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Climate Justice, Humans Rights, and the Case for Reparations

AUDREY R. CHAPMAN AND A. KARIM AHMED

Abstract

The global community is facing an existential crisis that threatens the web of life on this planet. Climate change, in addition to being a fundamental justice and ethical issue, constitutes a human rights challenge. It is a human rights challenge because it undermines the ability to promote human flourishing and welfare through the implementation of human rights, particularly the right to life and the right to health. It is also a human rights challenge because climate change disproportionately impacts poor and the vulnerable people in both low-income and high-income countries. Those living in many low-income countries are subject to the worst impacts of climate change even though they have contributed negligibly to the problem. Further, low-income countries have the fewest resources and capabilities at present to adapt or cope with the severe, long-lasting impacts of climate change. Building on human rights principles of accountability and redress for human rights violations, this paper responds to this injustice by seeking to make long-neglected societal amends through the implementation of the concept of climate reparations. After discussing the scientific evidence for climate change, its environmental and socioeconomic impacts, and the ethical and human rights justifications for climate reparations, the paper proposes the creation of a new global institutional mechanism, the Global Climate Reparations Fund, which would be linked with the United Nations Human Rights Council, to fund and take action on climate reparations. This paper also identifies which parties are most responsible for the current global climate crisis, both historically and currently, and should therefore fund the largest proportion of climate-related reparations.

Audrey R. Chapman, PhD, is Healey Professor of Medical Ethics and Humanities at the University of Connecticut School of Medicine, and an adjunct professor at the University of Connecticut Law School, USA.

A. Karim Ahmed, PhD, is an honorary professor at the University of Cape Town, South Africa; an adjunct professor of occupational and environmental medicine at the University of Connecticut School of Medicine, USA; and a founding board member of the Global Council for Science and the Environment, Washington, DC, USA.

Please address correspondence to Audrey R. Chapman. Email: achapman@uchc.edu.

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Introduction

At the beginning of the third decade of the 21st century, we are confronting an unprecedented crisis of global climate change. However, neither the causes nor the impacts of climate change are equally shared among different regions of the world. While the first scientific evidence that global warming from the continuing emission of greenhouse gases posed an existential threat to life on earth was pointed out many decades ago, it did not become a priority concern for policy makers until recently. The scientific evidence now leaves no doubt that climate change is human induced. Above all, its current and potential environmental impacts and socioeconomic consequences are well documented and agreed on by the global scientific and policy-making communities.[1]

In discussions about climate change and global warming, one policy issue that needs greater and more immediate attention is the question of who bears the primary ethical responsibility and financial obligation for addressing this crisis. There is increasing reason to believe that the severest consequences of global warming will fall most heavily on low-income countries and vulnerable groups who have been of priority concern to the human rights community. This paper examines the human rights dimensions of this problem, placing it within a climate justice context. The critical question we consider is this: What role should high-income countries undertake in meeting their obligation to not only significantly reduce and mitigate their current emissions of greenhouse gases but also to make reparations for the harm their emissions, both historically and at present, have inflicted on low- and middle-income countries (LMICs)?

Impact of climate change on the web of life

Today, climate change and its accompanying global warming are a fact of life. We have already reached a global mean temperature of 1.1°C over pre-industrial levels.[2] In its 2018 interim special report, the expert Intergovernmental Panel on Climate Change (IPCC) predicted that a global temperature increase of 1.5°C over pre-industrial levels would occur sometime between 2030 and 2052, which could have catastrophic effects on the web of life on this planet.[3] In its most recent assessment report (published in August 2021), the IPCC concluded in no uncertain terms:

> *It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere … The scale of recent changes across the climate as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousand of years … Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and in particular, their attribution to human influence, has strengthened since AR5 [an assessment report published by IPCC in 2014].*[4]

What is not entirely clear is where our future lies—whether we can slow this rate of increase or whether will we allow this trend to continue, with climatic conditions that would undermine the web of life and render many regions of our planet problematic for human flourishing.

Present and historical sources of greenhouse gas emissions

One way of assessing the contribution of current and past greenhouse gas emissions to global warming is to examine its major contributing component, namely carbon dioxide (CO_2), a major by-product of fossil fuel combustion. The estimated global annual emissions of CO_2 were about 5 billion metric tons in 1950, increasing to 22 billion metric tons by 1990, with the most recent estimate (2019) reaching over 36 billion metric tons.[5] This amounts to greater than a sevenfold increase in annual atmospheric CO_2 emissions in 70 years, while the world population rose only threefold in that same time frame (2.5 billion to 7.8 billion).[6] These figures reflect a sharp increase in per capita combustion of fossil fuels, which have provided the main source of energy for a fast-growing world economy. However,

this dependence on fossil fuels has come at a high a price—a warming planet at the edge of a precipitous global calamity.

A significant contributor to global warming is the amount of greenhouse emissions emitted by high-income countries. A recent analysis conducted by the World Resources Institute points out the stark differences between top and bottom greenhouse gas emitters:

> *The top three greenhouse gas emitters—China, the European Union and the United States—contribute 41.5% of total global emissions, while the bottom 100 countries account for only 3.6%. Collectively, the top 10 emitters account for over two-thirds of global [greenhouse gas] emissions.*[7]

Currently, China leads the world in annual atmospheric carbon dioxide emissions, followed by the United States, India, the Russian Federation, and Japan. In the last decade, China overtook the United States as the largest annual source of emissions of CO2. In Table 1, the top 10 annual emitters of CO2 from fossil fuel combustion in 2018 are listed by country.

With regard to historical greenhouse gas emissions, since the beginning of the industrial age in the mid-18th century, the United States has been by far the biggest contributor to atmospheric CO2. Table 2 lists the top 15 historical contributors.

As can be seen in Table 2, the United States and the European Union's 28 countries (which included the United Kingdom until last year) are the largest cumulative contributors to present-day global warming, accounting for over half (51%) of the historical emissions of greenhouse gases. Additionally, the top 15 contributors account for over 88% of past cumulative CO2 emissions.

Countries' per capita annual emissions differ significantly. Table 3 presents the per capita CO2 emissions of the top 21 countries in 2018, the latest year for which such data are available.

The human rights impact of global climate change

Global climate change constitutes a major human rights challenge because the magnitude and severity of its adverse consequences will not be experienced equally by all people—rather, it will be felt most acutely in low-income populations and other groups already susceptible to human rights abuses. In her opening statement to the 42nd session of the Human Rights Council in 2019, Michele Bachelet, the United Nations High Commissioner for Human Rights, warned that "the human rights implications of currently projected levels of global heating are catastrophic."[8] She went on to state that "climate change threatens the effective enjoyment of a range of human rights including those to life, water and sanitation, food, health, housing, self-determination, culture and development."[9] Consistent with our call for a human rights response to climate

TABLE 1. Top 10 current atmospheric CO_2 emitters from fossil fuel combustion

Rank	Country	Annual CO_2 emissions (billion metric tons) 2018
1	China	9.5
2	United States	4.9
3	India	2.3
4	Russian Federation	1.6
5	Japan	1.1
6	Germany	0.67
7	South Korea	0.61
8	Iran	0.58
9	Canada	0.57
10	Indonesia	0.54

Source: International Energy Agency, *IEA atlas of energy: CO_2 emissions from fuel combustion* (Paris: International Energy Agency, 2021). Available at http://energyatlas.iea.org/#!/tellmap/1378539487/0.

change, she added that "states have a human rights obligation to prevent the foreseeable adverse effects of climate change and ensure that those affected by it, particularly those in vulnerable situations, have access to effective remedies and means of adaptation to enjoy lives of human dignity."[10] She reiterated these concerns in 2021 in her statement to the 48th session of the Human Rights Council, stating that as the interlinked crises of climate change, pollution, and biodiversity loss multiply, "they will constitute the single greatest challenge to human rights in our era."[11]

Clearly, global climate change is already undermining the ability to promote human flourishing and welfare through the implementation of economic and social rights in many societies and will increasingly be problematic. The global climate crisis also affects the ability to protect and promote specific human rights. Among them are the right to life and the right to health, as well as several social determinants of the right to health, such as access to nutritious food, safe water, sanitation, and housing. In relation to public health, the adverse health consequences caused by climate change include heat-related disorders, greater incidence of water-related and vector-borne diseases, respiratory and allergic disorders, malnutrition, violence, and mental health problems.[12]

Underscoring the impact of climate change on human health, more than 230 leading medical journals from a wide range of countries published a joint editorial a few weeks ahead of the 2021 COP26 climate conference in Glasgow to warn that the greatest threat to public health would be the failure to prevent the global temperature from rising above 1.5°C. The editorial echoes the warnings that health is already being harmed by global temperature increases.[13] Such health consequences will most severely impact infants and young children, especially those living in low-income countries in Asia, Africa, and Latin America. This is because, compared to adults, children require more food and water per unit of their body weight, are less able to survive extreme weather events, and are particularly susceptible to toxic chemicals, temperature changes, and diseases.[14] According to a recently published UNICEF report, one billion children are at extremely high risk of the impacts of the climate crisis.[15] The report indicates that the aggregate disease burden of children living in LMICs from climate-related outcomes, such as malnutrition, diarrhea, and malaria, is likely to increase. Henri-

TABLE 2. List of largest historical emitters of atmospheric CO_2 (1751 to 2017)

Rank	Country	Cumulative CO_2 emissions (billion metric tons)	Percentage of global CO_2 emissions
1	United States	457	29
2	European Union (28 member states)	353	22
3	China	200	12.7
4	Russian Federation	101	6
5	Japan	62	4
6	India	48	3
7	Canada	32	2
8	South Africa	19.8	1.3
9	Mexico	19	1.2
10	Ukraine	19	1.2
11	Australia	17.4	1.1
12	Iran	17	1
13	South Korea	16	1
14	Brazil	14.2	0.9
15	Saudi Arabia	14	0.9

Source: H. Ritchie, "Who has contributed most global CO_2 emissions?," Our World in Data (2019). Available at https://ourworldindata.org/contributed-most-global-co2.

etta Fore, UNICEF's executive director, warns that "virtually no child's life will be unaffected," making climate change a children's rights crisis. Moreover, she notes that children from countries that are least responsible will suffer most.[16]

Among the people most vulnerable to climate change are members of minority and Indigenous groups, older individuals, people with chronic diseases and disabilities, and low-income people living in marginal environments. Climate change will make women's responsibility for gathering water, food, and fuel for their households in poor countries more difficult. Because the lives of Indigenous people are so closely tied to the natural environment, they are likely to suffer both disproportionate physical loss and a sense of spiritual loss and a lack of well-being.[17] People who will be particularly susceptible to the health consequences of climate change also consist of many of the vulnerable groups of concern to the human rights community: those who are poor, members of minority groups, older people, people with chronic diseases and disabilities, and workers exposed to extreme heat.[18] Moreover, individuals from these communities will lack the resources to adapt to and cushion the blows from climate change. There is thus concern that the intranational socioeconomic disparities between affluent and disadvantaged groups due to the impacts of climate change may enter into a self-reinforcing vicious circle, whereby the initial inequality will result in disadvantaged groups suffering disproportionately, leading to greater subsequent inequality.[19]

Most unjustly, even though individuals in LMICs have contributed negligibly to global warming, they are being subjected to the worst impacts of climate change currently and will be increasingly into the future. Eight of the 10 countries most affected by the quantifiable impacts of extreme weather events in 2019 were in the low- to lower-middle-income category and half were least-developed countries.[20] Small island states are particularly vulnerable to the sea level rise. Some of them, such as the Bahamas, Kiribati, the Mar-

Table 3. Per capita annual emissions of CO_2 by country (2018)

Rank	Country	Per capita annual CO_2 emissions (tons)
1	Saudi Arabia	18.48
2	Kazakhstan	17.60
3	Australia	16.92
4	United States	16.56
5	Canada	15.32
6	South Korea	12.89
7	Russian Federation	11.74
8	Japan	9.13
9	Germany	9.12
10	Poland	9.08
11	Iran	8.82
12	South Africa	8.12
13	China	7.05
14	United Kingdom	5.62
15	Italy	5.56
16	Turkey	5.21
17	France	5.19
18	Mexico	3.77
19	Indonesia	2.30
20	Brazil	2.19
21	India	1.96

Source: Union of Concerned Scientists, Each country's share of CO_2 emissions (August 12, 2020). Available at https://www.ucsusa.org/resources/each-countrys-share-co2-emissions.

shall Islands, and the Maldives, are currently only a mere three to four meters above mean sea level. Like other LMICs, many of these small island states also have limited funds and poorly developed infrastructures, making it difficult for them to adapt to these challenges.[21] Likewise, Bangladesh, with its flat, low-lying and delta-exposed topography and high population density, is very vulnerable to sea level rise.[22] Much of the population in many LMICs lives in rural areas and is dependent on agriculture, a sector that is highly vulnerable to environmental conditions, particularly when it comes to steady access to a supply of water. African countries, already some the poorest and most disadvantaged countries, are among the most vulnerable to climate change because of multiple existing stresses and low adaptation capacity. Prolonged drought in many areas is drastically reducing water resources and food productivity, resulting in severe famine conditions.[23]

Recently, the Human Rights Council, at its 48th session, adopted a resolution recognizing a new right: the right to a safe, clean, healthy, and sustainable environment. The resolution encourages member states to build capacity for efforts to protect the environment. It also asks member states to adopt policies for the enjoyment of the right.[24]

Several Special Rapporteurs in the United Nations human rights system have mandates that overlap with policy issues related to the climate crisis; these include the Special Rapporteurs on health, on food, on safe water and sanitation, and on Indigenous peoples. The Special Rapporteur on human rights and the environment does so even more directly. During its 48th session in October 2021, the Human Rights Council also established a Special Rapporteur with a mandate to promote and protect human rights in the context of climate change.[25]

The case for climate reparations

Human rights obligations require that states cooperate toward the promotion of human rights globally, and as the High Commissioner for Human Rights has stated, this should include adequate financing from those who can best afford it for climate change mitigation, adaptation, and rectification of damage.[26] Moreover, for equity to be at the center of the global response, countries that have disproportionately created this environmental crisis must do more to compensate for damages they have caused, particularly with respect to the most vulnerable countries. This brings us to the subject of reparations.

Reparations are generally understood as an effort to redress significant societal harm through acknowledgment of wrongdoing and through in-kind and monetary means. Reparatory justice also entails acceptance of responsibility, followed by undertaking measures that seek to address and repair societal injustices and widespread harms.[27] Applied to climate change, reparations would first entail identifying those entities—both countries and private corporations—whose greenhouse gas emissions have contributed the most to climate change. It would require countries and the international community to recognize the harms they have caused, in order to rectify the serious damage being inflicted disproportionately on low-income countries as a result of climate change.[28]

Climate reparations are justified by the principles of fairness and equity. Here, the principles identified by philosopher Henry Shue are helpful to consider.[29] According to Shue, the "first principle" of equity is the following:

> *When a party has in the past taken an unfair advantage of others by imposing costs upon them without their consent, those who have been unilaterally put at a disadvantage are entitled to demand that in the future the offending party shoulder burdens that are unequal at least to the extent of the unfair advantage previously taken, in order to restore equality.*[30]

To put it more simply, those who have made a greater contribution to a harmful problem and received its benefit have an obligation to rectify it. According to Shue, in the area of development and the environment, the initiation of global warming by the process of industrialization, which has enriched the Global North but not the South, constitutes a clear example of this principle. In response to those who

argue that today's generation in the industrialized states should not be held responsible for damage done by previous generations, he points out that contemporary generations are reaping the benefits of rich industrial societies and have continued to contribute to global warming despite their awareness of its harmful consequences.[31] This means that the countries that have received most of the historical benefits of industrialization and enjoyed the highest income from oil and gas extraction should bear the burden of financing reparations to benefit the most affected low-income countries, which have generally made little contribution to the serious, long-lasting consequences of climate change.

Shue's "second principle" of equity is related to certain parties' greater ability to pay. This principle states, "Among a number of parties, all of whom are bound to contribute to some common endeavour, the parties who have the most resources normally should contribute the most to the endeavour."[32] When applied to the climate crisis, this principle further places the equity burden on high-income countries, which are most able to pay for adaptation to the climate crisis, and not the low-income countries, which are least able to pay to make themselves more resilient to climate risks. This principle additionally lays at least some of the responsibility on the major corporations involved with fossil fuel extraction and sales.

Shue's "third principle" of equity serves the purpose of avoiding making those who are already worst off even more worse off. According to Shue, in a situation of radical inequality, fairness demands that those people with less than enough for a decent human life be provided with enough. This principle of equity states:

> *When some people have less than enough for a decent human life, other people have far more than enough, and total resources available are so great that everyone could have at least enough without preventing some people from retaining considerably more than others have, it is unfair not to guarantee everyone at least an adequate minimum.*[33]

Maintaining a guarantee of an adequate minimum could mean either not interfering with others' ability to maintain a minimum for themselves or embracing a stronger requirement to provide assistance to enable others to do so. One implication is that any agreement to cooperate made between one group of people having more than enough and another group of people who do not have enough cannot justifiably require those in the second group to make sacrifices. Applied to the climate crisis, countries that are operating climate harmful industrial processes cannot ask low-income countries, which are poor in large part because they have not industrialized, to make sacrifices in order to rectify the problem.

Taken together, these equity principles require that whatever needs to be done about global climate change, the costs should be borne by those most responsible and not by the countries currently most affected. In a detailed review of the key factors that should be considered in framing a rationale for climate reparations, Maxine Burkett states:

> *In the absence of a substantial commitment to remedy the harm faced by the climate vulnerable, reparations for damage caused by climate change can provide a comprehensive organising principle for claims against those most responsible while placing key ethics and justice concerns—concerns that have been heretofore woefully under-emphasised—at the centre of the climate debate.*[34]

Applied here, climate reparations would require raising funds and material resources from the governments in the countries most responsible historically for the climate crisis. We also propose that the major fossil fuel extraction corporations be held responsible for their role in contributing to climate change and therefore be asked to contribute to reparations. Not only have they profited financially over time, but these corporations have led a campaign over many years to deny the existence of human-induced climate change, funding scientists and lobbyists to do their bidding—and then when it was no longer possible to deny the existence of climate change, they argued that fossil fuel extraction and use were not the cause.[35]

A one-off payment would not offer a permanent solution to the disproportionate impacts

of climate change. Instead, climate reparations should be envisioned as a series of initiatives to raise financial assistance, transfer resources, and provide technical expertise to low-income and vulnerable countries, as well as requiring all countries, particularly the affluent industrialized countries in Western Europe, the United States, and China, to adopt significantly more carbon-free energy policies.[36]

International framework to implement climate reparations

A program of global climate reparations requires an international mechanism for implementation. There is an existing institution—the Green Climate Fund (GCF)—intended to provide economic assistance to low-income countries detrimentally affected by climate change. The GCF was agreed to by the Conference of the Parties in 2010 under the aegis of the United Nations Framework Convention on Climate Change. It became operational a few years later, with administrative offices located in Incheon, South Korea.[37] It is currently the largest international fund dedicated to fighting climate change. Part of its mandate is to assist low-income countries in mitigating and adapting to climate change through project design and implementation.[38] Its 24-member board has equal representation from low- and high-income countries. Its funds are derived from public and private sources, including multilateral, regional and national development agencies; international and national banks; and private equity institutions.[38] It should be noted that the GCF operates on technical and economic grounds, not ethical or human rights principles.

Unfortunately, the GCF has been unable to raise sufficient funds to fulfill its mandate and meet the needs of the low-income countries most affected by climate change. At the COP15 held in 2009 in Copenhagen, Denmark, participating countries committed to raise US$100 billion per year by 2020 through public and private sources to fund climate-related programs.[39] While there is considerable controversy over what should be counted as part of that US$100 billion per year, one of the mechanisms for collecting and distributing these funds to low- and middle-income countries is the GCF. According to its latest annual report (2020), the GCF had raised US$2.1 billion, with another US$2.8 billion committed through private investments to programs related to mitigation (63%) and adaptation (37%). However, only US$1.5 billion of these funds were allocated to lower-income countries, African states, and climate-vulnerable countries, such as small island states.[40] It is believed that such a shortfall of climate-related funds can be laid primarily at the feet of many industrialized countries, whose financial contributions to the GCF have been quite disappointing to date.[41] Therefore, the present international mechanism for providing funds for climate-related programs is seriously failing to meet its intended purpose, let alone serve as the potentially chief instrument for a more ambitious climate reparations initiative.

We think that it is important to respond to climate change on the basis of equity and human rights rather than on economic or technical grounds, including with regard to the manner in which programs will be executed. It may well be that the reason the GCF has raised only a fraction of the funds committed 10 years ago at COP16 is in part because neither ethical nor human rights appeals have been made. Moreover, donations to the GCF have been voluntary and haphazard. There have been no formulas setting forth expected donations. A human rights and ethical approach centered on reparations principles with a related levy mechanism may be more effective in garnering financial support. The most recent IPCC report's warning concerning the dire consequences of not lowering carbon dioxide emissions—documented by reports of rising temperatures, extreme weather events, and waves of wildfires in many regions—will hopefully convince policy makers that the effects of climate change are occurring now and are not something that will happen in the distant future. It might also spur them to respond in a more urgent and meaningful manner at the present time. Above all, an international assessment scheme for climate reparations based on criteria linked to responsibility for global climate change, as we recommend

here, combined with high-visibility reporting on whether each country has made its rightful contributions, would likely provide greater motivation and accountability.

Therefore, we propose the establishment of a Global Climate Reparations Fund (GCRF) that would operate more consistently within human rights and equity principles and have a substantially more robust budget. The main goals of the envisioned GCRF would be to provide compensation for damages inflicted by climate change on low-income countries and small island states. This assistance would apply to those countries that have been or are being threatened by global climate change, in accordance with the level of loss and damages already experienced or those damages that are projected in the near term. Some middle-income countries confronting climate-induced problems, such as severe loss of water resources and other climate-related calamities, would also qualify for technical and financial assistance.

We anticipate that the proposed GCRF would be more successful than the GCF in raising climate-related funds for several reasons. As noted above, the worsening climate crisis and the warnings of expert bodies of a dire future provide an incentive to take more immediate action. The current plight of small island states and coastal communities provides additional motivation for the global community to initiate a joint response much more urgently. Also, the issue of reparations for past abuses and harms has received considerable currency historically and in recent years for several different purposes. Some well-known examples are financial payments made by the German government to Holocaust victims and their families beginning in 1952 through payments to the government of Israel; the Canadian government's compensation in 2019 to Indigenous persons who were forcibly removed from their families and made to attend Indian residential schools to assimilate them into white society; and the US government's payments in 1988 to Japanese Americans interned during World War II. In addition, several of the transitional justice commissions established in countries experiencing patterns of severe human rights abuses, violence, and conflict have gone beyond efforts to document the perpetrators to recommend some form of recompense to victims. Currently, the question of reparations for the labor of enslaved Black Africans is being discussed in the United States, including among several city governments and universities that have made financial commitments to provide long-deferred reparations for that purpose.[42] As mentioned above, we believe that framing contributions to a reparations fund as an ethical and human rights obligation is more likely to engender a successful monetary response than the GCF's more technically related approach. Further, fundraising seems more likely to be effective if the contributions are assessed on the basis of formulaic criteria linked to responsibility for global climate change, as we recommend here.

We recommend that the GCRF be headquartered in Geneva, where it could operate as an innovative kind of Special Procedures mechanism under the Human Rights Council. This would emphasize that climate reparation is a human rights issue, with the fund's collection and distribution of resources, as well as its operating procedures, determined by human rights principles. Like other Special Procedures expert working groups, its members would be appointed by the Human Rights Council, and it would issue reports to be reviewed by the council at least once a year. The role of this working group would be to make major decisions about priorities in countries receiving funding and to oversee operations and funding commitments.

What we have in mind is to model the operation of the GCRF after the Global Fund to Fight AIDS, Tuberculosis and Malaria, often referred to as the Global Fund. The Global Fund was independently established in 2002, with administrative offices based in Geneva.[43] Before the COVID-19 pandemic, the Global Fund raised and invested some US$4 billion annually in grants to support programs and projects submitted by applicant countries.[44] Hopefully, the proposed GCRF would handle an even larger portfolio of funding.

Similar to the Global Fund, the GCRF would have a country-centered partnership model of shared governance that incorporates key stake-

holders. We envision that it would provide funding on a priority basis to countries affected by climate change, with the use of the funds being determined by the recipient countries. In-kind and technical assistance could be provided if requested.

At present, the Global Fund has a secretariat to conduct day-to-day operations, oversee fundraising, and provide support for program implementation under the aegis of a broadly representative board. It operates through five subcommittees focusing on strategy development, governance oversight, commitment of financial resources, assessment of organizational performance, and resource mobilization and advocacy.[45] The proposed GCRF may need a somewhat similar structure, with working groups appointed by the Human Rights Council, which would serve as a governing body in order to make key policy decisions and oversee the distribution of funds.

Climate reparations financing

Consistent with Henry Shue's first principle of equity, we propose that the funding for climate reparations come from the countries and private corporations most responsible historically for the CO_2 emissions that have caused the present climate crisis, along with the countries contributing the highest current levels of emissions that are intensifying climate change. Reflecting Shue's second principle of equity, these countries and corporations also have the greatest means to do so.[46] In line with Shue's third principle, this funding scheme for climate reparations would avoid making those who are already worst off even worse off. For this reason, it would not be appropriate to impose reparations charges on low-income countries. We would leave the precise formula as to how to levy these sources of funding to the leaders of the GCRF.

As seen in Table 2, the United States (29%), European Union countries (22%), and China (12.7%) account for the largest cumulative amount of atmospheric CO_2 emissions since the start of the industrial age in the mid-eighteenth century. Therefore, we anticipate that these three would be a major source of climate reparations financing, with the funds levied in accordance with their overall historical contributions to atmospheric emissions. Russia, Japan, and India are also among the top six CO_2 emitters historically, but on a much smaller scale, and would be levied proportionately less in their contributions to climate reparations.

Table 1 lists those countries most responsible for current annual emissions of CO_2. China, with 9.5 billion metric tons, is by far the leading emitter, contributing more than twice the amount as the United States, which is in second place. The other countries in the top 10 are India, the Russian Federation, Japan, Germany, South Korea, Iran, Canada, and Indonesia. If the countries of the European Union were listed as a group, they would most likely be the third-largest source of annual CO_2 emissions.

Table 3 lists the per capita atmospheric annual CO_2 emissions for 2018, the most recent year for which data are available. Unfortunately, these data do not provide a cumulative total for the countries in the European Union, as does Table 2 on largest historical emitters of atmospheric CO_2. Given the major differences in countries' populations, it is important to consider per capita emissions so that large-population middle-income countries such as China and India are not unduly penalized. In Table 3, the order of responsibility for current emissions is quite different from the order in Table 2 on largest historical emitters. The 10 highest per capita atmospheric emitters are Saudi Arabia, Kazakhstan, Australia, the United States, Canada, South Korea, the Russian Federation, Japan, Germany, and Poland. We believe that these countries, particularly those near the top of the list, should also be major contributors to climate reparations funding.

In addition to imposing climate reparations based on countries' historical emissions, we propose levying reparations in accordance with countries' current levels of emissions. In this regard, we propose that a scheme of global carbon taxation or other financial contribution be levied in accordance with each country's current annual total CO_2 emission levels (see Table 1), balanced with current per capita emissions (see Table 3). This dual source would complement the levy based on coun-

tries' historical emissions (see Table 2). We think that such a measure is appropriate for assessing climate reparations because, as noted above, countries with large populations should not be unduly penalized for their numbers. A country's total annual CO_2 emissions are also relevant for assessing climate reparations since this figure reflects public policies that result in excessive energy consumption, including both a lack of initiatives to reduce per capita emissions and decisions about the kind of energy sources to promote. Here, the fact that China is currently the biggest annual CO_2 emitter (9.5 billion metric tons) is due both to its population size and to its continuous construction of coal-fired power plants—currently outnumbering those in the rest of the world combined—in order to drive its economy.[47] The United States is in second place (4.9 billion metric tons), followed by India, Russia, Japan, Germany, South Korea, Iran, Canada, and Indonesia. The imposition of a global carbon tax would provide additional financial resources to the climate reparations fund, while encouraging countries to lower their CO_2 emissions by cutting their fossil fuel consumption.

Major corporate contributors to CO_2 emissions in the past 50 years should also be an important source of funding. Data compiled by the Climate Accountability Institute reveal that 20 private corporations have contributed over one-third of all energy-related carbon dioxide and methane emissions worldwide since 1965. Many of them also previously played a major role in financing campaigns promoting false and misleading information that climate change was not occurring, followed by campaigns claiming that even if it were, CO_2 emissions were not responsible. Twelve of the top 20 companies are state-owned entities, with Saudi Aramco topping the list. Other major contributors are Chevron (United States), Gazprom (Russia), ExxonMobil (United States), BP (United Kingdom), and Shell (the Netherlands).[48] Just as the countries mentioned above, these corporate giants should be required to donate generously to the climate reparations fund. Their claim that they were not directly responsible for how the petroleum and other fossil fuel products they extracted, transported, and marketed were used by consumers is a spurious argument, especially since their continual denial of global warming over the past half century has helped delay the global response to climate change.[49]

Dealing in depth with the complex subject of climate-related migrations that will inevitably occur in a warming planet is beyond the scope of this paper, but responding to the forced displacement of large numbers of people due to the impacts of climate change will need to become yet another prong of climate reparations. The major international initiatives to assist with the impact of climate change envisioned here, if adopted, would help reduce the level of migration. However, they would not eliminate this challenge, since the international environmental refugee problem has already begun and will only grow in future years. In a recent article on this subject, the authors expressed their concern in fairly stark terms, anticipating that over the next 30 years, the global climate crisis will displace more than 140 million people within their own countries and drive many more across national borders.[50] The question of how to deal with the growing challenge of "climate refugees" is a greatly troubling one for which no easy solutions exist at present. Nevertheless, the countries whose emissions played the largest role in contributing to climate change should also bear the greatest responsibility in addressing the challenge, whether that be by financing resettlement programs or accepting refugees within their borders, or both.

Conclusion

The current climate crisis looms as one of the greatest challenges that humanity has ever faced. What makes it even more disturbing is the unequal nature of its adverse impacts, which fall heavily on those least responsible and most vulnerable. These populations are also unable to protect themselves from the disastrous consequences of climate change and global warming in the near term. It is debatable whether the world will meet the goal of the Paris Climate Agreement of limiting global temperature to 1.5°C above pre-industrial levels. This failure is likely to have increasingly disastrous consequences

for many low-income countries. In recent years, the development of a conceptual framework for climate reparations has gained greater interest.[51] However, the means to achieve such an objective has remained elusive. It is doubtful that present-day mitigation and renewable energy programs alone in high-income countries will soften the blow of climate-related impacts on low-income countries in the future. It is therefore incumbent on policy makers to prepare for a series of worst-case scenarios in low-income countries and island states, such as those related to sea level rise, extreme weather events, water scarcity, loss of agricultural productivity, and vector-borne diseases. Financing adaptation programs and building resilience should be given the highest priority for most low-income countries. The assessment of reparation funds to enable these countries to do so should be based on responsibility for past carbon dioxide emissions, along with a carbon tax imposed on current annual emissions of countries and private corporate entities.

In the recently concluded COP26 meeting held in Glasgow, United Kingdom (October 31–November 13, 2021), the question of climate reparations to countries most affected by the impacts of climate change was prominently raised. While expressing disappointment that the previous goal of US$100 billion per year by 2020 had not been met, representatives at the meeting approved doubling such financial assistance for climate change adaptation by 2025. On a more controversial topic, funding for climate-related "loss and damage" currently suffered by low-income countries was acknowledged for the first time (in article VI of the final draft document), calling for "dialogue among parties, relevant organizations, and stakeholders to discuss the arrangements for the funding of activities."[52]

At present, an effective international financial mechanism is not in place to solicit and administer climate reparations funds to low-income countries in a timely manner. In our opinion, raising the funds and distributing climate-related reparations should be administered by a newly instituted agency overseen by the Human Rights Council, in conjunction with other multilateral agencies, thereby linking reparations to human rights standards, including equity, transparency, and accountability. These should be the chief objectives in establishing a human rights-oriented and well-funded Global Climate Reparations Fund.

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