Introduction

Most books have many aims. This one is no different. One central aim of this book is to explain the important ways in which the problems of climate change and global poverty are intertwined. The intertwining that interests me is moral. If we care about poverty, as we should, we need to be concerned about climate change. But also, addressing climate change needs to be attentive to poverty. Although the intertwining is moral, it exists because of complex causal interactions, such as those between the engines of human development and the workings of the climate system. There is no understanding of what to do about climate change without understanding these.

As I first wrote this the circumstances in Zambia served as an example. From its base at the bottom of the gorge to its upper rim, the handsome arched wall of the Kariba Dam stands 128 meter (420 feet) high and 579 meters (1,900 feet) wide. The dam construction was a marvel of engineering, construction, social planning, and environmental transformation by the administrators of Northern and Southern Rhodesia (present-day Zambia and Zimbabwe) and Nyasaland (present-day Malawi). A feat of colonial will, the construction required the forced relocation of more than 50,000 Batonga people living in the gorge, the stripping and burning of the valley vegetation, and the transfer of some 6,000 elephants, antelopes, rhinos, leopards, zebras, and assorted birds and reptiles in an effort with the grandiose name "Operation Noah." More than a million cubic meters of concrete were poured, and $480 million was spent. When the construction ended and the sluice gates closed, the immense Lake Kariba slowly filled the gorge. After five

years, the wall holding back the mighty Zambezi River contained the world's largest man-made lake, extending 220 kilometers (170 miles) in length.

The dam promised electricity and modernity to the people of the region. Power to the people, of a sort. Independence, however, would not come to Zambia for several more years. Surely a democratic idea, power to the people is also an ideal of human development. There is a well-established correlation between improvements in human development and the wide dissemination of modern forms of energy, in particular electricity and clean cooking fuels.

Massive hydroelectric projects that run roughshod over local people and ecology are hardly commendable, but electrification that puts an end to energy poverty is. Home electrification extends the time during which children can do homework, facilitates the use of computers and internet technology, allows clean cooking that reduces respiratory illness caused by indoor pollution. Streetlights provide a measure of safety for women and girls at night. And the grid powers schools, hospitals, and factories.

In stressing the importance of electrification for advancing the Russian Revolution, V.I. Lenin once quipped, "Communism is Soviet power plus the electrification of the whole country."[1] Like Karl Marx, Lenin looked forward to a communist era characterized by such a high level of overall production that human prosperity would become generalized. Abundance would render obsolete the need to divide society into classes in order to discipline producers to work so that a minority would be free to enjoy the social surplus. Whatever one thinks of the possibility, or even the desirability, of such a classless society, countries making developmental progress in the twentieth century have repeatedly demonstrated the importance of electrification. Significant human development gains are reliably accompanied by dramatic increases in per capita energy consumption.

A recent United Nations policy brief declares that "reducing the global disparity in energy is key to reducing income inequalities, gender inequalities and inequalities in other dimensions such as rural/urban income disparities. A lack of adequate, reliable and affordable supplies of modern energy disproportionally impacts women and children. It is also more severe in rural communities and it limits their productive opportunities, enterprise growth and employment, exacerbating income inequality and persistent poverty."[2] Extreme poverty is horrifically brutal. The anthropologist and medical doctor Paul Farmer relates a typical story of poverty and medical neglect in rural Haiti. It is of a woman with metastatic breast cancer who had been to fourteen different clinics, finding none willing to operate because she could not pay the $700 fee. "A young woman takes my arm in a common enough gesture in rural Haiti. 'Look at this, doctor.' She lifts a left breast mass. The tumor is not at all like the ones I was taught to search for during my medical training in Boston. This lesion started as an occult lump, perhaps, but by this September day has almost completely replaced the normal breast. It is a 'fungating mass,' in medical jargon, and clear yellow fluid weeps down the front of a light-blue dress. Flies are drawn to the diseased tissue, and the woman waves them away mechanically."[3] Although every experience of illness is unique, Farmer's account of poverty and sickness is sadly illustrative. Extreme poverty is the leading cause of death globally.

At full capacity the Kariba Dam drives turbines on the north side that produce more electricity than any other source in Zambia. Still, energy poverty is endemic. According to the World Bank, only about 42 percent of Zambia's population has access to electricity. And in rural areas, a mere 12 percent have access.[4] At the time of this writing, after two years of drought, the water level behind the dam remained way down. Low water levels diminished the functioning of the turbines and threatened to halt them altogether.[5] Due to insufficient capacity, even those Zambians with access

to electricity experience rolling blackouts for up to twenty hours every day.

The Zambian drought threatens more than access to electricity. In the west and south of the country the drought brought mass-scale food insecurity. Crops wilted under the heat and aridity. As a result, some 2.3 million people, 1,500 kilometers to the north of my temporary residence in Johannesburg, were desperately hungry. As the terrible Australian bush fires made for dramatic media coverage, with pictures of homes caught in firestorms and tales of heroism by ordinary people, comparatively little attention from the international press was directed at the millions of people on the brink of famine caused by years of drought.

The drought in Zambia is a harbinger of future trends. As greenhouse gases bake the planet, climate models predict both temperature increases above the planetary average and precipitation decreases (with some regional exceptions) against historical averages in southern Africa.[6] The Zambian case illustrates the vulnerability of the world's poor to climate change. Suffering a two-year drought would put stress on any community. However, for communities that survive largely by means of subsistence farming, extended periods of water scarcity are a matter of life and death. Increased incidence of prolonged drought threatens lives on the scale of millions. The slow agony of a dearth of water, however, makes for much less riveting copy than ferocious fires raging through the bush.

Even before the water through the turbines of Kariba Dam slowed, the money coming in to modernize the facility dried up. The utility that runs the generating station, jointly owned by Zimbabwe and Zambia, has been cash-strapped for years. Revenues from electricity rates are a trickle of what is needed to finance the modernization of the generating stations. Although the population of Zambia has been growing, by the governments' admission there has been inadequate corresponding investment in hydroelectric power generation since the 1970s, resulting in a failure to keep

pace with increasing demand.[7] The bad news, however, just keeps flowing. In March 2014 the Zambezi River Authority reported that a cavernous crater had been created at the base of the spillway from fifty years of water pounding onto the ground. Were the grand concrete wall to give way, a massive tsunami would tear through the lower valley, inhabited by some 3.5 million people.

The dream of mass electrification remains deferred. Zimbabwe is in arrears with international lenders. Zambia's sovereign debt nearly matches its gross domestic product. Money to renovate and shore up the dam is not easy to come by from international lenders. As debt obligations grow, Zambia defaulted on international loans. However, new international financiers have been willing to step in. The Chinese Belt and Road Initiative has been a source of finance for infrastructure in the region. But suspicions mount that China is pursuing debt trap diplomacy in order to gain access to Zambia's vast copper mining assets as collateral for the loans.[8]

A changing climate threatens famine, energy poverty, and geopolitical vulnerability in southern Africa. Mitigation, to the extent possible, is an anti-poverty project, as is adapting to that measure of change that isn't mitigated. In this book I defend and deploy what I call the *Anti-Poverty Principle*. Moreover, policy efforts to avoid dangerous climate change must allow for the differential capacities of states to absorb the costs of protection, or such efforts risk creating poverty traps of their own. I argue in these pages that responsibility for climate change policy must be based on the ability of states to pay for the needed measures. This conception of responsibility is required if we take seriously the right of states to promote sustainable development, for both a price on carbon, whether the result of regulation, markets, or taxes, and new capital investments in energy generation could raise the costs of human development in low-income regions. Responsibility in a climate change policy regime should rest squarely on the ability of states to take on policy burdens without harming the human development level of the

population. This is required by the right of states to promote sustainable development.

Recognizing the importance of energy to the human development project, the countries negotiating the United Nations Framework Convention on Climate Change in 1992 included in Article 3 several important norms. Paragraph 1 requires that states protect the climate system on the basis of equity and in accordance with differentiated responsibilities and respective capacities, and specifically that developed countries take the lead in addressing the problems of climate change. Paragraph 2 asserts the privileges of low- and medium-income countries. Paragraph 3 requires cooperation on the basis of the recognized different socioeconomic contexts of countries. Paragraph 4 asserts that states have the right to promote sustainable development, the liberty to develop and pursue national development plans appropriate to their needs. Finally, Paragraph 5 calls for an international economic framework that is supportive of such plans.[9] In light of these agreed-upon commitments it would be not only disrespectful of poor states but wildly unrealistic to propose any international climate change policy that did not leave states at liberty to access inexpensive forms of energy for purposes of promoting human development. Respect and realism align in this instance.[10]

The year 2015 was a landmark year for international ambition setting. The United Nations agreed to seventeen Sustainable Development Goals (SDGs), the first of which was to end poverty in all of its forms everywhere.[11] As a specific aim, the UN seeks to end extreme poverty by 2030. SDG 13 is to take urgent action to combat climate change and its impacts. At the Paris meeting of the United Nations Framework Convention on Climate Change (UNFCCC) that same year, the member states reaffirmed the goal limiting warming to "well below 2°C" and to pursue efforts to limit "temperature increase to 1.5°C."[12] (Hereafter, I use "Framework Convention" to refer to the treaty document, and "UNFCCC" to refer to the organization founded on the treaty.) The task for the

coming several decades could not be more dramatic: to decarbonize the global economy and to expand immensely the production and consumption of energy so as to fuel poverty eradication programs globally.

The ambitions of 2015 are far from realized. A recent International Energy Agency report asserts that the gaps between aspiration and reality in both climate change policy and electrification are massive: "The energy world is marked by a series of deep disparities. The gap between the promise of energy for all and the fact that almost one billion people still do not have access to electricity. The gap between the latest scientific evidence highlighting the need for ever-more-rapid cuts in global greenhouse gas emissions and the data showing that energy-related emissions hit another historic high in 2018."[13] There is need for urgent policy action. Policy, however, must be guided by a sound understanding of what matters morally. And an understanding of what matters morally for purposes of guiding policy has to be developed in light of an intelligent diagnosis of the problem and the available levers the public authorities can pull or could pull if citizens so demanded.

Another aim of this book is to anchor the moral assessments that are its central message in a realistic explanation of the problem. I seek to explain the moral intertwining of climate change and global poverty, but the factual intertwining matters to what I have to say. No academic discipline is broad enough to provide a full understanding of climate change. I am a philosopher by training, but one working in a Political Science department. I often rely on theories and findings from the social and natural sciences after working to understand them, though without claiming originality in doing so. The intertwining that I explicate is important for what we should do politically. Responding to climate change and global poverty makes moral demands on us as authors and subjects of our laws, as democratic citizens. If we fail politically, we fail morally. Even so, our understanding of the causes of our failings up to this point requires knowledge gained from the empirical social

sciences. To address the moral problems of climate change and global poverty, we must go outside of normative philosophy to the social sciences for explanations of our circumstances. John Dewey once wrote that when moral philosophers acquire a well-informed empirical understanding of the context of their concerns, their philosophical accounts are improved. Their philosophy "loses its peculiar flavor of the didactic and pedantic; its ultra-moralistic and hortatory tone."[14] And so I seek greater empirical understanding to inform the moral judgments of this book; we need such understanding to guide our attempts at just responses to climate change. The works of international relations specialists, political scientists, and economists enrich our moral understanding of the avenues available for action.

I can't claim confidence that we have reason to be optimistic that the problems of climate change and global poverty will get successfully addressed in the coming decades. The climate system is so inadequately understood that there is reason to worry that bad surprises, thresholds crossed, will overwhelm our capacities to adapt. Moreover, there are strong economic interests in the fossil fuel industry tantalizing politicians to slow the response to climate change, and even outrageously to deny the existence of the problem. Political support for these views also can be found among industry workers and their communities whose fates are tied to the extraction and refining of fossil fuels. Convincing these people to support political programs that their employers find threatening will require intelligent political mobilization and attention to their concerns. This is a major and important political task. To ignore it would put success in doubt. The politics that fall under the broad banner of the Green New Deal are important in this regard. A failure to mitigate sufficiently could result in, say, a quarter of the Earth's population living in fortresses more or less adapted to a changed climate while the rest are trapped in poverty, struggling to adapt, and on the move from drought-prone regions or low-lying coastal areas. The disruptions within states and the pressure

for cross-border migration could be immense. More militarized borders, ever higher walls, frequent resource conflicts, and widespread hunger could be in the forecast.

Nonetheless, this book also aims to show that there is reason not only to hope, but to act in ways that mobilize hope. Political mobilization can be supported by a hopeful vision of a possible better world. Broad mobilization requires a vision of global solidarity, increased prosperity for working people, and sustainable communities. And intelligent political mobilization can inspire hope that such a vision is within reach. Since 2018 the efforts of millions of schoolchildren and other young people around the world have offered inspiration. Fridays for Future and affiliated groups, such as Scientists for Future, have helped galvanize a global movement, as have other groups such as Extinction Rebellion and the Sunrise Movement. Each of these groups has organizational and political limitations, but importantly they lend encouragement, training, and organizational acumen to a new generation of activists. Hope is both cause and effect of a certain sort of politics.

Hope does not require optimism. Unlike optimism, hope can be mobilized and sustained with less confidence that things are going in the right direction. A hoped-for end need not be likely, just reasonably possible. St. Thomas Aquainas identified the object of hope as the arduous but possible good.[15] Hope can be maintained in darker times than can optimism. And to the extent that there is hope, there is some light in the darkness. The light is extinguished only when reasonable possibilities have vanished altogether. That is not our circumstance. Not yet, anyway. Recalling the great philosopher of hope, Ernst Bloch: "It is not yet the evening to end all days, every night still has a morning. Even the defeat of the wished for good includes its future possible victory as long as not all possibilities of becoming different, becoming better are exhausted in history and world."[16] The alternatives have not so narrowed; paths to a prosperous and sustainable global order remain available. Mobilizing hope involves understanding and communicating

those paths and demanding that political leaders pursue them. This book aims to make a modest contribution to that effort.

Many worthy books call out to us to be read, far too many good ones to read them all. Why spend the time to read this one at the expense of another one? I owe the curious potential reader a short summary of what she would be getting into if she chose to devote herself to this book. Chapter 1 argues that, despite some objections to the contrary, there are good reasons for policymakers to aim toward the goal of limiting warming to 1.5°C. The chapter rejects two reasons for not making this temperature target a policy goal. One is the Uncertainty Objection, which stresses our ignorance about how much warming is produced by our emissions and what the broader effects of that warming will be. Such uncertainty is real, but it's not a reason not to act. The second reason is the Priority to Global Poverty Eradication, which claims that we should pursue development first and deal with climate change later. The pursuit of human development is currently among the most important aims of humanity, but to neglect climate change mitigation and adaptation in order to pursue it would be self-defeating. This chapter introduces and defends the Anti-Poverty Principle. The Anti-Poverty Principle identifies dangerous climate change as that which would prolong or worsen poverty. Finally, the chapter introduces the idea of hope-makers, bits of evidence or explanations of the likelihood of our hopes coming to pass. These may be states of affairs or theories, or even human action capable of contributing to the outcome. Despite the reasons to worry, there are hope-makers that dangerous climate change can be avoided. The most important among these is the upsurge in climate activism, especially by young people around the world.

The concerns of the first chapter are developed further in Chapter 2. Growth in productive capacity suggests the possibility of realizing a progressive vision of prosperity in which economic necessity has been overcome for everyone. This attractive vision of globalized freedom from the drudgery of enforced labor arose in

response to possibilities afforded by the Industrial Revolution, but the activities that have given rise to this unprecedented growth in productive capacity have also created the Anthropocene. Pervasive impact on planetary systems has raised the uncertain possibility of environmental catastrophe. Uncertainty is a reason to take 1.5°C seriously as a warming limit. This chapter draws a distinction between risks and uncertainties. There is a reason to take precaution when there is the real possibility of an uncertain but especially bad outcome. The possible cataclysmic outcomes of climate change satisfy the conditions in which precaution is required. Although the case for precaution is moral, we also have reasons of self-respect to want our legacy to be positive. And it is better to err on the side of precaution than to do too little.

Matters become more theoretical in Chapter 3. Indeed, this is probably the most theory-centered of all of the chapters in this book. It is devoted to a discussion of intergenerational justice and climate change. It takes note of the long-term, intergenerational effects of climate change. Our capacity to affect the living circumstances of future people raises the question of which principle of intergenerational justice best explains our duty to mitigate climate change on behalf of future generations. In this chapter I examine four possible principles: Help and Do No Harm, Discounted Utilitarianism, Intergenerational Equality, and Anti-Catastrophe. The survey reveals serious problems with the first three of these principles. In the end, Anti-Catastrophe has a considerable degree of plausibility. Moreover, its plausibility is augmented by the fact that it is consistent with the Framework Convention.

Chapter 4 takes up international justice and responsibility in climate change mitigation. It argues that human development, as understood by the United Nations Human Development Programme (UNDP), is rightly a high priority, and that respecting the right to promote sustainable development is a matter of international justice. Taking that right seriously requires a conception of responsibility in a climate change mitigation regime that protects the human

development interests of states. And the only conception that noncontingently does that is one that assigns responsibility based on a state's human development level. Solidarity in climate change mitigation requires assigning the burdens of achieving a zero-carbon global economy in accordance with protecting the right to promote sustainable development.

Chapter 5 is concerned with the aims of adaptation and the moral requirement that high-income industrialized countries support adaptation in poor countries. As noted previously, the Anti-Poverty Principle identifies dangerous climate change as that which would prolong or worsen poverty. Avoiding such danger requires prioritizing adaptation projects in poor countries. The Pro-Poor Formula offers guidance for doing so in setting adaptation priorities. It includes factors of effectiveness, size, and the poverty gap. Support by wealthy countries for adaptation projects in poor ones has thus far been measly. This chapter explores the reasons this is the case, and the permissible responses on the part of poor countries. In addition, it argues that despite the local benefits of adaptation projects, there is a sound basis for the politics of international solidarity in adaptation policy.

The prospects for the Paris Agreement of 2015, an important even if incomplete accomplishment of international climate diplomacy, are discussed in Chapter 6. The agreement salvaged an international process that was in trouble, and the pledge-and-review process of generating mitigation targets provided a procedural safeguard for the right to promote sustainable development. However, the sum of the mitigation pledges made fell far below that needed to meet the Paris goals of limiting warming to 1.5°C, or at least well below 2°C. In order to realize the goal of Paris, mitigation pledges will have to become more ambitious, and, of course, they will have to be pursued and realized. However, progress has been frustratingly slow. By far the most political of the book's chapters, Chapter 6 details four Problems of Political Economy that help to explain this unsatisfactory pace. The most serious political problem among

these is due to the power of the fossil fuel industry to influence politics according to its interests. Here I draw on Martin Luther King Jr.'s theory of mass mobilization to argue that countering the power of the fossil fuel industry requires popular mobilization. Inspirations for the politics of mobilization can be found in a hopeful vision of a sustainable and prosperous world. The political program of the Green New Deal, based on an expansion of employment and income through green growth, constitutes such a vision. However, the idea that economic growth must have limits has been raised by some activists and theorists. But the politics of green growth is superior on several counts to a politics of reduced expectations and zero growth. A hopeful politics that combines a vision of prosperity with sustainability can help to motivate a politics of mass mobilization for rapid de-carbonization.

A policy of limiting warming in accordance with the Paris Agreement limits is a pro-poor policy. Chapter 7 emphasizes the Geophysical Limit, the upper limit on concentration of CO_2eq in the atmosphere for maintaining a reasonable likelihood of keep warming within the Paris Agreement targets. The concentration in 2019 already rendered the likelihood of limiting warming to 2°C no better than 50 percent. Since there is compelling reason to judge warming in excess of 1.5°C as dangerous, a realistic appraisal of the prospects suggests that robust mitigation alone is unlikely to avoid dangerous climate change. Policy should encourage the research and development of forms of Negative Emissions Technology to draw CO_2 out of the atmosphere. Because the prospect of having this technology at sufficient scale is uncertain, and the deployment of it in any case could lead to a temporary temperature overshoot, research into the possibility and merits of using Solar Radiation Management should be carried out. And the best time to develop a regulatory framework for the possible deployment of such technology is before it is fully developed. The chapter explores and rejects the criticism that intentionally manipulating the planetary climate shows improper regard for nature. Because mitigation

policies alone are unlikely to halt warming in accordance with the Paris targets, promoting technological developments that might supplement mitigation is a pro-poor policy.

Climate change is an example of a planetary system put under stress by human activity. Importantly, it is not the only such example. Indeed, human impact on the planet's geology, as well as on other planetary systems, is so profound that there is a call among planetary scientists to designate a new geological epoch, the Anthropocene. Chapter 8 discusses both the threats that the Anthropocene poses and the prospects for a vision of global prosperity and sustainability it affords. The threats are characterized as risks of crossing planetary boundaries that could disrupt the fragile equilibria of Earth systems that have provided the background conditions of human civilization. The consequences could lead to massive suffering caused by environmental disruptions, and to even more profound global inequalities than now exist. This would all be the product of human activity, which suggests the appropriateness of calling the era the Misanthropocene. Resisting the Misanthropocene calls for a conception of a realistic utopia for the Anthropocene. This chapter examines two such conceptions, the Arcadian and the Promethean. Such a realistic utopia may focus efforts at mobilizing hope for the Anthropocene.