [climate change] question that we may optionally take up or not, as we choose."[77] Rather, "the central question is essentially intergenerational."[78]

What would intergenerational climate change triage look like? Allocating the limited absorptive capacity of the atmosphere across generations would mean that the present generation would have to determine what part of remaining atmospheric capacity is legitimately ours and what part must be preserved for our descendants. Policy makers might

72 *See* IPCC, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 1106–07 (Stocker et al. eds, 2013), *available at* http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf (describing the long lifetimes of certain greenhouse gases and their persistent effect on planetary warming).

73 *Id.* at 1108 (explaining that stabilizing global temperatures will take centuries to millennia).

74 GARDINER, *supra* note 9, at xii–xiii, 8 (noting that because we are "judges in our own case," it is "all too easy to slip into weak and self-serving ways of thinking").

75 Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water, Aug. 5, 1963, 480 U.N.T.S. 43.

76 *See, e.g.*, GARDINER, *supra* note 9, at 32; DOUGLAS A. KYSAR, REGULATING FROM NOWHERE 18 (2010); POSNER & WEISBACH, *supra* note 22, at 144–45; Edith Brown Weiss, *Climate Change, Intergenerational Equity, and International Law*, 9 VT. J. ENVTL. L. 615, 616 (2007).

77 HENRY SHUE, SBSTA TECHNICAL BRIEFING: HISTORIC RESPONSIBILITY 6 (2009), *available at* https://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/1_shue_rev.pdf.

78 *Id.*

even set aside some reserve capacity, such that the present generation would conserve some portion of the emissions budget. In practice, however, policy makers have never seriously considered reserving limited atmospheric space in this way, despite paying lip service to the needs of future generations in various treaties and declarations.[79]

C. The Current Allocation of the Atmospheric Resource

The international law of climate change has emerged over the past twenty-five years without any clear allocation rules.[80] As a consequence, a *default* allocation of atmospheric space is occurring.

The present allocation can best be described as a free-for-all. With limited exceptions, such as the European Union and other jurisdictions that have put emissions reduction targets and measures into domestic law,[81] nations may emit greenhouse gases without constraint, taking from the carbon budget as much as they want and externalizing the ecological costs. Despite research on low-carbon energy supplies, biofuels, energy efficiency, and forest preservation, as well as twenty gatherings of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), global emissions keep rising.[82] There is a "pivotal disjuncture" between governments' professed aspirations and the policies they have actually put in place.[83]

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79 *See, e.g.*, UN Conference on Environment and Development, Apr. 30–May 9, 1992, *Framework Convention on Climate Change*, U.N. Doc. A/AC.237/18 (Part II) Add.1, Annex 1, 4 (May 15, 1992) (noting that the parties are "[d]etermined to protect the climate system for present and future generations").

80 The 1997 Kyoto Protocol did impose binding emissions reductions targets on 41 nations listed in Annex 1 of the Protocol. Kyoto Protocol to the UNFCCC, Dec. 10, 1997, 2303 U.N.T.S. 148. However, the largest-emitting Annex I nation, the United States—which represented almost 25% of global greenhouse gas emissions in 1997—never ratified the Kyoto Protocol, and the greenhouse gas reduction commitments under the Protocol expired in 2012. *Id.* at art. 3.

81 The European Union has committed to a 20% reduction in its greenhouse gas emissions below its 1990 levels by 2020. *See* EUR. COMM'N, COMMUNICATION FROM THE COMMISSION: ANALYSIS OF OPTIONS TO MOVE BEYOND 20% GREENHOUSE GAS REDUCTIONS AND ASSESSING THE RISK OF CARBON LEAKAGE 2 (2010), *available at* http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0265&from=FR. California has enacted legislation requiring the state to achieve its 1990 greenhouse gas emissions levels by 2020. CAL. GOV. CODE § 14000.6 (West 2014). Ninety nations made non-binding pledges to reduce greenhouse gas emissions in the 2011 Cancun Agreement. UNFCCC Conference of the Parties, Cancun, Mex., Nov. 29–Dec. 10, 2010, The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, ¶ 36, 49, U.N. Doc. FCCC/CP/2010/7/Add.1 (Mar. 15, 2011). However, only 42 of these nations (mostly in Europe) committed to quantified, economy-wide emissions reduction targets. UNFCCC, Subsidiary Body for Scientific and Technological Advice & Subsidiary Body for Implementation, Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention, June 6–16, 2011, U.N. Doc. FCCC/SB/2011/INF.1/Rev.1 (June 7, 2011).

82 James Hansen et al., *Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE 1, 1 (2013), *available at* http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0081648&representation=PDF.

83 Anderson & Bows, *supra* note 50, at 20, 23.

The free-for-all use of the atmosphere has been the default allocation since the dawn of the industrial revolution,[84] so there is enormous disparity in the cumulative emissions of countries, depending on when they began to industrialize and their rate of growth. For example, the United States is responsible for nearly 30% of the greenhouse gases emitted since 1850, whereas Mexico is responsible for 1% and Indonesia for 0.5%.[85] Per capita emissions and emissions per unit of GDP also remain highly unequal across nations.[86] The average Australian, for example, emits over fifty times more carbon dioxide annually than the average Cambodian.[87]

There is no attempt in the status quo allocation to redress past inequities in the use of atmospheric space. There is also little discussion of which allocation formula for emissions rights would best promote overall human welfare—let alone the welfare of other species or ecosystems. The current distribution simply does not reflect any principled allocation method. As Amy Sinden has observed, "no matter how we conceptualize the question [of emissions allocations] from the perspective of justice, a status quo distribution consistently emerges as the worst solution."[88]

The status quo is an allocation of limited atmospheric space. It proceeds, however, under no principle, plan, or agreement, with no realistic prospect that the world will actually meet the two degree goal it has set for itself. One hundred and fifty years ago, Walt Whitman, observing the carnage of a Civil War battlefield, wrote that there was "no system, no foresight, no genius"[89] in the allocation of medical attention for the soldiers. The same might be said about our laissez-faire approach to greenhouse gas emissions today.

Even if we were to set aside principles of justice and assess current greenhouse gas emissions patterns purely from the standpoint of efficiency, the distribution can hardly be said to be Pareto optimal. The default allocation is plagued by externalities because producers and consumers of fossil fuels are not obliged to take into account the ecological and human harm from their activities. In April 2013, the consulting firm TruCost calculated the cost of environmental externalities from over five hundred industries in twenty-two different regions of the world.[90] The peer-reviewed

84 *See, e.g.*, Sjur Kasa, *Industrial Revolutions and Environmental Problems*, *in* CONFLUENCE: INTERDISCIPLINARY COMMUNICATIONS 2007/2008, at 70, 70–71 (Willy Østreng ed., 2009) (examining the environmental impact of industry since the start of the Industrial Revolution).

85 KEVIN A. BAUMERT ET AL., WORLD RES. INST., NAVIGATING THE NUMBERS: GREENHOUSE GAS DATA AND INTERNATIONAL CLIMATE POLICY 32 fig.6.1 (2005).

86 PBL NETHERLANDS ENVTL. ASSESSMENT AGENCY, TRENDS IN GLOBAL CO_2 EMISSIONS: 2013 REPORT 18–19 figs.2.4 & 2.5 (2013).

87 *See* The World Bank, *CO_2 Emissions (Metric Tons Per Capita)* tbl.3.8, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries/1W-AU-KH?display=default (last visited Nov. 22, 2014).

88 Sinden, *supra* note 71, at 297.

89 WALT WHITMAN, SPECIMEN DAYS 35 (David R. Godine, ed. 1971) (1882).

90 TRUCOST, NATURAL CAPITAL AT RISK: THE TOP 100 EXTERNALITIES OF BUSINESS 63 app. 3, 77 app. 5 (2013). TruCost defined global regions according to the United Nations' classification of sub-continental regions. *Id.* at 15, 77 app. 5. It then assessed impacts for over 500 business sectors in those regions. *Id.*

study concluded that of the twenty industries with the highest ecological impact, including steel manufacturing, electricity generation, and farming, not a single one would be profitable if the industries had to fully internalize the cost of their ecological damage.[91]

To put the current situation in the language of triage, the largest industries in the world are free to ignore the impacts of their production and consumption decisions on the scarce resource. Collectively, we are treating the scarce resource as if it is not scarce.

D. Triage Without Triage Personnel

Climate change triage differs from traditional triage contexts in one fundamental respect: there are no duly empowered triage personnel in the climate context that can develop allocation principles, enforce them, and restrict access to the scarce resource. The parties making decisions on allocation include, at least formally, over 190 countries involved in the UNFCCC negotiations.[92] Each nation is self-interested in the allocation outcome, whereas in traditional triage contexts such as emergency medicine or organ donation triage personnel generally have no personal stake.[93] Some scholars have suggested that the UN process is fundamentally unworkable and that climate change negotiations should be conducted among smaller blocs or "clubs" of nations, such as the Major Economies Forum.[94] But even within these smaller groups, nations still have a vested interest in the allocation outcome.

At first glance, the lack of authoritative triage personnel suggests that it will be impossible to implement any principled allocation formula. There is no global sovereign to devise such a formula. There is no global enforcement body. There is no one with monopoly control over the resource to decide on an optimal allocation. Any party, moreover, can blow up a carefully arranged

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91 *Id.* at 31 fig.5.2, 32. In estimating externalities from carbon emissions, TruCost adopted the Stern Review's figure for the social cost of carbon, adjusted for inflation to $106 per metric ton CO_2 (2009). *Id.* at 10. The social cost of carbon represents the present value of current and future economic damage caused by each additional ton of carbon emissions. WILLIAM NORDHAUS, A QUESTION OF BALANCE: WEIGHING THE OPTIONS ON GLOBAL WARMING POLICIES 11 (2008). Other studies have relied on a lower social cost of carbon to estimate externalities. *See, e.g.*, *id.* at 11 (estimating the social cost of carbon at $30 per ton of carbon or approximately $8 per ton of CO_2 (2005)); WILLIAM NORDHAUS, ESTIMATES OF THE SOC. COST OF CARBON: BACKGROUND AND RESULTS FROM THE RICE-2011 MODEL 1 (2011) (setting the social cost of carbon at $12 per ton of CO_2 for 2015 (2005)). In May 2013, the United States government revised its social cost of carbon to $37 per ton of CO_2 for 2015, in 2007 dollars. *See* INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866, at 3 (2013). The working group based its calculation on three peer-reviewed models and applied a 3% discount rate. *Id.* at 2.

92 *See* UNFCCC, *Parties to the Convention and Observer States*, http://unfccc.int/parties_and_observers/parties/items/2352.php (last visited Nov. 22, 2014).

93 *See generally* George P. Smith II, *Re-Shaping the Common Good in Times of Public Health Emergencies: Validating Medical Triage*, 18 ANNALS HEALTH L. 1, 12 (2009).

94 *See* DAVID G. VICTOR, GLOBAL WARMING GRIDLOCK: CREATING MORE EFFECTIVE STRATEGIES FOR PROTECTING THE PLANET 22–24, 242–45 (2011).

climate allocation scheme by defecting from treaty obligations. If, as Hobbes argued, the conditions for justice can exist only within a sovereign state, then perhaps globalizing principles of justice within a climate change treaty is a fanciful proposition.[95]

Although a just allocation cannot be imposed by fiat within the international system, it can still be negotiated. The UNFCCC negotiations should be viewed as a forum for a "'negotiated justice' settlement"[96] in which nations bargain over the terms of a fair contractual arrangement that serves their common interest in climate stability. For a treaty to be widely ratified and enter into force, parties must perceive it to be fair, and ultimately the parties will need to address the problem of vast inequities in use rights. A principled allocation formula is admittedly more difficult to achieve through negotiations than in a domestic triage context, where a formula can be imposed, but it is not impossible.

Though no nation is in charge of the triage that needs to take place, it is also clear that some nations matter more than others. The United States, Canada, China, the European Union, Japan, Russia, and India are the lynchpins of the system. Together they are responsible for more than 70% of global emissions, and with their economic and political influence, they have the corresponding power to shape the negotiations.[97] Meanwhile, the forty-three members of the Alliance of Small Island States, a negotiating bloc within the UN talks, are collectively responsible for about 0.5% of global emissions, yet many of these nations will disappear as the oceans rise.[98] In this context, the major emitters, though not exactly akin to triage personnel, certainly have an outsized influence on utilizing atmospheric space and keeping emissions with a carbon budget.

III. TRIAGE ETHICS IN CLIMATE CHANGE MITIGATION

Given the close parallels between climate change mitigation and traditional applications of triage, climate policy makers ought to consider triage ethics in developing options for allocation. The literature on triage ethics—developed in contexts such as battlefield trauma, emergency medicine, and disaster response—helps to illuminate some of the core questions of equity and justice in climate change law.

This Part explores the triage ethics literature and identifies three principles of distributive justice that could potentially guide a climate change allocation scheme: utilitarianism, egalitarianism, and market-based

95 *See, e.g.*, Thomas Nagel, *The Problem of Global Justice*, 33 PHIL. & PUB. AFF. 113, 114, 121–22 (2005).

96 J. Timmons Roberts & Bradley C. Parks, *Fueling Injustice: Globalization, Ecologically Unequal Exchange and Climate Change*, 4 GLOBALIZATIONS 193, 204 (2007).

97 BAUMERT ET AL., *supra* note 85, at 11–14.

98 *See* UNITED NATIONS OFFICE OF THE HIGH REPRESENTATIVE FOR THE LEAST DEVELOPED COUNTRIES, LANDLOCKED DEVELOPING COUNTRIES AND SMALL ISLAND DEVELOPING STATES, THE IMPACT OF CLIMATE CHANGE ON THE DEVELOPMENT PROSPECTS OF THE LEAST DEVELOPED COUNTRIES AND SMALL ISLAND DEVELOPING STATES 12 (2009).

distribution. After considering the benefits and drawbacks of each, this Article concludes that egalitarian principles provide the fairest basis for emerging climate change law. This Part also addresses the role of corrective justice—redress and compensation—in both climate change law and in triage.

A. The Triage Ethics Literature

Most historians date the first formal triage protocols to the Napoleonic Wars.[99] Baron Dominique-Jean Larrey, chief surgeon of Napoleon's Imperial Guard, developed what he called a system of "prompt and methodical succor" for the battlefield wounded.[100] In his 1812 notes on Napoleon's Russian campaign, Larrey wrote: "Those who are dangerously wounded should receive the first attention, without regard to rank or distinction. They who are injured in a less degree may wait until their brethren in arms, who are badly mutilated, have been operated on and dressed."[101]

For much of the nineteenth and twentieth centuries, writing on triage ethics focused on the battlefield setting.[102] Since the 1960s, however, writers have also turned their attention to the triage decisions triggered by new medical technology, such as neonatal intensive care, organ transplant, and kidney dialysis.[103] Much of the writing on triage ethics has appeared within specialized trade journals, and there have been a few book-length treatments as well.[104]

A major lesson of this literature is that triage conditions trigger situational ethics.[105] Conditions can deteriorate to a point where ordinary methods for allocating resources no longer seem appropriate. In warfare or natural disasters, for example, triage ethics may require health care workers to neglect some victims, purposely, to save others.[106] Common allocation mechanisms for triage—such as lotteries, rationing, and queuing—would seem bizarre or intolerable in the ordinary practice of medicine. Triage

99 Iserson & Moskop, *supra* note 65, at 277.

100 Robert Baker & Martin Strosberg, *Triage and Equality: An Historical Reassessment of Utilitarian Analysis of Triage*, 2 KENNEDY INST. ETHICS J. 103, 110 (1992).

101 Iserson & Moskop, *supra* note 65, at 277.

102 *See* GERALD R. WINSLOW, TRIAGE AND JUSTICE 1–11 (1982) (tracing triage practices in military medicine).

103 *Id.* at 11–21 (discussing triage debates in the 1960s and 1970s regarding kidney dialysis and transplant).

104 *See, e.g.*, *id.*; *see also, e.g.*, RUTH GAARE BERNHEIM ET AL., ESSENTIALS OF PUBLIC HEALTH ETHICS (2013); CALABRESI & BOBBITT, *supra* note 54; DÓNAL P. O'MATHÚNA ET AL., DISASTER BIOETHICS: NORMATIVE ISSUES WHEN NOTHING IS NORMAL (Michael J. Selgelid ed., 2014).

105 *See* The World Med. Ass'n, *WMA Statement on Medical Ethics in the Event of Disasters*, http://www.wma.net/en/30publications/10policies/d7/ (last visited Nov. 22, 2014) ("Triage may pose an ethical problem owing to the limited treatment resources immediately available in relation to the large number of injured persons in varying states of health.").

106 *See* Donald R. Korobkin, *Contractarianism and the Normative Foundations of Bankruptcy Law*, 71 TEX. L. REV. 541, 586 (1993) ("In medical triage, doctors defer working on those patients who cannot be saved, or whose rescue would require disproportionate attention, time, and resources, even if it means that those patients will probably die.").

conditions may require modification of legal rules as well as ethical rules. For instance, many U.S. states relax their licensing standards for medical professionals in times of natural disaster and allow a wider array of procedures to be performed under various licenses.[107]

The diversity of settings in which triage can arise forces us to consider the ethical principles that should apply for the extraordinary exigencies of particular dire situations. At the extreme, where scarcity is so dire that it threatens the collapse of society, some philosophers, including Hume, have suggested that there is no possibility of justice, and the only ethic is one of self-preservation. As Hume wrote, "where the society is ready to perish from extreme necessity, no greater evil can be dreaded from violence and injustice; and every man may now provide for himself by all the means, which prudence can dictate, or humanity permit."[108]

Global warming has not yet reached a point where there is an impossibility of just outcomes. As we face an era of ecological overshoot, the triage lens offers some hope that just solutions to the climate crisis can still be reached.

B. Substantive Principles for Triage

There are three potential principles for allocating scarce resources under triage conditions: utilitarianism, egalitarianism, and market-based distribution. Each is considered here.

1. Utilitarian Triage Ethics

In the triage literature, it is frequently stated that triage is a utilitarian exercise: the goal is to save as many lives as possible, given severe resource constraints.[109] According to Peter Baskett, a British physician who pioneered advanced life support techniques, triage means "[d]o as little as possible, for as many as possible, as quickly as possible."[110] In practice, utilitarian triage may require sacrificing individuals who require too many resources needed by other patients. As a World War I military surgery manual stated, "[a] single case, even if it urgently requires attention . . . may have to wait, for in

107 *See* James G. Hodge, Jr., Lance A. Gable & Stephanie H. Cálves, *The Legal Framework for Meeting Surge Capacity Through the Use of Volunteer Health Professionals During Public Health Emergencies and Other Disasters*, 22 J. CONTEMP. HEALTH L. & POL'Y 5, 48 (2005) (advocating relaxation of licensing standards to increase the supply of health professionals during emergencies). Many states, moreover, allow temporary governmental taking of private property to address emergencies, including not only hotel space and other facilities that could be used for emergency housing, but also pharmaceuticals and other medical supplies. *See, e.g.*, D.C. CODE § 7-2304 (2013); GA. CODE ANN. § 38-3-51 (2013); LA. REV. STAT. ANN. § 29:769 (2013); N.J. STAT. ANN. §§ 26:13-9, 26:13-11 (West 2013); N.M. STAT. ANN. § 12-10A-6 (2013).

108 DAVID HUME, AN ENQUIRY CONCERNING THE PRINCIPLES OF MORALS 19 (2d ed. 1966) (1777).

109 Matthew D. Sztajnkrycer et al., *Unstable Ethical Plateaus and Disaster Triage*, 24 EMERGENCY MED. CLINICS N. AM. 749, 751 (2006).

110 *Id.* at 756 (quoting Peter J. F. Baskett, *Ethics in Disaster Medicine*, 9 PREHOSPITAL & DISASTER MED. 4 (1994)).

that same time a dozen others, almost equally exigent, but requiring less time, might be cared for. The greatest good of the greatest number must be the rule."[111]

Within this utilitarian framework, triage rests on a prioritization of interests. Treatment is ordinarily prioritized to those with a realistic prognosis for recovery due to the intervention, and it is denied to those who have little chance of medical success even with the intervention.[112] Treatment of the latter group would simply be an unacceptable waste of time and resources.

Benthamite utilitarianism has intuitive appeal in triage. Few people quarrel with using medical success as a primary criterion for triage in battlefield, emergency room, and Intensive Care Unit settings.[113] Virtually all scholars of triage ethics have endorsed it.[114] When confronted with scarcity and overwhelming need, it is natural to ask the question: How can this resource be deployed so it will do the most good?

Applying utilitarian triage ethics can be difficult in practice, however. In addition to the practical challenges of accurately and rapidly assessing the medical condition of claimants on the resource, there is also a larger, structural challenge in utilitarian triage: defining the "greatest good for the greatest number."[115]

In battlefield triage, for example, we assume that utilitarianism means using scarce resources to save the largest possible number of wounded soldiers.[116] But medical personnel sometimes prioritize the current fighting strength of a unit, rather than saving the largest possible number of soldiers.[117] Military physicians have prioritized aid to soldiers who have slight injuries, rather than severe injuries, so the soldiers can get back to the battlefield as soon as possible.[118]

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111 Iserson & Moskop, *supra* note 65, at 277 (quoting W.W. KEEN, THE TREATMENT OF WAR WOUNDS 20 (1917)).

112 *Id.* at 284.

113 Baker & Strosberg, *supra* note 100, at 113, 115; *see also* Centers for Disease Control and Prevention, *Guidelines for Field Triage of Injured Patients*, 61 MORBIDITY & MORTALITY WKLY. REP. 1, 2, 17 (2012).

114 *See* Baker & Strosberg, *supra* note 100, at 107 (quoting Nat'l Inst. of Health Consensus Dev. Conference Statement, *Critical Care Medicine*, Mar. 7–9, 1983, *available at* http://consensus.nih.gov/1983/1983CriticalCare035html.htm) ("It is not medically appropriate to devote limited ICU resources to patients without reasonable prospect of significant recovery when patients who need those services, and who have a significant prospect of recovery from acutely life-threatening disease or injury are being turned away due to lack of capacity.").

115 *See, e.g.*, Nicholas Rescher, *The Allocation of Exotic Medical Lifesaving Therapy*, 79 ETHICS 173, 177, 182–83 (1969).

116 Baker & Strosberg, *supra* note 100, at 104.

117 *Id.* at 104, 120.

118 WINSLOW, *supra* note 102, at 6. In a well-known example of this practice, military physicians in North Africa during World War II gave their first shipments of penicillin to soldiers who contracted gonorrhea in brothels rather than to soldiers injured in battle. Iserson & Moskop, *supra* note 65, at 277. The theory was that those with gonorrhea could be cured in a matter of days with the penicillin and get back to fighting, whereas those with more serious injuries could take weeks to get back to the front, even with the penicillin. Baker & Strosberg, *supra* note 100, at 104. Similarly, a U.S. Army Technical Bulletin from 1955 stated that under

In the hospital setting, what "good" should be maximized in triage decisions? There are many potential options. A utilitarian ranking for treatment could certainly be based on a patient's degree of injury or on the prospects for medical success, but it also could be based on a patient's projected life span or quality of remaining life—a maximization of so-called Quality-Adjusted Life Years.[119] To maximize *societal* welfare, rather than the welfare of a group of patients, a utilitarian triage ethic might give priority to patients with dependent children, to patients who employ many individuals in their business, or to patients deemed to have high social worth.[120] Triage ethicists have debated whether triage should consider patients' past or potential contributions to society as well as their misdeeds, such as criminal convictions.[121]

In short, even in battlefield and hospital contexts, utility itself is a contestable concept. Utilitarianism requires some consensus on the good to be maximized and corresponding decisions on which claimants shall take priority. Utilitarianism remains a foundational principle for allocating resources in triage, but it is a constrained form of utilitarianism.[122] It is utilitarianism focused on improving survival rates for needy claimants, not on promoting overall societal good.

2. Egalitarian Triage Ethics

While utilitarian ethics dominate in battlefield and emergency room triage, there is a distinct class of triage situations in which egalitarian ethics prevail. In allocation of emergency food and shelter after a disaster, allocation of scarce antibiotics during a bacterial outbreak, or allocation of organs for transplant, most ethical guidelines for triage are strongly egalitarian.[123] The driving concern is equality—equal access to the scarce good. Triage protocols for these contexts usually ignore wealth, age, race,

conditions of thermonuclear attack, medical attention for soldiers should not be given to the severely injured, but rather to those who would be able to return to military duty after minimal treatment, such as "[t]hose with small lacerations or contusions." Thomas J. O'Donnell, S.J., *The Morality of Triage*, 14 GEO. MED. BULL. 68, 70–71 (1960).

119 *See* Baker & Strosberg, *supra* note 100, at 108 (defining "quality adjusted life-year" as a utilitarian triage factor that weighs remaining length of life against quality of life).

120 *See* WINSLOW, *supra* note 102, at 33 (discussing a heart transplant panel's rejection of social worth criteria for triage). In the early debates over organ donation in the 1960s, University of Pittsburgh philosopher Nicholas Rescher was the leading advocate for the position that a patient's social worth should be used as a utilitarian triage criterion, on the grounds that when investing a scarce resource in one person instead of another, society is entitled to look to the probable prospective societal gain. *Id.* at 84.

121 *E.g.*, George P. Smith, II, *Triage: Endgame Realities*, J. CONTEMP. HEALTH L. & POL'Y, Spring 1985, at 143, 145.

122 *See* Nikki Pesik et al., *Terrorism and the Ethics of Emergency Medical Care*, 37 ANNALS EMERGENCY MED. 642, 644–45 (2001) (arguing that in utilitarian medical triage, the only permissible prioritization should be likelihood of recovery, amount of resources required, and whether the person's survival is important to save others).

123 *See* Meir Katz, *Bioterrorism and Public Law: The Ethics of Scarce Medical Resource Allocation in Mass Casualty Situations*, 21 GEO. J. LEGAL ETHICS 795, 805 (2008) (discussing how egalitarianism plays a critical role in emergency situations).

religion, gender, military rank, and ability to pay.[124] Unlike utilitarian allocations, egalitarian allocations typically do not include individualized assessments of the medical condition of the claimants.

Egalitarian triage allocation methods include lottery, first-come-first-served, or, where possible, an equal per capita distribution of the resource.[125] Efficiency is still relevant in these egalitarian allocations. It would be wasteful to hand out scarce resources to those who cannot benefit from them. But once *initial* categorizations have been made to determine who is in need and who can benefit (as in organ donor matching), the actual distribution of the resource in triage situations is frequently egalitarian.[126]

Egalitarianism is the dominant approach in these contexts for a few reasons. First, there may be many hundreds or thousands of claimants on the resource, unlike battlefield or emergency room triage, where the task is to prioritize among a smaller group. Second, within the class of claimants in need, the need of each individual for food, shelter, or medicine is roughly the same, making it difficult to establish a prioritization hierarchy. Third, the scarce resource is often divisible into roughly equal portions, unlike medical attention on the battlefield or in a hospital. Some resources, such as kidneys, cannot be subdivided, of course, but others, such as food and water, can be almost infinitely subdivided to produce equal portions for those in need.[127]

Like utilitarian triage ethics, egalitarian triage ethics raise a host of implementation issues. The most significant issue is how to measure equality. There are three main alternatives. First, equality could be determined by equality of an *opportunity* to receive aid—as in a lottery system—even if this means that many who applied for the lottery are denied aid altogether. Second, equality could be conceived as equalizing *amounts* of a resource distributed to claimants (the per capita option). Third, equality could be conceived as a kind of guarantee of equal *outcomes*, in which those most in need would receive more of the resource. Under this approach, the frail and sick would receive more aid (food, water, blankets, etc.) on the grounds that more aid is needed to restore them to a baseline of health.

The main disadvantage of egalitarian allocations in triage situations is that there is typically no individualized assessment of claimants' need for the resource. Such an individualized ranking of the needy might save more lives overall because it avoids the distribution of a scarce resource to those with lower priority needs. Such a ranking, however, takes time and resources for triage personnel. This is one reason why egalitarian allocations of scarce life-saving resources are common after natural disasters affecting large populations, where there is neither the time nor the resources to undertake individualized assessments of need.

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124 KATHY KINLAW & ROBERT LEVINE, ETHICAL GUIDELINES IN PANDEMIC INFLUENZA 7 (2007).

125 Sztajnkrycer et al., *supra* note 109, at 759–60.

126 *See, e.g.*, WINSLOW, *supra* note 102, at 33 (noting that if two candidates for a heart transplant present themselves with roughly equivalent medical need, the transplant recipient "should be selected by some random method").

127 *Id.* at 43 ("Some scarce resources can be divided and subdivided into smaller and smaller portions. The smaller amounts may be less effective and yet still be better than nothing.").

3. Market-Based Distributions in Triage

The third potential principle for allocating scarce resources is market-based distribution. Triage personnel could auction off scarce goods or sell them for some fixed price, and those who successfully obtain the good could sell it or trade it. Such a plan would lead to different outcomes compared to a utilitarian or an egalitarian allocation. In a utilitarian allocation, the triage personnel must decide the prioritization rules that will benefit the most number of claimants. In contrast, in a market-based distribution, the triage personnel would remain agnostic on prioritization, and the market itself would determine the distribution. That distribution, grounded in ability to pay, is highly unlikely to lead to a uniform, equal distribution of a good among a population.

Most scarce goods, including finite natural resources, are routinely distributed through the market. Copper, oil, timber, and oceanfront real estate are sought after and valuable, yet we do not ordinarily think that these resources need to be triaged through some governmental or collective decision making to direct them to their highest use. Even when the government has taken exclusive control over a scarce resource, such as radio spectrum, market-based auction remains a common allocation mechanism.[128] No one expects egalitarian outcomes in these situations, and we do not typically view the losers in the market—those who are outbid for the resource—as having suffered a tragedy.

If a market-based distribution were applied in a triage situation, it would avoid the need for triage personnel—whom we assume have near-monopoly control over the resource—to assess the individual needs and condition of claimants. The price offered by claimants would instead reflect their own assessment of their need and their opportunity costs. A market-based distribution could potentially raise revenue that society could use for broader health care goals or for securing additional supplies of the scarce resource.

The major disadvantage of a market-based distribution of scarce life-saving goods is that it privileges willingness to pay or ability to pay as the criteria for allocation. There are strong moral objections to giving such primacy to wealth in triage, because wealth is so heavily influenced by family history, race, gender, geography, and other factors unrelated to medical need.[129] Indeed, if market principles were to govern triage, the scarce resource may very well be delivered to those who have no need for it, but merely think they have a need for it or want to stockpile it. In addition, in many triage situations, those in need of a scarce resource are on the verge of death. They are in no position to bid in this particular marketplace.

Triaged goods are survival goods—goods necessary for life itself. Unlike other kinds of scarce goods typically distributed through the market, there is intense concern in triage for the welfare of the losers—those

128 Terrence J. Schroepfer, *Allocating Spectrum Through the Use of Auctions*, 14 HASTINGS COMM. & ENT. L.J. 35, 36 (1991–1992).

129 Sztajnkrycer et al., *supra* note 109, at 759.

claimants who do not become recipients—and we often view the losers as having suffered a tragedy. Triage personnel understand the moral gravity of these allocation decisions. In a study of the psychological health of triage practitioners, researchers noted that the practitioners experience feelings of "doubt, discomfort, and other forms of ethical dissonance before, during and after a process of prioritization of resources and services."[130] Triage personnel rarely use a market-based distribution of scarce resources, and in the literature on triage ethics, it is widely accepted that willingness or ability to pay should not be criteria for allocation.[131]

C. Utilitarianism, Egalitarianism, and the Market in Climate Change Mitigation

In climate change triage, which of these different allocation principles should govern the allocation of the limited carbon budget?

A market-based approach to climate change triage would be highly problematic. Assume, for example, that the limited remaining carbon budget were simply auctioned off to nations. The vast differences in wealth among nations are in large part due to past consumption of fossil fuels and associated emissions of greenhouse gases.[132] To make those wealth differences the primary criterion for deciding which nations should enjoy *future* rights to emit greenhouse gases would be morally perverse. There is simply no reason to make the existing distribution of wealth among nations the foundation for long-term allocation decisions regarding the available carbon budget. For this same reason, an approach that requires nations to reduce their emissions by a certain percentage from a baseline year is also unjust because the widely varying emissions in a baseline year are not morally relevant grounds for an allocation program that may last decades.[133]

Another problem with a market distribution is that in a hypothetical market auction of atmospheric space, or emissions rights, it is likely that the wealthiest countries would acquire the vast majority of the resource, leaving none for the poorest countries. Such a program of market allocation, causing emissions starvation for the poorest countries, is morally unjust and would never be agreed to consensually through a treaty.

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130 Norman Linzer et al., *Terror and Triage*, 7 ANNALS OF GEN. PSYCHIATRY 1, 1 (2008).

131 As three experts in disaster triage concluded, a "free-market system of resource allocation, based in large part on ability to pay, has [no] role in resource allocation during a disaster," at least with respect to publicly provided necessities. *Id.*

132 *See* STEVEN VANDERHEIDEN, ATMOSPHERIC JUSTICE: A POLITICAL THEORY OF CLIMATE CHANGE 78–79 (2008) (stating that national greenhouse gas emissions are closely correlated with industrial development and national wealth).

133 For further discussion of the drawbacks and advantages of allocations based on historical baselines, see J.B. Ruhl & James Salzman, *Gaming the Past: The Theory and Practice of Historic Baselines in the Administrative State*, 64 VAND. L. REV. 1, 18, 25 (2011). *See also* VANDERHEIDEN, *supra* note 132, at 231 (critiquing the Kyoto Protocol for relying on a 1990 baseline year, which meant that "the United States, which had significantly higher per capita emissions that year than did either Europe or Japan, was allowed to maintain that wide disparity in average pollution levels").

Between the two other approaches, egalitarianism and utilitarianism, egalitarianism is the preferable allocation method for atmospheric space. There are seven billion people who are claimants on the scarce resource, and there is no principled means of arranging the citizens of the world into a hierarchy of the "deserving," based on wealth, nationality, race, geography, or perceived social worth.[134] A utilitarian approach would inevitably involve deciding which countries "need" to emit greenhouse gases and whose needs should be prioritized. The atmosphere's absorptive capacity is a common heritage of humanity, owned by no one.[135] There is therefore a strong moral claim for equal allocation of atmospheric space.

An egalitarian distribution of rights to the atmosphere can be justified through Rawlsian contract theory. In his classic 1982 book, *Triage and Justice*, Gerald Winslow engaged in a Rawlsian thought experiment for triage, exploring what rational contractors would choose as allocation principles for scarce goods if they were under a veil of ignorance regarding their own future need for the good in a triage situation.[136] Winslow concluded that in this original position, contractors would still value utility, in the sense that they would want to maximize use of the scarce resource to save lives. However, once those individuals with a realistic chance of medical success were identified, Winslow argues, contractors would opt for an egalitarian system of equal access.[137] They would rule out principles such as ability to pay, social worth, or just deserts.[138] Using this Rawlsian analysis, Winslow endorsed "a fundamental presumption in favor of the justness of equal access to the scarce life-saving resource."[139]

In the climate change context, an egalitarian distribution would presumably focus on equality of distribution of the scarce resource—atmospheric space or emissions rights—rather than more difficult-to-measure criteria, such as equalizing individual welfare, utility, or happiness; or equalizing national wealth or GDP. An allocation program based on per capita distribution of emissions rights, within the constraints of the carbon budget, is the most straightforward way of operationalizing egalitarianism in climate change policy.

Egalitarianism in climate change policy does not mean that *every* form of inequality among nations or among individuals must be eliminated. Nations differ greatly in their wealth, natural resources, human capital, climate change vulnerability, dependence on fossil fuels, seasonal temperatures, etc. Redressing the totality of *these* inequalities is not mandated by principles of justice, and it is asking far too much of a climate change treaty to measure its success on these grounds.

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134 Henry Shue, *Climate*, *in* A COMPANION TO ENVIRONMENTAL PHILOSOPHY 449, 450 (Dale Jamieson ed., 2001); VANDERHEIDEN, *supra* note 132, at 108.

135 Robin Attfield, *Environmental Values, Nationalism, Global Citizenship and the Common Heritage of Humanity*, *in* ENVIRONMENTAL VALUES IN A GLOBALISING WORLD: NATURE, JUSTICE AND GOVERNANCE 38, 44 (Jouni Paavola & Ian Lowe eds., 2006).

136 WINSLOW, *supra* note 102, at 133.

137 *Id.* at 143–53.

138 *Id.* at 155–61.

139 *Id.* at 167.

Eric Posner and David Weisbach make this unreasonable demand in *Climate Change Justice*, repeatedly criticizing advocates of egalitarian climate policies because such policies will not achieve these lofty purported goals of global equity or global redistribution of wealth described above.[140] Posner and Weisbach note, for example, that Thailand, Romania, and Jamaica are all currently near the world average in per capita emissions and therefore would not have a significant change in emissions rights under a climate change treaty grounded in egalitarianism.[141] Because these countries face very different *impacts* from climate change, Posner and Weisbach contend, an egalitarian distribution of emissions rights will not truly treat these nations equally.[142]

No climate change treaty can achieve the idealized form of equality that Posner and Weisbach posit here. Advocates of egalitarian climate change policies are not suggesting that such policies could equalize per capita wealth or income across the globe, let alone equalize the ability of nations to adapt to a changing climate.[143] Rather, egalitarianism in the climate change context means something narrower—equal distribution of the scarce good itself. Part IV.C outlines what such an equal per capita distribution of emissions rights could look like.

It might be argued that egalitarianism is the wrong approach because it unnecessarily collectivizes the atmosphere and treats it as a resource in which every citizen of the world has an ownership stake. Other natural resources such as timber and minerals—even food and water necessary for survival—are controlled by sovereign nations and are usually used by nations to benefit their own citizens. Just as the citizens of Morocco have no legitimate claim to the water resources of Canada, this argument might run, the citizens of Morocco have no claim to atmospheric space being used by Canada's rising greenhouse gas emissions. If we do not seek equal allocation of the world's supply of food, water, or minerals—we in fact tolerate vast inequities in consumption[144]—then why should we be concerned with equal allocation of atmospheric space?

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140 *See* POSNER & WEISBACH, *supra* note 22, at 121–22, 143 ("It would be much better to design a treaty on the basis of fundamental normative principles, [as opposed to a per capita approach], while taking into account feasibility constraints . . . .").

141 *See id.* at 125–26 (citing 2000 figures). By 2010, emissions from Romania and Thailand were exceeding those from Jamaica. *See* World Bank, *CO_2 emissions (metric tons per capita)*, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC (last visited Nov. 22, 2014).

142 *Id.* at 126 ("Jamaica may be exposed to changes in hurricane intensity in the Atlantic. Thailand may face changes in agricultural patterns. Both are exposed to sea-level change, while Romania is not. The net effects of a climate treaty with per capita allocations would be quite different for these countries.").

143 *See, e.g.*, Sinden, *supra* note 71, at 311–17 (discussing methods for allocating emissions rights under a per capita distribution).

144 *See* John Ashton & Xueman Wang, *Equity and Climate: In Principle and Practice*, *in* BEYOND KYOTO: ADVANCING THE INTERNATIONAL EFFORT AGAINST CLIMATE CHANGE 61, 65 (2003), *available at* http://www.c2es.org/docUploads/Beyond%20Kyoto.pdf ("[Egalitarianism] is harder to invoke when it comes to more material goods. . . . No state, for example, shares equally among its citizens the benefits accruing from the extraction of its minerals . . . . Most goods are

The reason is that the atmosphere is fundamentally different from other natural resources. The atmosphere is a true global commons, owned by no single sovereign.[145] Its absorptive capacity is scarce and cannot be replenished.[146] There is no substitute for it. And unlike a nation's use of food or water, a nation's greenhouse gas emissions cause global externalities, with extensive ecological damage beyond national borders. As the British economist Nicholas Stern put it, climate change is "the greatest market failure the world has ever seen."[147]

Under these circumstances, those who want to justify vastly unequal use rights in the commons ought to bear a heavy burden of persuasion. It would be morally perverse, for example, if Canada were to argue that it has an "entitlement" to continued high emissions because it is a first-in-time user of atmospheric space or because it has built its infrastructure around a high-emissions economy.[148] Similarly, countries that have had low emissions in the past cannot be said to have forfeited their population's right to the commons, and no country would ever be expected to consent to near-exclusive appropriation by others.

In contrast to egalitarianism, utilitarianism is a problematic moral framework for climate change triage. In a climate change treaty, allocating emissions rights or atmospheric capacity according to a utilitarian calculus would inevitably mean establishing a hierarchy of the deserving—a kind of rational sorting of individuals or nations. It is highly unlikely that such a treaty would be widely ratified or remain stable over the long term. Indeed, triage scholars have observed that utilitarian triage allocations almost always require "coercion" or "covertness" to be workable because when the rationing or ranking criteria become public, the triage personnel tend to lose their authority.[149] This kind of coercive utilitarian prioritization can work on the battlefield and in emergency room settings because there is a clear command authority.[150] But given the consensus nature of international decision making, any attempt to engage in a utilitarian ranking of the deserving would quickly eviscerate support for a climate change treaty.

There is a superficial appeal in designing an allocation scheme in which the scarce resource of the limited carbon budget can do the most "good." In

allocated through property rights according to ability or willingness to pay, not provided equally to all.").

145 *Id.*

146 *See id.* ("[E]very human has an equal stake in [the atmosphere]: an equal share of the total carbon space available for human activity.") (internal quotation marks omitted).

147 NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW xviii (2007).

148 Posner and Weisbach contend that high-emitting countries such as the United States and Canada should receive some sort of preference in a future allocation. They note that if high-emitting countries are severely constrained under an allocation system, they "should be compensated for the lost investment that they made in the reasonable expectation that rights would continue as in the past." POSNER & WEISBACH, *supra* note 22, at 136.

149 Baker & Strosberg, *supra* note 100, at 117.

150 *See generally id.* at 107, 110 (discussing both the policy developed by the National Institutes of Health for prioritizing care in intensive care units, and the battlefield triage system implemented by Napoleon's army).

climate change politics, however, there is no consensus on this issue.[151] What is the good that we should be maximizing, and what should the limited atmospheric budget be spent on? Is the allocation to be based on which nations, or individuals, can produce the most goods and services from each ton of greenhouse gases emitted? The most improvement in quality of life? Should we assume a declining marginal utility of emissions? Should countries such as China, the United States, and Canada, which are now locking in their fossil fuel infrastructure through the middle of this century,[152] have a larger entitlement to continued greenhouse gas emissions, based on the costs they would incur if their emissions were severely constrained?

A utilitarian approach to climate change policy would also have to confront some of the classic problems of utilitarian moral theory. It could justify morally abhorrent treatment of some to benefit the whole, and it could run roughshod over competing values and tastes held by minorities and dissenters. Furthermore, because it takes preferences at face value, a utilitarian allocation scheme can be too easily influenced by the intensely held preferences of a few.[153]

There is no doubt that utilitarian climate change policy would be strident and divisive. Consider the charges of cultural hegemony that would be raised if any group of policy makers tried to determine which nations' emissions are most valuable or which population could make the best use of a limited allocation.

As John Stuart Mill recognized, there are some areas of public life where utilitarian ethics need to be constrained. It is "inconsistent with justice to be partial," he wrote, "to show favor or preference to one person

151 *See* UNFCCC, Mar. 13, 2013, *Submission by the Like-Minded Developing Countries on Climate Change (LMDC) to the Ad-Hoc Working Group on the Durban Platform for Enhanced Action (ADP)*, 5, 7 (Mar. 13, 2013) [hereinafter *Submission by LMDC*], *available at* http://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/adp_lmdc_workstream_1_20130313.pdf (explaining that developed countries should take the lead in combating climate change and reducing emissions); MASS. INST. OF TECH. ENERGY INITIATIVE, THE FUTURE OF NATURAL GAS: AN INTERDISCIPLINARY MIT STUDY, 132, 134–35 (2011) [hereinafter MIT ENERGY INITIATIVE], *available at* http://mitei.mit.edu/system/files/NaturalGas_Chapter6_Infrastructure.pdf (describing recent expansion in the U.S., of natural gas infrastructure and future infrastructure needs through 2030); Damian Carrington, *More Than 1,000 New Coal Plants Planned Worldwide, Figures Show*, THE GUARDIAN, Nov. 19, 2012, http://www.theguardian.com/environment/2012/nov/20/coal-plants-world-resources-institute (last visited Nov. 22, 2014) (describing recent expansion of coal plants worldwide, particularly in China).

152 *See* Carrington, *supra* note 151; MIT ENERGY INITIATIVE, *supra* note 153; Gov't of Alberta, *Inventory of Major Projects*, http://albertacanada.com/business/statistics/inventory-of-major-projects.aspx (last visited Nov. 22, 2014) (listing hundreds of infrastructure projects to develop Alberta's oil sands).

153 *See* ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 41 (1974) ("Utilitarian theory is embarrassed by the possibility of utility monsters who get enormously greater gains in utility from any sacrifice of others than these others lose . . . . [T]he theory seems to require that we all be sacrificed in the monster's maw, in order to increase total utility."); Jedediah Purdy, *Our Place in the World: A New Relationship for Environmental Ethics and Law*, 62 DUKE L.J. 857, 881–82 (2013) (arguing the utilitarianism in environmental law may lead to "disregarding or sacrificing inconveniently situated individuals or sloughing over values that some people treasure").

over another in matters to which favor and preference do not properly apply."[154] While few would object to favoring certain injured soldiers in a utilitarian battlefield triage, it is highly objectionable to prefer some populations or nations over others in a utilitarian allocation of global atmospheric space.

D. Triage and Corrective Justice

I have focused so far on *distributive* justice—fairness in allocation—but another major issue in climate treaty negotiations is *corrective* justice[155]: the view, held by many developing countries, that the past wrongs of excess greenhouse gas emissions need to be redressed, and those nations most responsible for global climate disruption should compensate the victims.

India, China, and many other countries contend that a fair climate change treaty should involve substantial emissions reductions by wealthy, developed states of the world, given the historic advantage of these states in emitting greenhouse gases for two centuries as the engine of their economies, with essentially no controls.[156] In addition to emission reductions, developing countries have also consistently sought financial transfers from wealthy countries to assist with climate change adaptation and capacity building.[157] In the 2009 Copenhagen Accord, developed countries committed to mobilize $100 billion per year by 2020 for such assistance, though it is now doubtful that such a huge amount will actually be appropriated.[158]

154 JOHN STUART MILL, UTILITARIANISM 67 (7th ed. 1879).

155 *See* ARISTOTLE, NICOMACHEAN ETHICS: BOOK V (W. D. Ross trans., 2009) (350 B.C.E) (describing "rectificatory" justice, in which equality needs to be restored where "one [has] inflicted injury and the other has received it").

156 UNFCCC, Aug. 2009, *Ministry of Env't and Forests, Gov't of India, Climate Change Negotiations: India's Submissions to the United Nations Framework Convention on Climate Change*, 14 [hereinafter *India's Submissions*], *available at* http://www.moef.nic.in/sites/default/files/UNFCCC_final_1.pdf; UNFCCC, July 7–31, 1997, *Ad Hoc Group on the Berlin Mandate, Implementation of the Berlin Mandate*, 4–5, 18–23, U.N. Doc. FCCC/AGBM/1997/MISC.1/Add.3 (May 30, 1997) [hereinafter *Berlin Mandate*], *available at* http://unfccc.int/cop5/resource/docs/1997/agbm/misc01.pdf; *Submission by LMDC*, *supra* note 151, at 5, 7; Info. Office of the State Council of China, *China's Policies and Actions for Addressing Climate Change, Part VI* (2012) [hereinafter *China's Policies*], *available at* http://www.china.org.cn/government/whitepaper/node_7172407.htm (affirming the principle of "common but differentiated responsibility").

157 *Copenhagen Accord*, *supra* note 36, ¶ 8; *Berlin Mandate*, *supra* note 156, at 4–5, 23; *Submission by LMDC*, *supra* note 151, at 5, 7, 10.

158 *Copenhagen Accord*, *supra* note 36, ¶ 8. The developed countries also pledged $30 billion in "fast-start finance" between 2010 and 2012. *Id.* In 2012, the World Resources Institute estimated that $33.92 billion had been pledged for this early financing. Clifford Polycarp et al., World Res. Inst., *Developed Country Fast-Start Climate Finance Pledges: A Summary of Self-Reported Information* (2012), *available at* http://www.wri.org/sites/default/files/pdf/climate_finance_pledges_2012-11-26.pdf. As for long-term funding sources to mobilize $100 billion per year by 2020, the parties have not yet reached agreement, and the outlook remains highly uncertain. Yulia Yamineva & Kati Kulovesi, *The New Framework for Climate Finance Under the United Nations Framework Convention on Climate Change: A Breakthrough or an Empty*

Corrective justice has intuitive appeal in many decisions involving natural resources. It would be unjust, for example, if one family recklessly pollutes a village well and then suggests an equal method for allocating any remaining drinking water in the village. Such a purely egalitarian distribution would ignore how the well became polluted in the first place. The family might pay some compensation to the rest of the village, and the family's responsibility for polluting the well should be a factor in the future allocation of the remaining water.

Posner and Weisbach have criticized the application of corrective justice principles to climate change because of the intergenerational nature of the problem. They contend that it would be unjust to punish the current population of wealthy countries by making them pay compensation for the harm done by emissions of their parents and grandparents.[159] Cass Sunstein made the same argument in an article co-authored with Posner.[160] As Dan Farber shows, however, a compensation obligation in a climate change treaty would not necessarily punish current affluent populations for the sins of the past.[161] The United States, for example, has emitted 53.5% of its total greenhouse gas emissions since 1970, during the lifetimes of the majority of Americans alive today.[162]

The literature on triage ethics rarely addresses issues of corrective justice. Concepts such as punishment for past misdeeds or allocation of aid according to just deserts are foreign to triage practice. There are two reasons for this. First, triage is usually a one-time event—a tragic allocation under difficult conditions unlikely to be repeated. The emergency requires immediate response and rapid aid to the injured, and emergency situations are not the place for remediation of societal inequalities or meting out punishment and reward.[163] As Gerald Winslow notes, "affirmative action in triage would generally seem strange and unwarranted. Few social injustices would be sufficient grounds for concluding that those who had reaped unfair benefits would thereby have lost their equal right to life."[164]

The second reason that corrective justice is usually foreign to triage practice is that claimants on a triaged resource are rarely responsible for the condition of shortage. Shortage is instead an exogenous condition caused by natural disaster, war, limited supplies, or even poor planning on the part of

Promise?, *in* CLIMATE CHANGE AND THE LAW 191, 213–14 (Erkki J. Hollo, Kati Kulovesi, & Michael Mehling eds., 2013).

159 Posner and Weisbach object to corrective justice principles in climate change because of the "wrongdoer identity problem," in which present generations are punished for emissions in the past. POSNER & WEISBACH, *supra* note 22, at 103. They also contend that not all emissions in the past were morally culpable, particularly those emissions that predate the modern scientific consensus on global warming that emerged in the 1990s. *Id.* at 111.

160 *See* Posner & Sunstein, *supra* note 22, at 1593.

161 *See* Farber, *supra* note 9, at 396. ("[T]o think of harmful CO_2 emissions as only a historical phenomenon, unconnected with the lives of current-day Americans, is clearly mistaken.").

162 *Id.* at 395–96.

163 *See* Pesik et al., *supra* note 122, at 644 (noting that "antisocial or aggressive behaviors" should not be considered in deciding aid priority within an emergency room setting).

164 WINSLOW, *supra* note 102, at 98.

triage personnel. Just deserts—punishing or rewarding claimants based on their contribution to the problem—thus rarely arises in triage.

Climate change is a repeat triage situation, however, in which allocation decisions need to be made repeatedly over decades, opening a window for corrective justice claims that is normally closed in a typical triage situation. High-emitting nations such as the United States, China, Australia, and Canada, claiming rights to the future use of atmospheric space, are themselves responsible for the current condition of shortage, and their emissions are harming other nations.[165] Climate change policy therefore should involve compensation by high-emitting countries for both past and ongoing injuries.

This Article does not lay out the details of a compensation system, but it is important to note here that there are two distinct grounds for compensation. The first ground is the prior overuse of a shared resource, which does not depend on the occurrence of any physical injury to the party seeking compensation. The second ground is injury from emissions, which does not depend on any claim about overuse of a global commons. As Stephen Gardiner has observed, these two separate grounds are compatible with each other, and both serve as moral bases for compensation.[166]

IV. FOUR IMPLICATIONS OF CLIMATE CHANGE TRIAGE

Recognizing the climate change crisis as a triage challenge helps to clarify the ethical stakes, but what does a triage framework mean in practice? This Part discusses four major implications of a climate change triage framework, elaborating on the theoretical discussions of Parts II and III to concretize how climate change triage might operate. It concludes by exploring the ways in which a triage framework might influence international law.

A. Recognize Shortage Conditions

The first major implication of a triage framework for climate change is that policy makers and treaty negotiators must recognize, and adhere to, conditions of shortage. The most tragic outcome in triage occurs when a resource in short supply is treated as if it were abundant. If life-saving drugs are severely limited after a mass trauma event, for instance, but medical personnel do not recognize the shortage, they will waste the precious resource in the near term, with long-term misery.

The need to recognize shortage conditions should be apparent, yet policy makers are ignoring it. Governments are not setting national energy and environmental policy in a manner that reflects the true extent of scarcity in the atmosphere. They are instead treating the atmosphere as a naturally

165 *See* Stephen Gardiner, *Ethics and Global Climate Change*, 114 ETHICS 555, 579 (2004) (discussing the disproportionate amount of greenhouse gases emitted by developed countries).

166 *Id.* at 579–80.

abundant commodity such as aluminum, a substance we can continue to exploit.

Recognizing shortage conditions would rule out some of the dominant approaches to climate mitigation today. Consider, for example, the "pledge and review" system for emissions reductions that many of the UNFCCC parties have embraced in the past five years.[167] Such a system avoids legally binding, numeric emissions reductions targets in favor of voluntary policies and measures.[168] The 2009 Copenhagen Accord was emblematic of this approach, and the United States continues to advocate such a system of "pledges" as the basis for a new international treaty or other agreement.[169] Indeed, a pledge and review system is probably the most likely outcome of the Paris climate negotiations in 2015.[170]

There are two problems with this approach. First, looking only at developed countries, their pledges to date have been based on a percentage reduction from a baseline year, either 2005 or 1990, which locks in and grandfathers the highly unequal emissions patterns from those years.[171] Second, as soon as the ink was dry on the Copenhagen Accord, analysts concluded that the pledges made by all countries would not keep warming below two degrees—the stated objective of the Accord—but would instead lead to warming greater than two degrees, assuming, optimistically, that all these voluntary pledges were fully implemented.[172] The mismatch between the pledges and the ultimate goal of the treaty was quickly dubbed the "emissions gap."[173]

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167 David Hunter, *Implications of the Copenhagen Accord for Global Climate Governance*, SUSTAINABLE DEV. L. & POL'Y, Winter 2010, at 4, 12–13.

168 *See* Kati Kulovesi, *Exploring the Landscape of Climate Law and Scholarship: Two Emerging Trends*, *in* CLIMATE CHANGE AND THE LAW 31, 46–47 (Erkki J. Hollo, Kati Kulovesi, & Michael Mehling eds., 2013); Daniel Bodansky, *A Tale of Two Architectures: The Once and Future U.N. Climate Change Regime*, 43 ARIZ. ST. L.J. 697, 705–06 (2011); Nathan Hultman, Brookings Inst., *The Doha Climate Talks and Long Term Treaty Goals*, http://www.brookings.edu/blogs/up-front/posts/2012/11/21-doha-climate-talks-hultman (last visited Nov. 22, 2014) (explaining that UNFCCC parties informally agreed to the "pledge and review" system at Copenhagen in 2009 and officially endorsed the approach at the 2010 Cancun meeting).

169 *See* Valerie Volcovici, *U.S. Envoy Sees New Plan Energizing Global Climate Talks*, REUTERS, May 7, 2013, http://www.reuters.com/article/2013/05/07/us-un-climate-us-plan-idUSBRE9460XY20130507 (last visited Nov. 22, 2014).

170 *See* Alister Doyle & Michael Szabo, *U.N. Climate Talks Blocked Over Aid, Steps to 2015 Deal*, REUTERS, Nov. 23, 2013, http://uk.reuters.com/article/2013/11/23/uk-climate-talks-idUKBRE9AL0ZF20131123 (last visited Nov. 22, 2014) (discussing text adopted by the Conference of the Parties in Warsaw that called on countries to make national pledges by early 2015 so that they can be compared and reviewed in time for the 2015 summit in Paris). *But see* Responding to Climate Change, *Concrete Emissions Pledges 'Not a Priority' for 2015 Climate Deal—U.N. Official*, http://www.rtcc.org/2013/09/18/concrete-emissions-pledges-not-a-priority-for-2015-climate-deal-un-official/ (last visited Nov. 22, 2014).

171 *See, e.g.*, Ruhl & Salzman, *supra* note 133, at 37–38 (discussing the choice of the baseline year of 1990 under the Kyoto Protocol as an example of "gaming" the use of historic baselines in environmental law).

172 *See, e.g.*, UNITED NATIONS ENV'T PROGRAMME, THE EMISSIONS GAP REPORT 2012, at 1 (2012).

173 *See, e.g.*, UNITED NATIONS ENV'T PROGRAMME, THE EMISSIONS GAP REPORT: TECHNICAL SUMMARY 10 (2010) (noting that even if the more ambitious policy options from the Copenhagen

By ignoring the physics of global warming and making national pledges that will quickly exhaust the carbon budget, parties may find it easier to reach agreement, but this approach evades the hard choices necessary to avoid exhausting the limited resource. As Calabresi and Bobbitt noted, tragic choices can always be made palatable by hiding the ball—that is, by not disclosing to the public the nature of the scarcity or the actual allocation formula being used. "Evasion, disguise, temporizing, deception are all ways by which artfully chosen allocation methods can avoid the appearance of failing to reconcile values in conflict."[174] But sound triage practice depends on the principle of honesty.[175] Policy makers should adhere to the limits of the scarce resource and present the values in conflict for debate.[176]

What would an alternative approach to climate mitigation look like? Viewing the climate crisis through the lens of triage would force policy makers to work backward from the realities of ecological scarcity. A triage lens would take the limited carbon budget seriously as a constraint on emissions—it would force us to recognize atmospheric finitude. National emissions pathways would then be negotiated in relationship to this red line, rather than the current approach of nations pledging to do what they can to reduce their own emissions, even if this leads to two degrees of warming or more.[177] Within the carbon budget constraint of a triage framework, negotiators would bargain over issues such as emissions trading, targets and timetables, compensation, and adaptation assistance. The constraint of the limited capacity of the atmosphere to absorb greenhouse gases would be viewed as a firm one, however, not as a flexible target.

B. Fulfill Responsibilities to Vulnerable Populations

The second implication of climate change triage is that the largest greenhouse gas emitters need to fulfill their responsibilities toward vulnerable nations by reducing greenhouse gas emissions and providing significant funding to help vulnerable nations adapt to a warmer world.

In traditional triage contexts, triage personnel serve as "trustee[s] for the social interest,"[178] charged with the care and recovery of a vulnerable group. In most triage situations, patients themselves have lost their capacity for self-care and self-protection.[179] The enormous power that triage personnel hold over vulnerable populations becomes ethically tolerable if two conditions are met: 1) the exigencies of wartime or disaster require

Accord were implemented, the "emissions gap" would be approximately five billion tons of CO_2).

174 CALABRESI & BOBBITT, *supra* note 54, at 26.

175 *See id.*

176 *See, e.g.*, *id.* at 18.

177 *See infra* text accompanying notes 172–173.

178 Rescher, *supra* note 115, at 178.

179 *See* Sharona Hoffman, *Preparing for Disaster: Protecting the Most Vulnerable in Emergencies*, 42 U.C. DAVIS L. REV. 1491, 1499, 1546 (2009) (arguing that there are numerous vulnerable populations that have special needs that require "acute attention" during emergencies).

rapid decision making and a ceding of autonomy to triage personnel; and 2) the rapid decision making of triage is conducted impartially and fairly, according to some prioritization rule that is, ideally, debated and agreed to in advance.[180]

Along with the power vested in triage personnel, in other words, comes a responsibility to allocate limited resources—such as physician time, drugs, painkillers, food, and shelter—fairly.[181] It is crucial that triage decisions be made without bias or personal favoritism.[182] Instead, they should be made from the perspective of what Adam Smith called the "fair and impartial spectator"—without a vested interest in the outcome.[183]

In the context of climate change, it is unrealistic to expect nations to negotiate without regard to self-interest. But negotiating *solely* from self-interest ignores the clear state of dependency that exists between the most vulnerable nations and the world's largest emitters. The largest greenhouse gas emitters—the United States, the European Union, China, India, Japan, Canada, and Russia—are responsible for over 70% of global emissions annually.[184] Other nations have little capacity for self-protection and are entirely dependent on the decisions of the largest emitters to mitigate the global growth of emissions. Developing countries in the mid-latitudes, for example, are predicted to experience the worst impacts from drought and desertification.[185] Low-lying developing countries such as Bangladesh and island nations such as the Seychelles, the Bahamas, and the Marshall Islands

180 *See* Rescher, *supra* note 115, at 174–75 (explaining that triage decisions have traditionally been accepted on the battlefield and that a "reasonable code of operating principles" is necessary to guide triage decisions).

181 *See id.* at 173 (describing a physician's dilemma in determining which patients will receive human resources and treatment).

182 *See* CALABRESI & BOBBITT, *supra* note 54, at 145; Rescher, *supra* note 115, at 176 ("[Triage] must be *fair*—it must treat relevantly like cases alike, leaving no room for 'influence' or favoritism, etc.").

183 ADAM SMITH, THE THEORY OF MORAL SENTIMENTS 110 (D.D. Raphael & A.L. Macfie, eds., 1976) (1759) ("We endeavor to examine our own conduct as we imagine any other fair and impartial spectator would examine it."). According to Smith, the justness of a particular social arrangement can be determined in reference to the views of a disinterested person who is not advocating any particular side. Such an impartial spectator need not be culturally similar to the parties dividing a resource. In fact, Smith argues, views of those a "certain distance from us" can help avoid the hold of ingrained culture and practice. *Id.*

184 *See* JOS G. J. OLIVER ET AL., TRENDS IN GLOBAL CO_2 EMISSIONS: 2013 REPORT 8, 14 (2013), *available at* http://www.pbl.nl/en/publications/trends-in-global-co2-emissions-2013-report.

185 *See* Zbigniew W. Kundzewicz et al., *Freshwater Resources and Their Management*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 175, 178, 187 (M.L. Parry et al. eds., 2007), *available at* http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm; Neil Adger et al., *Summary for Policymakers*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 8, 11, 16 (M.L. Parry et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf.

are likely to suffer severely from sea-level rise.[186] Poor nations in general are more vulnerable to climate change because they have fewer resources to adapt to rising temperatures and are far more dependent on subsistence agriculture.[187]

Under this relationship of power and dependence, the largest emitters have global responsibilities. They must reduce their emissions significantly, provide climate change adaptation assistance to poor countries, and consider the interests of vulnerable nations in setting their domestic energy and environmental policies.

The largest emitters can fulfill these responsibilities at relatively modest cost. The IEA has estimated that nations must invest $1 trillion per year in renewable energy—about triple current rates—to maintain an 80% chance of keeping warming to below two degrees Celsius.[188] This amount seems large at first glance. Because of operational savings over time, however, the IEA concluded that an investment program of this magnitude would have net positive returns by 2025 and total returns of $100 trillion to $150 trillion by 2050.[189] The developed world is not putting policies in place to incentivize that scale of investment. Indeed, the United States and Canada, as well as China and India, are locking in fossil fuel-based energy systems that will be in place for three decades or more.[190]

To begin the enormous energy transition that needs to take place, governments will have to bridge the nationalist, short-term thinking that dominates the climate change discourse. Thinking about the problem through a triage framework helps to bring vulnerable countries and populations—and future generations—onto the radar screen of policy

186 *See* Mary-Elena Carr et al., *Sea Level Rise in a Changing Climate: What Do We Know?*, *in* THREATENED ISLAND NATIONS: LEGAL IMPLICATIONS OF RISING SEAS AND A CHANGING CLIMATE 40–54 (Michael B. Gerrard & Gregory E. Wannier eds., 2013); Robert J. Nicholls et al., *Coastal Systems and Low-Lying Areas*, *in* CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 185, at 326, 330–31.

187 As Rob Verchick has explained, even within a single nation, disaster vulnerability can vary widely. Vulnerability is a function not just of a community's physical geography, but also of its social status, the competence of government institutions, and the location and strength of local infrastructure. *See* ROBERT R. M. VERCHICK, FACING CATASTROPHE: ENVIRONMENTAL ACTION FOR A POST-KATRINA WORLD 135–48 (2010); Robert R.M. Verchick, *Disaster Justice: The Geography of Human Capability*, 23 DUKE ENVTL. L. & POL'Y F. 23, 38–41 (2012).

188 INT'L ENERGY AGENCY, ENERGY TECHNOLOGY PERSPECTIVES 2012, EXECUTIVE SUMMARY 1–2 (2012), *available at* http://www.iea.org/Textbase/npsum/ETP2012SUM.pdf.

189 *Id.* at 1. These are undiscounted figures. The discounted return, at a quite high 10% discount rate, is $5 trillion in net savings between now and 2050. *Id.*

190 U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK EXECUTIVE SUMMARY (2014), *available at* http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2014).pdf (noting that U.S. crude oil production surpassed the historic high reached in 1970); U.S. ENERGY INFO. ADMIN., CANADA (2014), *available at* http://www.eia.gov/countries/analysisbriefs/Canada/canada.pdf (forecasting rising Canadian oil production through 2040); U.S. ENERGY INFO. ADMIN., CHINA (2014), *available at* http://www.eia.gov/countries/analysisbriefs/China/China.pdf (forecasting a 50% increase in Chinese coal consumption by 2040); U.S. ENERGY INFO. ADMIN., INDIA (2014), *available at* http://www.eia.gov/countries/analysisbriefs/India/india.pdf (anticipating a doubling of Indian oil demand by 2040).

makers, ending the distancing that tends to marginalize small nations in the political discourse of larger ones. The triage lens also brings into focus the consequences of current emissions patterns: we are treating many nations of the world as expendable—as nations whose territories and populations can be sacrificed to promote the consumptive, fossil fuel-dependent lifestyles of the affluent.

Prime Minister Tony de Brum of the Marshall Islands, which will likely be fully submerged this century by the rising seas, has argued forcefully in favor of protecting the vulnerable in climate change policy:

> The situation we face is as dire and serious as civil war, terrorism and nuclear weapons. The degree of imminence may differ, but they amount to the same thing. Which one of you here is willing to look me in the eye and tell me that the forced relocation of my people, the loss of my homeland and the disappearance of my country is not a matter which lies at the core of international peace and security? Is my country's territorial integrity any less important than yours? Isn't this place, the United Nations, built on the sovereign equality of states? . . . Treating the atmosphere like a Westphalian cake where we can haggle over the size of each country's slice is wrong. Negotiating to get the best deal for our country over the interests of others is downright irresponsible.[191]

Many realist international relations scholars would likely reject the core of Prime Minister de Brum's argument, contending that a sovereign nation's sole obligation is to maximize the welfare of its own citizens, and its sole responsibility in an international negotiation is to get the best deal for itself.[192] Posner and Weisbach, for example, take the position that because reducing emissions is likely to be costly for the United States, it should not sign any climate change treaty unless the poor nations of the world pay the United States for its cooperation.[193]

The "take care of our own" argument has little merit, however, when other nations, many in deep poverty, are directly harmed by emissions from the wealthiest nations. Responsibility toward vulnerable countries flows not from altruism or noblesse oblige, but rather from a duty of the high-emitting countries to mitigate their own transnational ecological externalities—a duty recognized in international law.[194] For the United States, the relevant question is not whether climate change policy should primarily benefit Americans rather than non-nationals, but rather, what should the United States do to eliminate, or at least curtail, the transnational externalities of its

191 Tony de Brum, Prime Minister, Republic of the Marshall Islands, Speech Before the U.N. Security Council (Feb. 15, 2013), transcript available at http://www.independentdiplomat.org/debrumspeech.

192 *See* MICHAEL C. WILLIAMS, THE REALIST TRADITION AND THE LIMITS OF INTERNATIONAL RELATIONS 7 (2005); *see also* JACK L. GOLDSMITH & ERIC A. POSNER, THE LIMITS OF INTERNATIONAL LAW 3 (2006).

193 POSNER & WEISBACH, *supra* note 22, at 86.

194 *See, e.g.*, United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, princ. 2, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I) (Aug. 12, 1992), *available at* http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm.

own emissions?[195] As Doug Kysar has explained, U.S. environmental law has frequently struggled with recognizing the needs of "others" that are not part of elite decision-making circles of U.S. lawyers and policy makers, including citizens of other countries and future generations.[196] Kysar advocates a thicker conception of international responsibility, arguing that "law's geography must become more expansive."[197]

C. Distribute Emissions Rights on an Egalitarian Basis

The third implication of climate change triage is that a climate change agreement should allocate emissions rights on a roughly egalitarian basis in which a nation's share of atmospheric space would correspond to its population size. Under such a per capita allocation, the 1,780 billion tons left in the global carbon "budget" could be hypothetically distributed among all people who are projected to live between now and 2050.[198] The actual national allocations would then be calculated by multiplying this figure by population. Once allocated, nations would be free to sell or trade their emissions allocations to others.

Within this egalitarian framework, there are a number of complicated design issues. For instance, population might initially be calculated at some base year, to avoid pro-natalist policies aimed at increasing population to receive greater emissions allocations.[199] Determining precise population figures for many countries is difficult, and population accounting may need to be subject to verification. The per capita allocation could gradually be implemented over two to three decades to smooth the transition from highly unequal status quo.

Although a per capita distribution would be a dramatic change from the status quo use of the atmosphere, some scholars contend that it does not go far enough, claiming that a per capita allocation is unjust because it tolerates, or grandfathers, the excess historic emissions of wealthy individuals and nations.[200] Other scholars contend that equality may demand deviating from a strict per capita share, given different circumstances of different groups. Residents of very cold climates who need to burn fossil fuel for survival, for instance, may deserve a larger allocation of the resource.[201]

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195 *See* AMARTYA SEN, THE IDEA OF JUSTICE 130 (2011) ("We do not live in secluded cocoons of our own. And if the institutions and policies of one country influence lives elsewhere, should not the voices of affected people elsewhere count in some way in determining what is just or unjust in the way a society is organized . . . ?").

196 KYSAR, *supra* note 76, at 123–24, 151.

197 *Id.* at 148.

198 *See infra* text accompanying note 209.

199 *See* Sinden, *supra* note 71, at 311–18 (discussing design considerations for per capita greenhouse gas allocation frameworks).

200 *See, e.g.*, PAUL BAER ET AL., THE GREENHOUSE DEVELOPMENT RIGHTS FRAMEWORK: THE RIGHT TO DEVELOPMENT IN A CLIMATE CONSTRAINED WORLD 26–27, 104 n.6 (rev. 2d ed. 2008).

201 JAMES GARVEY, THE ETHICS OF CLIMATE CHANGE: RIGHT AND WRONG IN A WARMING WORLD 128 (2008) (stating that the average Norwegian might need more "emissions shares" than the average American because of Norway's colder winters).

Henry Shue has argued that we should deviate from strict per capita allocations to prioritize the "subsistence" emissions of the poor over the "luxury" emissions of the already wealthy.[202] Eric Posner and Cass Sunstein, on the other hand, argue that a per capita allocation goes too far. They argue that such an allocation amounts to a massive global redistribution of wealth and is unworkable in practice.[203] Major emitting nations would never agree to it, they argue, and continuing to press this agenda threatens the prospects for a global treaty.[204]

Although implementing egalitarian principles through a climate treaty would be complex and would likely involve some deviation from a strict per capita allocation, the per capita approach nonetheless serves as a kind of moral benchmark. Even if the ideal institutional arrangement cannot be reached, we need not reject arrangements short of the ideal. Instead, progress can be made by adoption of an agreement that moves in the direction of justice.[205] Because the atmosphere is a common heritage of humanity, was previously treated as an undifferentiated commons, and now needs to be allocated somehow, the logical starting point for discussion should be an egalitarian distribution among all claimants.[206]

Given the highly unequal distribution of emissions today, any allocation approaching a per capita distribution would be a step toward just arrangements compared to the status quo. The average American emits about 17.3 tons of carbon dioxide per year, several times more than citizens of some developing countries.[207] The average Indian, for example, emits about 1.6 tons per year, and the average Mexican emits 3.9 tons per year.[208] Assuming a strict, global per capita allocation of the remaining carbon budget applied between now and 2050, each person would have a hypothetical individual allocation of approximately 155 tons of carbon dioxide.[209] The average American would run through that allocation of 155

202 Gardiner, *supra* note 165, at 585 (discussing the merits of this approach).

203 *See* Posner & Sunstein, *supra* note 22, at 1608 (noting that under a per capita allocation, the United States would have "less than 30% of the emissions rights" of India and China and arguing that such an allocation would represent a transfer of wealth "worth hundreds of billions of dollars").

204 *See id. See also* POSNER & WEISBACH, *supra* note 22, at 120 (arguing that it is "unlikely" that a per capita allocation system "will satisfy the demands of the United States").

205 *See* SEN, *supra* note 195, at 9 (critiquing "transcendental" theories of justice and arguing that we should ask the question of "how would justice be advanced?" rather than the question "what would be perfectly just institutions?").

206 *See* Sinden, *supra* note 71, at 319–20 (referring to the default assumption of distributing a common resource in equal shares).

207 OLIVER ET AL., *supra* note 184, at 29 tbl.A1.3 (reporting that U.S. per capita CO_2 emissions are 2.4 times greater than China's 7.2 tons, 10.8 times that of India's 1.6 tons, and 7.5 times greater than Brazil's 2.3 tons).

208 *Id.*

209 Assuming 1,780 billion tons left in the carbon budget through 2050, and approximately 11 billion–12 billion people who will live between now and 2050, the carbon budget on a per capita basis is approximately 155 tons per person. The UN Population Division estimates there will be 9.5 billion people alive in 2050, and there are approximately 2 billion additional people alive now, older than age 45, who will likely die before 2050. *See* US Census Bureau, *World*

tons in about nine years.[210] For the United States, sustainable use of a strict per capita allocation of the carbon budget would require, over the next few decades, 80%–90% reductions in per capita emissions from 2005 levels.[211]

A reduction in greenhouse gas emissions of that scale may seem politically untenable in the United States, but in the not-so-distant past, this scale of reductions was very much on the U.S. political agenda. During the 2008 presidential campaign, Barack Obama and John McCain both called for 80% reductions in greenhouse gas emissions by 2050.[212] In 2009, the House of Representatives passed the Waxman–Markey climate change bill, which provided for 80% emissions reductions below 2005 levels by 2050.[213] The United Kingdom has enacted legislation that requires 80% emissions reductions below 1990 levels by 2050, starting from an earlier baseline than the United States.[214] Moreover, the European Union's per capita emissions are about half those of the United States, suggesting that substantial emissions reductions are feasible while maintaining a high standard of living.[215]

D. Conduct Long-Term Planning for Economic Transition

The fourth major implication of a triage framework for climate change is that nations must conduct long-term planning for the transition to low-carbon economies. This differs from the first principle of climate change triage—recognize shortage conditions—because the planning discussed here

Population by Age and Sex, http://www.census.gov/population/international/data/idb/worldpop.php (last visited Nov. 22, 2014).

210 *See id.*

211 A gradual reduction in per capita emissions in the United States along a trajectory aiming at 90% reductions from the status quo of 17.3 tons of carbon dioxide per American would eventually bring these emissions to approximately 1.7 tons per year, a more sustainable emissions rate through 2050 assuming a 155-ton individual carbon budget. Reductions could occur more slowly if the United States purchased emissions rights from other countries. For a similar calculation of an individual carbon budget through 2050, based on IEA and UN figures, see Shrink That Footprint, *Carbon Targets for Your Footprint*, http://shrinkthatfootprint.com/carbon-targets-for-your-footprint (last visited Nov. 22, 2014) (estimating an individual's sustainable carbon footprint at 2.1 tons of carbon dioxide in 2050, using a per capita allocation and estimates of global population in that year).

212 John M. Broder, *Obama Affirms Climate Change Goals*, N.Y. TIMES, Nov. 18, 2008, http://www.nytimes.com/2008/11/19/us/politics/19climate.html?_r=1& (last visited Nov. 22, 2014).

213 *See* American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 702 (1st Sess. 2009). In a November 2011 poll, the Yale Project on Climate Change Communication found that 66% of Americans would support an international treaty that requires the United States to make 90% cuts in emissions of carbon dioxide by 2050. *See* YALE PROJECT ON CLIMATE CHANGE COMM., CLIMATE CHANGE IN THE AMERICAN MIND: PUBLIC SUPPORT FOR CLIMATE & ENERGY POLICIES IN NOVEMBER 2011, at 6 (2011) *available at* http://www.climatechangecommunication.org/images/files/PolicySupportNovember2011.pdf.

214 *See* Climate Change Act, 2008, c. 27, § 1 (U.K.).

215 *See generally* The World Bank, *Data: CO2 Emissions (metric tons per capita)*, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries/US—EU?display=graph (last visited Nov. 22, 2014) (indicating that U.S. per capita CO_2 emissions are approximately twice that of the European Union).

is about long-term climate governance, rather than the immediate problem of allocating emissions rights under a climate change treaty.

One of the major lessons of traditional triage practice is that triage personnel should not only respond to immediate scarcities, but should also plan to avoid future scarcity. For example, medical personnel may perform admirably in allocating aid after a hurricane, but their work is only partial if they neglect to do long-term planning to ensure that a sufficient amount of aid is stockpiled for the *next* emergency. As many triage experts have noted, long-term triage planning should involve community input and consultation with stakeholders.[216] Communities should determine, for example, how much to spend on preparedness, stockpiling, and emergency response versus other community needs. Planning should involve consultation with vulnerable populations,[217] as well as stakeholder input on the ethical basis for rationing or allocation, so that the public is not first confronted with these hard choices under disaster conditions.[218]

Triage conditions do not emerge out of nowhere. In many triage situations, the conditions of scarcity reflect prior societal decisions on how to value and allocate resources. As Calabresi and Bobbitt observed, "scarcity is not the result of any absolute lack of a resource but rather of the decision by society that it is not prepared to forgo other goods and benefits in a number sufficient to remove the scarcity."[219] In other triage situations, however, the conditions of scarcity may simply reflect mismanagement, ineptitude, and poor planning, as in the governmental response to Hurricane Katrina.[220] By instituting a credible planning process that involves multiple stakeholders, governments and emergency personnel can avoid blundering into these conditions of scarcity.

There has been some advance planning on how to adapt to a warmer world, as governments begin to focus on issues such as hardening of

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216 Hoffman, *supra* note 179, at 1541–42 (advocating predisaster consultation with vulnerable groups including the disabled and the elderly).

217 *Id.* at 1541.

218 Sztajnkrycer et al., *supra* note 109, at 763 ("The time to address or resolve these complex issues is not during or after a disaster, but rather in the preparatory phase. The discussion must be transparent and reflect the cultural, ethical, and moral makeup of the community as a whole."). *See also* Hoffman, *supra* note 179, at 1508 ("Planning before catastrophic events have struck will diminish the need for government agencies to make difficult moral choices in the midst of emergencies.").

219 *See* CALABRESI & BOBBITT, *supra* note 54, at 22.

220 Frank Braio, *Understanding Triage: Three Sorts and Cases, in* PERSPECTIVES ON DEATH AND DYING 18 (Philip A. Pecorino ed., 2002), *available at* http://www2.sunysuffolk.edu/pecorip/scccweb/etexts/deathanddying_text/Understanding%20Triage.pdf (stating that in the "technical, economic, and political decisions of one's community" lay "the socially and historically determined seeds . . . of triage situations." Braio notes that such a deep inquiry into triage necessarily involves studying "one's community's attentiveness and/or blindness, intelligence and/or stupidity, rationality and/or irrationality, responsibility and/or irresponsibility."); *see also* Eli Kintisch, *Levees Came Up Short, Researchers Tell Congress*, SCI., Nov. 11, 2005, at 953 (explaining how the levees protecting New Orleans gave way due to human error and poor planning).

infrastructure and planning for water shortages.[221] But given the closing of the two degree window and the rapid energy and economic transition that needs to take place by 2050, the planning for climate change mitigation has not been adequate for the task ahead. In the United States, Congress and business leaders still have not confronted the scale of the challenge. Because of sophisticated campaigns of climate change denial and a host of psychological factors that lead people to discount long-term risk, millions of Americans have been lulled into a false sense that climate change is not caused by humans and that the coming changes will be benign.[222] As a result, the American public is unprepared to take the needed steps on a national level.[223] The public is also unaccustomed to the degree of international governmental coordination that will be needed to keep warming within two degrees Celsius.

The triage challenge for policy makers in the United States and other nations, therefore, is not just to allocate a limited carbon budget, but also to open far-reaching conversations about changing energy systems, land use, and transportation—conversations about how we should be living and what constitutes a decent life. Governments need to begin to prepare their citizens for the difficult choices ahead, including not only changes in technology, but also changes in lifestyle and behavior. Different values in international relations will be needed to sustain us through the climate change crisis—values like reciprocity, obligation, solidarity, and resilience. As Jed Purdy observes, our long-term response to climate change may involve "changing our ethical vocabulary" entirely.[224]

In climate change law, a triage framework offers a better organizing framework for this long-term planning than the principle of sustainable

221 *See, e.g.*, MARK HERTSGAARD, HOT: LIVING THROUGH THE NEXT FIFTY YEARS ON EARTH 60–62 (2011) (describing adaptation efforts undertaken by the Netherlands, the United Kingdom, and United States municipalities); Alan Feuer, *After Hurricane Sandy, New York Rebuilds for the Future*, N.Y. TIMES, Oct. 25, 2014, http://www.nytimes.com/2014/10/26/nyregion/after-hurricane-sandy-new-york-rebuilds-for-the-future.html?_r=0 (last visited Nov. 22, 2014) (describing New York City's efforts to protect critical infrastructure from rising seas and storm surge).

222 *See* Anthony Leiserowitz, *Communicating the Risks of Global Warming: American Risk Perceptions, Affective Images, and Interpretive Communities*, *in* CREATING A CLIMATE FOR CHANGE: COMMUNICATING CLIMATE CHANGE AND FACILITATING SOCIAL CHANGE 44, 47–53 (S. Moser & L. Dilling eds., 2007) (discussing climate change and risk perception, affective imagery, and interpretive communities); Stephan Lewandowsky et al., *NASA Faked the Moon Landing—Therefore, (Climate) Science is a Hoax: An Anatomy of the Motivated Rejection of Science*, 24 PSYCHOL. SCI. 622, 622 (2013) (discussing the "manufacture of doubt" by climate change skeptics); Anita Pugliese & Julie Ray, *Fewer Americans, Europeans View Global Warming as a Threat*, GALLUP, Apr. 20, 2011, http://www.gallup.com/poll/147203/fewer-americans-europeans-view-global-warming-threat.aspx (last visited Nov. 22, 2014); *see also* AM. PSYCHOLOGICAL ASS'N, PSYCHOLOGY & GLOBAL CLIMATE CHANGE: ADDRESSING A MULTIFACETED PHENOMENON AND SET OF CHALLENGES 6 (2010) (analyzing the psychology of climate change); CTR. FOR RESEARCH ON ENVTL. DECISIONS, THE PSYCHOLOGY OF CLIMATE CHANGE COMMUNICATION: A GUIDE FOR SCIENTISTS, JOURNALISTS, EDUCATORS, POLITICAL AIDES, AND THE INTERESTED PUBLIC 1 (2009) (noting that Americans are not very concerned about climate change).

223 *See generally* Laurence L. Delina & Mark Diesendorf, *Is Wartime Mobilisation a Suitable Policy Model for Rapid National Climate Mitigation?*, 58 ENERGY POL'Y 371, 371 (2013).

224 Purdy, *supra* note 153, at 918.

development, the reigning paradigm to date for balancing development and environmental goals.

Sustainable development is a notoriously broad and undefined concept and it has been described and interpreted in innumerable ways.[225] The core idea is that economic development needs to be harmonized with, and should not undermine, environmental and social goals.[226] Because sustainable development is such a vague concept, however, its meaning has become malleable, like shifting sands.[227] Indeed, many politicians and business leaders have interpreted sustainable development to mean that rapid economic growth should be prioritized, on the grounds that richer countries will ultimately invest more in environmental protection.[228] There is little consensus on the goal that sustainable development aspires to, the resources that need be conserved to achieve sustainable development, and the particular policy changes that are needed to achieve sustainable development. As a practical matter, thirty years of international negotiations and national policymaking under the rubric of sustainable development have not slowed the rise in greenhouse gas emissions. By any measure, global development since the 1990s has not been sustainable.[229]

With its focus on harmonization of goals, the sustainable development paradigm has lulled people into a false optimism that economic growth and ecological preservation can reinforce each other, and do so indefinitely. A more honest evaluation of our situation would recognize that there needs to be some agreement—negotiated through a political process—on what steps need to be taken to preserve specific scarce and irreplaceable resources. In other words, there needs to be a triage planning process.

Climate change triage, far more than the broad concept of sustainable development, focuses attention on specific ecological resources that need to be preserved. Because triage is premised on conserving and allocating scarce resources, it highlights, in a way that sustainable development does not, that there are limits to the growth in the scale of human activities. The science is clear that we need to achieve certain numeric targets for annual global emissions and for atmospheric concentrations of greenhouse gases, and a triage framework uses that science as its underlying metric for

225 *See* DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 172 (4th ed. 2011).

226 *See* Robin Kundis Craig & Melinda Harm Benson, *Replacing Sustainability*, 46 AKRON L. REV. 841, 846 (2013) (stating that, in theory, "sustainability leads to laws and policies that limit human activity in and consumption of the natural environment to levels that can be continued on a long-term basis").

227 *See* Melissa Powers, *Making Sustainability Count*, 43 ENVTL. L. REP. 10,345, 10,345 (2013) ("[T]he term sustainability has become so ubiquitous and amorphous that it seems to have no common meaning.").

228 The meaning of sustainable development has shifted in the last three decades, from an emphasis on environmental protection to an emphasis on economic growth. Donald K. Anton, *The "Thirty-Percent Solution" and the Future of International Environmental Law*, 10 SANTA CLARA J. INT'L L. 209, 217 (2012) (tracing the history of meanings and interpretations of sustainable development).

229 *See id.* at 217.

planning. Sustainable development, in contrast, lacks any yardstick for measuring success.

By failing to specify its ecological aims or the process that needs to be implemented to avert catastrophic warming, sustainable development has become increasingly irrelevant as an organizing concept for the international law of climate change. A successor paradigm is needed. Viewing the climate crisis through the lens of triage provides an alternative framework that highlights, rather than obscures, the political, technological, and ethical choices we face.

V. CONCLUSION

Climate change has long been recognized as a problem of pollution of the global commons. But the features of the problem that resemble triage, such as a quantified and limited carbon budget, complicated zero-sum allocation dilemmas, and increasingly severe climate change impacts, have come into view more recently. As this Article has shown, the ethical principles that have governed traditional triage contexts help to illuminate how to structure a fair and effective global climate change regime. While the triage lens cannot dictate every aspect of a climate change treaty, it both highlights the core allocation dilemma at the heart of treaty negotiations and points the way toward just solutions.

Triage, to be sure, can be interpreted as pessimistic and defeatist. We often use the word triage when something has gone horribly wrong. People use the word in casual conversation when they feel overwhelmed with competing priorities. In the context of climate change, triage reflects the reality we face. A triage framework for climate change mitigation is not an abandonment of justice. It instead provides an organizing framework for finding just solutions within the new reality of scarcity and constraint.