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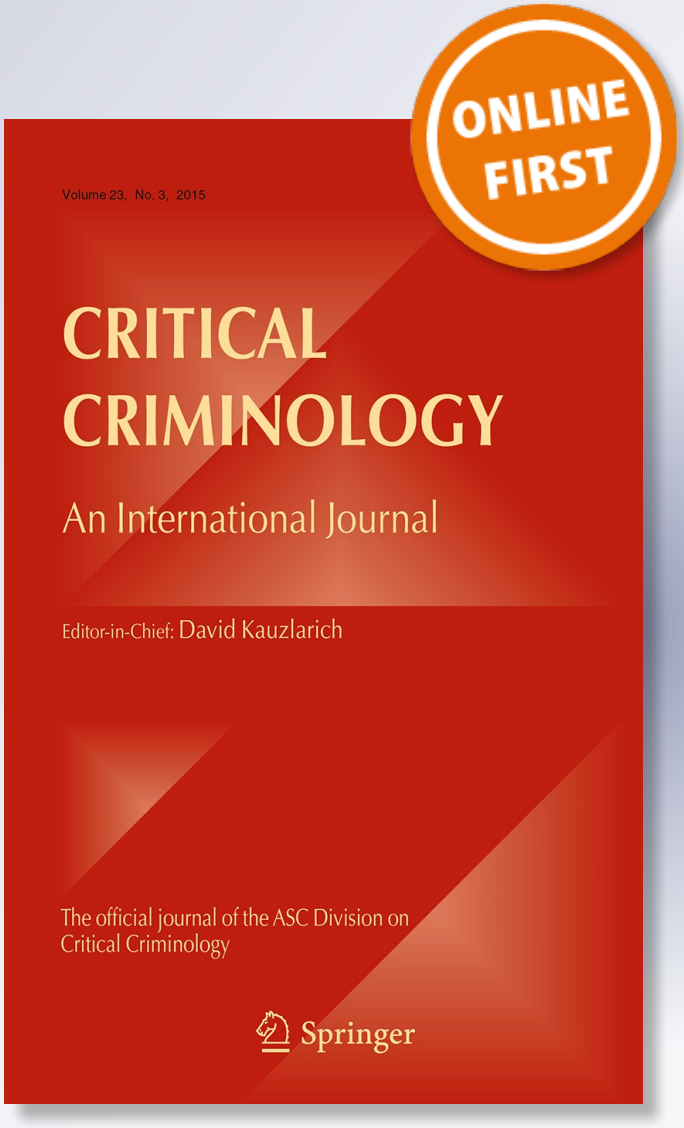

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Abstract This paper develops principles for responding to climate change from the perspective of John Rawls' writings on justice. Rawls (1971) argues that principles of justice, in particular those for assigning basic rights and duties of social cooperation, should be selected from an "original position" as though by (imaginary) agents who do not know their position in society. This paper adapts Rawls' notion of original position and applies it to the international context required to address climate change. From this perspective it is argued the agents would endorse the current consensus not to allow global warming to exceed 2 °C. They would also find that rich industrial countries, having contributed disproportionately to the causes of climate change, should reduce their emissions faster than developing countries and they should help developing countries to adopt non-carbon energy sources, to adapt to climate change, and to recover from its harms. The paper proposes new institutions needed to carry out these obligations efficiently and effectively.

An Original Position for Climate Change

Climate change is the greatest social justice challenge arising in the twenty-first century. John Rawls is the canonical political philosopher of the second half of the twentieth century. This paper considers the challenge of climate change through the prism of Rawls' ideas about justice. Rawls argues that to identify principles of justice to organize the basic rights and duties of social cooperation, we should imagine the choice is to be made by representatives who do not know who in society they represent—if they are rich or poor, male or female, black or white, gay or straight. From this perspective, which Rawls dubs "the original position," he argues the representatives would select principles that maximize liberties consistent with equal liberties for all and that require economic inequalities to

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serve the long term interests of society's least well off members (Rawls 1971). He does not lay out specifics such as a schedule of income taxes, but he offers principles to identify an income tax framework, along with other social institutions that could advance social justice.

In his foundational book, *A Theory of Justice* (1971), Rawls identifies principles of justice for modern, reasonably well off democracies. He focuses on principles for a nation state because in the present era this is the basic unit of social cooperation. Neither sub-national nor international institutions have regulatory power to match national parliaments and high courts. When Rawls addresses principles for relations between countries in *The Law of Peoples* (1999), he imagines a second original position no longer made up of representatives of individuals like you or me, but now of liberal peoples initially making agreements with representatives of other liberal peoples.[1] This is the discussion to which the principles he proposes for a law of peoples most directly apply. Liberal peoples need principles to organize relations with other peoples in ways that protect their interests and promote shared values. To identify fair principles to govern international relations, one imagines the choice is to be made by representatives who do not know if the liberal democracy they represent is rich or poor, powerful or weak, well endowed with natural resources or relatively barren.

For the problem of social justice that climate change presents—to identify principles for organizing rights and duties and associated institutions to address the challenges arising from climate change—we need a third original position. Anthropogenic climate change is caused mainly by the burning of fossil fuels to generate power for productive activities. This releases carbon dioxide and other greenhouse gasses into the atmosphere, and, as the name indicates, these gasses cause the atmosphere to retain more heat from the sun. This warming alters weather patterns, increasing the intensity of extreme weather events and causing droughts and floods. Global warming melts glaciers and other ice, the oceans absorb some of the increased atmospheric carbon dioxide and become more acidic, greater warmth expands ocean waters, and sea levels rise. Some greenhouse gasses remain in the atmosphere for extended periods, up to thousands of years.

We need a third original position because representatives of peoples are not in the appropriate position to represent, in particular, many of the victims of climate change. Burning fossil fuels is central to the core productive activities of most societies but it imposes harms on individuals and peoples around the world and far into the future. If fossil fuel-based production continues unchecked it will lead to ecological catastrophe, but at what atmospheric concentration must greenhouse gas emissions be contained, and how should the freedom to emit be regulated? How should the transition to non-fossil fuel based production be organized? How should societies adapt to warmer temperatures, rising sea levels, more extreme weather, and other consequences of climate change? How should those who suffer severe harm from these consequences be supported? How and to what extent should those who benefit from greenhouse gas emissions contribute to the costs of adaptation and of addressing the needs of climate change victims? The original position from *Theory*, with representatives of citizens from a single country working out principles for its constitution, is clearly inadequate to address these questions. But the original position from *Law of Peoples* also does not work. Its principles are to be selected from the perspective of national representatives because the law of peoples is to govern relations

[1] "Liberal peoples have three basic features: a reasonably just constitutional democratic government that serves their fundamental interests; citizens united by what Mill called 'common sympathies;' and, finally, a moral nature" (Rawls 1999, p. 23).

between peoples as represented by their governments. For problems arising from climate change, however, national representation will often be inadequate. It is appropriate to consider forms of production at the national level, as national governments structure productive institutions and may be relatively effective proponents of productive interests, but we cannot expect national governments adequately to represent the interests of the victims of climate change. Even in liberal democracies the poor and marginalized are often poorly represented by their governments. In the significantly authoritarian states, and sometimes failing states, in which many of those most severely harmed by climate change are likely to be found, now and in the foreseeable future, we certainly cannot expect that climate victims' interests would be appropriately represented by national representatives.

To establish principles for addressing climate change we need an original position with representatives of individuals. The representatives are to select principles that promote the interests of the person they represent, but besides not knowing whether they are rich or poor, or male or female, they also do not know in what country they reside, or, to address justice between generations, in what period of time, from now through the indefinite future. The representatives know that the person they represent is a citizen with a government, and sometimes it will be appropriate for the government to represent the person's interests, but they understand that government characteristics span the spectrum we actually observe.

It is part of Rawls' legacy that this procedure can be expected to yield principles that accord with social justice. It may be helpful to comment on the role of such principles in actual real-world politics, especially since we must anticipate that real-world politics will often be dominated by established interests. Established interests have certainly succeeded up to now in significantly blocking action on climate change. Nevertheless, we must aim for social justice. Justice is, as Rawls (1971, p. 3) says, the first virtue of social institutions. With so much at stake from climate change it is particularly important to establish just institutions here and now, and climate justice may turn out to be a keystone for social justice in other arenas. Rawlsian analysis aims to offer a perspective from which one can work for justice and a frame of reference for assessing contemporary affairs.

Climate Change as a Problem of Social Justice

Climate change is an instance of an externality—when one agent's activities have costs or benefits for other agents that are not reflected in the prices the first agent faces—a category long familiar to economists and political scientists. In this case, however, activities that generate the externality are central to the production that has driven most economic growth over the last century and a half, and that continue to be central to development efforts in most low- and middle-income countries, but now these activities need to be greatly reduced. The central problems of justice that climate change raises are:

1. How much more greenhouse gasses can be emitted?
2. Who has the right to emit how much?
3. What do greenhouse gas emitters, and those who benefit from these emissions, owe to those who are harmed by them, in terms of:
    a. assistance in adopting energy sources that do not emit carbon dioxide,
    b. assistance in adapting to climate change, and
    c. assistance in recovering from harms caused by climate change?
4. How should the implementation of answers to 1, 2 and 3 be organized?

Agents in our third original position are to identify principles for answering these questions knowing that they represent members of current and future world populations, but now knowing whom they represent.

Over the 800,000 years prior to the industrial revolution, carbon dioxide (CO_2) concentrations in the atmosphere ranged from 180 to 300 parts per million (ppm). Global temperatures loosely tracked CO_2 concentrations, with ice ages in periods close to 180 ppm. Over the last 150 years the release of about 1900 billion tonnes of CO_2 has increased concentrations by more than 100 ppm to about 400 ppm (UNEP 2014, p. 9; IPCC 2013). Adding emissions of other greenhouse gasses equivalent to about 800 billion tonnes of CO_2, the warming effect is equivalent to about 445 ppm CO_2 (Stern 2014, p. 402). Since it is the overall effect that is relevant, greenhouse gas concentrations are sometimes expressed as carbon dioxide equivalents (CO_2e). The increase in greenhouse gas concentrations has caused average global temperatures to rise by almost 1 °C compared to before the industrial revolution. There is, however, significant momentum in rates of CO_2 emissions. Many of their sources, such as power plants, have long economic lifetimes, and, with the technology prevailing in low- and middle-income countries (where most of the present increase occurs), economic growth in these countries usually involves burning increasing quantities of fossil fuels and hence increasing CO_2 emissions. Due to interactions with oceans (which have absorbed about 20 times more heat than the atmosphere in the last 50 years), there is also momentum in the warming caused by a given atmospheric concentration of CO_2 (in the present increasing trajectory): the earth may be "committed" to half a degree of additional warming even if we could halt emissions today (Union of Concerned Scientists 2015).

The selection of principles to answer our first question, how much more greenhouse gasses can be emitted, is dominated by uncertain but potentially catastrophic effects of global warming for future generations. We can certainly expect to see hotter summers, more extreme storms, rising sea levels and floods, harm to corals and other sea life from increasing acidification of the oceans, and increasingly erratic weather. The effects of these developments are generally more harmful to societies that are poorer, and thus more vulnerable, and in places that are already hotter, such as close to the equator. Nordhaus (2013, p. 140), the leading American economist studying climate change, argues that industrial societies can handle such changes anticipated for the present century at manageable economic costs. International discussions of scientists and national leaders, however, have concluded that temperature increases above 2 °C are unacceptably dangerous. Beyond this point there is increasing likelihood that warming may set in motion positive feedback effects, such as a collapse of the Amazon rainforest (releasing carbon stored in the trees), changing the structure of the oceans and their absorptive capacity, or the emission of vast quantities of methane (another greenhouse gas) from thawing permafrost, accelerating warming even without further human emissions. Beyond 2 °C there is also greater likelihood of crossing thresholds not yet known to science that lead to catastrophic effects, such as an accelerated collapse of massive ice sheets in Greenland or the west Antarctic that could raise sea levels by more than 8 m, a change in the route of the Gulf Stream that would lower temperatures in northern Europe by perhaps 10 °C and raise temperatures in West Africa, or a collapse of the South Asian monsoon. Any of these could cause hundreds of millions of climate refugees, and some could cause tens of millions of deaths. Widespread extinctions of species in sea and on land could also have unanticipated yet catastrophic effects. Many of these predicted effects are already evident now.

Agents in the original position, knowing they could represent someone in a generation subject to these effects, would be particularly concerned to avoid such risks, particularly if

the costs are manageable. Nordhaus (2013, pp. 177–178) estimates the cost of limiting warming to 2 °C at 1.5 % of world income if done efficiently with full participation (while pointing out that both of these conditions are problematic). We should also note that although 2 °C warming, expected with two-thirds certainty at 450 ppm CO_2, is the accepted target, some scientists believe that thresholds will be crossed and catastrophic effects set in motion at this or even lower temperatures, with lower atmospheric concentrations of greenhouse gasses. Yet at this writing, in early 2015, with global emissions continuing to increase and with generally weak national commitments to reductions, even the 2 °C target appears optimistic. Agents in the original position take it that targets must be agreed through negotiations. They are not prepared to endorse a global Leviathan, nor could they endorse the high cost of draconian, "cold turkey" cuts in carbon emissions, and they see geo-engineering "solutions," at least for now, as too dangerous and/or uncertain. Hence the original position leads us to (an instance of) what is known in the literature as the *precautionary principle*. Social justice calls us to avoid potentially catastrophic harms to large numbers if this can be done at a manageable cost (and within the broader bounds of justice), and this points to endorsing the 2 °C consensus target.

Clearly this conclusion involves judgments of institutional plausibility. At present it has not been demonstrated that governments can agree and actually implement a 2 °C target … but it seems attainable. By contrast, a more ambitious 1.5 °C target, while still physically possible, appears politically and institutionally farfetched. The 2 °C target also rests on many scientific projections and other findings that involve significant uncertainty, and new science could certainly surprise us. In the current state of knowledge, however, this target appears to accord with Rawlsian principles of justice.

This gives us the answer to Question 1. Based on earth's pre-industrial atmosphere and climate, a 2 °C warming target implies a total "budget" for humanity's carbon dioxide emissions (and equivalent in other greenhouse gasses) of 3670 billion tonnes. So far humanity has "spent" about 2700 billion tonnes through industrialization and other activities, leaving about 1000 for the current generation and our immediate descendants (UNEP 2014, p. xiv).

From the original position the first part of the answer to our second question, who has the right to emit how much, seems fairly clear. In the long run, emission rights should be equal for countries on a per capita basis. Greenhouse gas emissions are a factor in productive possibilities. At present arrangements for production and their integration with other social arrangements is largely organized at the national level. Agents in the original position do not know the country of the person they represent; there is no reason they would accept less than equal emission rights in the long run. High current emissions certainly shouldn't give rights to a permanent advantage, and while low current emissions based on low development may give some right to catch up, and even more (see below) to certain forms of assistance, it seems unreasonable for them also to give rights to a permanent advantage To stay within the 2 °C target we need to reduce annual emissions from 49 billion tonnes in 2010 to 22 billion tonnes by 2050 (UNEP 2014, p. xvi). Assuming today's world population of 7.3 billion grows (as expected) to 9 billion by 2050 this implies 3 tonnes annual CO_2e emissions per capita. Then we need to continue worldwide reductions to the point of carbon neutrality late in the century.

Why shouldn't emission rights be for consumption, based on the CO_2e generated in producing and transporting a good, rather than production? Moving to equal per capita consumption would be more difficult for rich countries than moving to equal per capita production, so it would certainly be harder to get an international agreement to equal consumption rights, but I don't think this is decisive. More important is that climate change

is driven by greenhouse gas emissions; a focus on production is on the immediate cause. Also, our role as producers is more central to our identity than our role as consumers. As individuals and as societies we are defined more by what we produce and how than by what we consume, and this is also relevant. When people, say, in China, produce goods for consumers, say, in the U.S., it is China that gets most of the jobs and economic expansion.

While agents in the original position would find no other basis than equality (on a per capita basis) for long term emissions, short term pathways would be influenced by cumulative historic emissions, technological capacity (for one's own country and to help other countries), and the need to catch up in economic development. It turns out that in the process of industrializing, advanced countries like Britain, Germany, and USA contributed significantly to the greenhouse gasses that have accumulated in the earth's atmosphere. They were not culpable as long as the effects of carbon pollution were not understood, but a condition of their present wealth is that now other countries must not burn as much fossil fuels as they did. Agents in the original position would appreciate that poor countries need to develop their economies, and, in the present state of technology, limiting the burning of fossil fuels is a serious economic constraint. As a consequence of industrialized countries' historic responsibility for the greenhouse gasses that have accumulated in the atmosphere, the agents see that it is fair for developing countries to take more time to reach equal per capita emissions, particularly those that already exceed the long term target. Given that a condition of industrialized countries' wealth is that they are also technologically advanced, and given the urgency for developing countries to move efficiently to low-carbon technologies, industrialized countries would also be found to have an obligation to assist developing countries to adopt these technologies.

Not only have industrialized countries generally contributed more to accumulated greenhouse gasses than poorer countries, their current emissions, in most cases, are also higher. The broad outlines of the science of climate change were certainly widely understood by the time of the 1992 summit of the United Nations Conference on Climate and Development in Rio de Janeiro, where the US and 153 other countries committed to stabilize greenhouse gas emissions at a level that would prevent dangerous interference with the climate system. Failures to rein in greenhouse gas emissions since then introduce an element of culpability. Agents in the original position would note that they could represent people who live in low-income countries, now and in coming years, who are and will be subject to the greatest harms from climate change, and who are generally in a weaker position to prepare for and recover from these harms. Most of the 400,000 or so people who are currently dying each year due to climate change live in sub-Saharan Africa and other poor regions, and this death rate is expected to increase (DARA 2012, p. 17). Africa is also home to millions of subsistence and near-subsistence farmers in regions where warming and weather changes will reduce agricultural productivity. Residents on several island nations are likely to have to abandon their homelands as sea levels rise, and many who live in coastal cities and who farm in river deltas are also likely to join the ranks of climate refugees.

We would have droughts and floods without climate change; we cannot divide individual extreme weather events into those caused and not caused by climate change. Climate change is increasing the frequency and intensity of these events, however, and countries that emit disproportionately high levels of greenhouse gasses bear responsibility for their harms. Agents in the original position would see that industrialized countries not only bear responsibility but also have the capacity to address those harms, while the most affected countries generally bear less responsibility and also have less capacity. Hence the agents would see that industrialized countries have an obligation to help those affected countries to adapt to climate change and to recover from the harms. We have noted,

however, that agents in the original position represent individuals, not countries. Some of the people they represent live in countries with governments that lack the will and/or capacity to adapt and effectively to support recovery from harms due to climate change, with leaders who may be inclined to use climate change resources to promote their own narrow interests. In such cases the agents would find the obligation to be from the industrialized country to the vulnerable individual. Of course each of us as individuals have an obligation to protect ourselves, and governments should protect their citizens. So these are shared obligations.

Implementing Responses to Climate Change

We have seen, in answer to Question 3, that from the original position, countries that have grown wealthy from what turn out to be disproportionate contributions to the accumulation of greenhouse gasses in our atmosphere, and individuals and countries that continue and benefit from disproportionate emissions, are found to have obligations to assist poor low-carbon emitters and those who are particularly harmed by climate change to adopt non-carbon emitting energy sources, to adapt to climate change, and to recover from its harms. The scope of these obligations would be found in the original position to correspond to needs, degrees of responsibility, and capacity. Along with the idea of moving to equal per capita emissions low enough to keep warming below 2 °C, these are the main results from considering the ethics of climate change from a Rawlsian perspective.[2]

It is clear that climate change places unprecedented demands on national and international institutions. Established institutions are not equipped to carry out these obligations effectively. However the form of institutions that can be expected to carry out the requirements of justice is also a matter of justice.

The main problem is that the people who are most vulnerable to harms from climate change generally lack the political strength and representation to defend their interests effectively. Nor can their governments be expected to represent them; rather their governments may be dominated by interests that would divert climate change resources or bend their allocation to their own purposes. Industrialized countries' obligation to help developing countries to adopt non-carbon energy is not at issue here; although it involves considerations of efficiency it is appropriately a matter for governments. Efforts to adapt to climate change and to support recovery from its harms, however, are more vulnerable to distortion.

Obligations to support adaptation and recovery are effectively from governments to persons. Agents in the original position recognize that resources generated internationally to address adaptation and recovery will be inadequate to address all the needs. They see that the right to support from these resources is based on need—due to actual or anticipated harms from climate change and taking account of other resources that may be available. This is because, since the agents do not know whom they may represent, they would want to do as much as possible to maintain each person's essential well-being.[3]

[2] Note that petroleum corporations and other firms do not come into the discussion. They are subject to government regulation; if they undermine or oppose movement toward a just solution, as may be in their financial interest, this would raise other kinds of questions of justice.

[3] Allocation of resources on this principle generates an incentive for governments to "play dead," that is, to present themselves as less capable and their populations as more needy than they actually are, so this incentive would have to be taken into account.

The institutional challenge, then, is to allocate and employ internationally sourced resources efficiently to address the greatest needs in adapting to and recovering from the effects of climate change. Adaptation includes such tasks as developing and promoting adoption of food grains (or farming systems) that are resistant to heat, drought, and salt water, improving infrastructure such as roads and ports, and resettling populations whose homes are particularly vulnerable, such as from low lying islands and flood plains. For very poor populations in regions heavily stressed by climate change there may be no clear line between adaptation and general development. Individuals and households need the capacity and resources to prepare for and respond to greater extremes of weather. For those already on the edge of survival, this may mean securing basic health, education, and economic security. Adaptation also includes addressing disagreements over the use of declining water resources so they are resolved fairly (or not unfairly) and so they do not break down into armed conflict.

Despite adaptation climate disasters will strike, and, should adaptation be weak, disasters will cause greater harm. We are familiar with humanitarian efforts to support relief from climate disasters. Of course we already see more severe droughts and floods, and we know these will intensify. Water scarcity already contributes to armed conflicts and is likely to continue to do so; "recovery" includes recovering from these. Given that climate change will often be only one factor in armed conflicts, and that droughts and floods may not be entirely due to climate change, at what point should climate change resources be allocated to support recovery from their harms? From the perspective of the original position it is clear that, once again, the determining factor is need. Since agents in the original position know they could represent someone who is among the victims, their priority would be to secure that person's essential well-being, not to determine the extent to which the harm they suffered was caused by climate change.

Although the tasks involved in adaptation and recovery are not unfamiliar, we cannot be confident that established institutions can carry them out efficiently and effectively. Existing organizations that might be involved include, besides governments, the multilateral, bilateral, and non-profit relief and development agencies and their associates. These include, *inter alia*, the World Bank, the United Nations Development Programme, the World Food Programme, and the Asian Development Bank; the US Agency for International Development, Britain's Department for International Development, and France's Department for International Cooperation; and the Danish Refugee Council, CARE International, BRAC, Doctors Without Borders, and a host of local NGOs. While these organizations are often more bureaucratically competent than some low-income country governments, we cannot trust that they will promote the interests of climate change's actual and potential victims efficiently and effectively. They have evolved to promote their own organizational interests, and, for the multilateral and bilateral agencies, the interests of the governments they represent, as well as the interests of the people it is their mission to serve (Clements 1999, 2013; Clements et al. 2008).

How can internationally sourced resources for adaptation and recovery be used efficiently to support the interests of the victims of climate change? First, resource allocation must be independent of the political interests of countries that provide the resources. We should recall that they provide these resources under obligation arising from their contributions to harms. Then we need to acknowledge that even though there is an enormous literature on factors that have contributed to the success of individual relief and development programs, we do not possess confident knowledge of how resources for adaptation and recovery can best be organized to promote victims' interests efficiently and effectively.

The challenge is to establish a base of knowledge and an incentive environment that sustains learning and organizational reform towards better resource allocation.

While there is some overlap between the tasks involved in adaptation and recovery, they are different enough in the challenges they present, the organization that may be effective, and the forms of learning they involve that they should be organized separately. In each case, however, the universe in which they need to optimize the cost effectiveness of their resource allocation is defined by the worldwide population of their respective victims. So there should be one funding agency for adaptation and another for recovery. Their task would be to maximize the effectiveness of their support for, respectively, adaptation and recovery, in terms of the long term wellbeing of their respective populations (regardless of their country of residence). They would fund operations organized and carried out by local and national governments, national and international NGOs, and multilateral and bilateral aid organizations according to each one's capacity to deliver results.

How would the incentives facing the Adaptation Fund and the Recovery Fund be aligned with those of the people they are intended to serve? Since these people are largely poor and politically weak, they are not a position to defend their own interests (although programs could be organized in ways that build this capacity). Their governments cannot be expected a priori to represent their interests effectively (although programs could strengthen this representation). In this context the unique basis for representing victims' interests is a reliable assessment of the impact of each funded program on their actual and expected wellbeing, and of how this impact was achieved in terms of the program's strategic context, design and implementation. This would provide the basis for learning and accountability for the two funds. Since the Adaptation and Recovery Funds need to maximize their impacts from their given budgets, each program should be evaluated for its impacts and cost effectiveness.

One challenge is to sustain a unified, strategically engaged view of the challenges presented in adapting to climate change and recovering from its effects, of the range of efforts to address these challenges, and of their respective cost-effectiveness. Another is to ensure that resource allocation within each Fund remains focused on the wellbeing of their respective populations of victims, to defend against tendencies to promote the organizational interests of implementing agencies or the political interests of donor or host country governments. It turns out that responding to the analytic challenge of maintaining a strategic view of the tasks at hand also provides a basis for responding to the political challenge of defending the focus on victims' interests. The strategic view can be maintained by evaluating each program in terms of its impacts and cost effectiveness within its strategic context. But this is technically demanding; it lies beyond the boundaries of existing knowledge. It should be the task of an evaluation association to work out methodologies and standards, to train a cadre of evaluators, and, through licensing, to uphold the quality of evaluations (Clements 2008).[4] However the *analytic* accomplishment that good, strategically engaged evaluations would represent, would also serve the *political* purpose of defending programs against competing interests. Once it is demonstrated that resources are used efficiently to promote victims' interests, if they also turn out to support particular organizational and political interests (as resource allocations tend to do) it does not present an ethical problem.

[4] Loosely along the lines of the International Accounting Standards Board, responsible for developing International Financial Reporting Standards and promoting the use and application of these standards. While existing accounting authorities have proven less than completely reliable, the institutional challenges in building a reliable authority are less than those in securing effective accountability from populations of victims.

Collectively, an Adaptation Fund, a Recovery Fund, and an Adaptation and Recovery Evaluation Association provide the means to implement the more institutionally challenging aspects of the response to climate change. It has often been noted that moving to renewable energy has the added benefits of reducing pollution and enhancing self-sufficiency and local control. Some libertarians and conservatives are alarmed by the bureaucracy and the sheer increased governance involved in organizing the reduction of carbon emissions and adapting to and recovering from climate change. The nature of climate change as a world-wide threat is such that effective responses must indeed strengthen global governance. If, however, these responses are implemented with institutional designs that promote learning and accountability, there are side benefits here as well. In fact, if adaptation and recovery efforts are routinely evaluated for their impacts and cost effectiveness, this will strengthen local governance and the organizational capacities of implementing organizations in other work as well, beyond responses to climate change.

Conclusion

This paper analyzes how we should respond to the unprecedented challenges presented by climate change from the ethical perspective developed by John Rawls. He calls his theory "justice as fairness," emphasizing that the original position, where agents do not know their position in society, establishes a perspective for making choices that are fair. We have modified the original position slightly to address the particular structure of the problems of social justice arising from climate change. From the resulting perspective we endorse the current consensus, that global warming must be kept from exceeding 2 °C. We find that in the long run national greenhouse gas emissions should be equalized on a per capita basis, around 3 tonnes of CO_2e for 2050. However high-income industrialized countries should transition to a level for equal emissions sooner, enhancing the opportunity for low-income countries to industrialize. Also, advanced industrial countries should help low-income countries to adopt energy efficient technologies, and they should provide resources to help the people most vulnerable to the effects of climate change to adapt to and to recover from its various harms.

Unfortunately, based on current capacities of existing organizations, we cannot expect resources for adaptation and recovery to be used efficiently and effectively. The people most vulnerable to the effects of climate change are generally poor and disempowered, lacking political voice. They have not been in a position to represent their interests in organizations that aim to support them. Also, there are unprecedented technical challenges in supporting global adaptation and recovery. To develop coherent approaches to these challenges we should establish Adaptation and Recovery Funds. To support learning within these Funds and to hold them and their implementing agencies accountable we should establish an Adaptation and Recovery Evaluation Association. Such an association, through its independent and strategically engaged evaluations for cost effectiveness, would also represent the interests of the victims of climate change.

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