Negative "GHIs," the Right to Health Protection, and Future Generations

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Abstract: The argument has been made that future generations of human beings are being harmed unjustifiably by the actions individuals commit today. This paper addresses what it might mean to harm future generations, whether we might harm them, and what our duties toward future generations might be. After introducing the "Global Health Impact" (GHI) concept as a unit of measurement that evaluates the effects of human actions on the health of all organisms, an incomplete theory of human justice is proposed. Having shown that the negative GHIs of our current generation cause unfair harm to future generations, I argue that each human being must be allocated a fair threshold of negative GHIs that should not be exceeded. By emphasising the need to consider all the GHIs of human actions, the theory of human justice developed here is highly relevant to evaluate human actions that might affect future generations, for example those related to climate change.

Key words: bioethics, ethics, global, health, future generations

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Introduction

While many bioethicists have traditionally focused on relationships between patients and health care providers in abstraction from their wider context, it has been argued that there is an urgent need for bioethics to broaden its horizon by addressing how the needs and interests of individuals must be weighed in the balance with those of the larger public, including members of future generations, as well as with the organisms that make up the nonhuman world (Ehrlich 2009). In some situations, the harms associated with decisions that are made by individuals might not or hardly affect them, while they might affect many others. Examples are activities that potentially contribute to the health risks associated with climate change or the emergence and spread of zoonoses. In some situations, the harms that are associated with present activities may not manifest themselves until much later. Dale Jamieson, however, has claimed that "the costs of present lifestyles are currently pushed on to future generations" (2008, 203), and that this is immoral. If the empirical evidence on which Jamieson relies is correct, the fact that we fail to consider adequately both human and nonhuman beings of the future suggests that we might lack clear ideas about whether or not we might harm those who will live in the future, how we might harm them, and what our responsibilities toward them might be.

The concept of "Global Health Impact" (GHI) can be used as a unit of measurement to evaluate the effects of human actions on human health, as well as on

nonhuman others, and this concept is useful for shedding light on the question of how we might benefit or harm others and for determining what our responsibilities might be. An incomplete theory of justice, then, can be created based on GHIs. The adjective "incomplete" is applied here for two distinct reasons. First, only our duties toward human beings are considered, with a particular focus on our duties toward future generations. Second, only negative duties (to avoid harming or disadvantaging others) are considered, and the question of what our positive duties to promote human flourishing might be is ignored. These restrictions are essential for developing a theory that is likely to appeal to a wide range of people, including strong anthropocentric libertarians who dismiss the view that we have strong duties toward nonhuman others and reject the existence of positive duties (Huseby 2008, 13).

After introducing the GHI concept, some evidence will be provided to support the view that the total negative GHIs of our present generation harm future generations unjustifiably. Consequently, the argument is made that our present generation is under a moral obligation to limit its negative GHIs, and that this obligation must be borne primarily by those who exceed their fair share of negative GHIs. In this way, it will be argued that even strong anthropocentric libertarians should accept the existence of significant duties toward future generations. Even though objections to this view exist—namely, growth, risk, and collective action discounting views—it will be argued that none of these survives ethical scrutiny.

The "GHI" concept

Every moral theory must include some account of which things should be valued. In the capabilities approach, proposed originally by Amartya Sen (1993) and developed by Martha Nussbaum (2004), moral duties toward humans originate from the recognition that humans possess capabilities to flourish, the functioning of which either should be promoted or at least not be hindered unfairly. A necessary condition for an action to harm human others unfairly is that its consequences undermine the possibilities for others to enjoy their capabilities. While Sen is vague about what these capabilities are, Nussbaum has identified ten human capabilities. These are: life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation; (a relationship with) other species; play; and political and material control over one's environment (Nussbaum 2006, 76). Nussbaum (2004) also has argued that many nonhuman organisms possess some capabilities and that we must consider how we might safeguard or promote these capabilities in our dealings with nonhuman life. While Nussbaum asserts human rights as important, her moral theory nevertheless focuses on capabilities, which she distinguishes from rights. A different approach is adopted by Simon Caney, who emphasises the human rights that should be protected or promoted when human beings make decisions about how to act. For example, in his discussion of rights in relation to climate change, he argues that climate change threatens various human rights, including the right to life, the right to subsistence, the right to health care, the right to property, and the right not to be subject to enforced relocation (Caney 2009, 167).

While Nussbaum's inclusion of nonhuman organisms within the sphere of justice is endorsed, the approach presented here is a theory of rights, and the argument will be made that the fundamental defendum of both capabilities and rights theories should be the same thing. I share Caney's view, moreover, which is based on the "interest theory" of rights proposed by Joseph Raz (1986), that human rights "are justified on the grounds that they protect vital human interests that are sufficient to generate duties on others" (2009, 167). An issue that has been the subject of considerable debate is the question of whether future generations have rights. Related to this issue is the "non-identity" problem, or the difficulty of conceiving how non-overlapping future generations could be harmed (by potential rights violations) if the people belonging to those generations would not have existed had the supposedly harmful activities not occurred (Parfit 1987, part 4). The belief that the people who might be born if we avoid certain activities today would be different from the people who might be born if we do not avoid them seems plausible. On this basis, the claim has been made that we cannot ascribe rights to future generations and, therefore, cannot violate their rights either (Broome 1992, 33): If violating someone's rights means causing them to be worse off than they would have been otherwise, those individuals who will belong to our future generations cannot be made worse off by our activities. This stems from the fact that they will not be brought into existence unless we commit ourselves to carrying out those activities. However, this understanding of harm and of rights has been challenged by William Fitzpatrick, who argues convincingly that it is possible to harm someone even if we are unsure about the identity of the person who might experience harm—as harming someone need not be

understood in terms of making someone worse off relative to some earlier condition (2007, 382–383). Fitzpatrick adds that "an action can turn out to have violated a person's rights *without* its having been the case *at the time of acting* that there was any right constraining the agent from so acting" (2007, 384, italics in the original). Similarly, Derek Bell (2011) has argued that future generations can be harmed if our activities result in future generations being forced to live in conditions that put them below a certain threshold of a good that is protected by a right. On this basis, it can be concluded that it is quite appropriate to speak of the rights of future generations.

In addition to human rights, a theory of justice also must consider what our duties are toward the nonhuman world. Indeed, whether we think in terms of capabilities or in terms of interests, many ethicists have argued that there are at least some nonhuman organisms that possess either capabilities or interests and that humans have at least some duties toward parts of the nonhuman world on the basis of these (Nussbaum 2004; Taylor 1986). At the same time, since the capabilities and interests of nonhuman organisms are different from those of humans, it is clear that the things we need to consider when we deal with the question of what we owe the nonhuman world are different from the things we must consider regarding our duties toward human beings. For example, humans do not appear to have as strong an interest in being able to climb trees compared to chimpanzees. Therefore, it is plausible to assume that we have a stronger duty to protect a chimpanzee's interest in climbing trees than that of a human being's.

In spite of these differences, the view—adopted by Paul Taylor (1986, 110)—that all living organisms have an interest in health is adopted here and it is added that health should be the only thing that matters when we consider our moral duties in relation to living beings. Health, however, is a value that cannot be guaranteed; therefore, this translates into a right to health care, rather than a right to health. Whereas such a narrow focus might be perceived to fail to do justice to the other capabilities, interests, or rights we should consider, the contention is made here that all the other capabilities and rights discussed by Nussbaum and Caney, respectively, are important precisely because they contribute to the value of a healthy or flourishing life. In this respect, it is worth mentioning that the concept of "flourishing" is repeated in Nussbaum's writings, suggesting that the fulfilment of these capabilities is what provides for a "flourishing life" or a healthy life (2000, 88; 2004).[1] Likewise, when we consider human rights, it could be said that the aforementioned rights to subsistence, property, and freedom from enforced relocation, as well as other rights that appear to be quite different from the right to health care (for example, the rights to free speech or privacy), are important because they contribute to a healthy human life. Whereas it can be meaningful to speak of a plurality of capabilities and interests in specific contexts, it also is useful to aggregate these into a single metric. On this account, bioethics—or the study of how we ought to act or refrain from acting in relation to living organisms—essentially should be about health protection and health promotion. Therefore, when we consider the moral quality of any particular action that might harm or benefit living organisms, we must assess its potential health impacts.

GHIs provide a tool to capture and evaluate the moral quality of human actions vis-à-vis the living world within one unit by focusing on health. Adding the word "Global" to that of "Health Impact" emphasises three things. First, it highlights the view that the concept of health should be understood broadly when we assess the health impacts of our (proposed) actions—i.e., a holistic understanding of health, encapsulating all things that are conducive to human and nonhuman flourishing. Second, it acts as a reminder that the consequences of our actions upon the health of the global population of human beings should be considered, including those who are more remote in space, and even upon global humanity, which is understood to include those who are more remote in time. And third, it refers to the need to consider the effects of our actions upon the nonhuman organisms that live on our globe.

Negative GHIs and our negative duties to future generations

An important issue for any theory of justice is the determination of our negative duties. Thomas Pogge has defined a negative duty as a "duty to ensure that others are not unduly harmed (or wronged) through one's own conduct" (2002, 130). This can be articulated as a duty to make sure that "others are not unduly harmed" through the negative GHIs produced by one's actions. While the production of some (quantities of) negative GHIs may not be problematic, the production of some other (quantities of) negative GHIs may be questionable; for example, if it would jeopardize the human right to health protection. Thus, the question remains: Do the negative GHIs of our current

generation cause unfair harm to future generations of human beings and, if so, what does this imply for us today? The work of Simon Caney and Derek Bell on the ethics of climate change offers some possible answers.

Drawing on Raz's (1986) "interest theory" of rights, Caney starts from the premise that (1) "a person has a right to X when X is a fundamental interest that is weighty enough to impose obligations on others" (2006, 259). He then argues that some interests are not sufficiently important to impose duties on others and, therefore, cannot ground rights. Vital or fundamental interests, by contrast, would be important enough to establish rights. Second, Caney argues that (2) "global climate change damages persons' fundamental interests" (2006, 259). To substantiate this claim, he suggests that humans have fundamental interests in a range of things, including health, food, water, and housing, and he refers to scientific evidence to support the view that these interests are already and will continue to be jeopardised by climate change. Critics might object that, while these interests are important, they are not sufficiently important to ground rights. Caney's response is that they are "key to all persons" and that the duties associated with protecting these interests are "not unreasonably demanding" (2008, 538–539). Moreover, even if some activities that contribute to climate change (e.g., burning fossil fuels to keep ourselves warm) protect our fundamental interests and curtailing those activities would require unjustifiably large sacrifices, Caney counters that the reason we are currently confronted with dangerous climate change relates to the fact that some people prioritize their own "relatively trivial" interests over the fundamental interests of others (2006, 263). This leads him to

conclude that (3) “persons have a right not to suffer from the ill-effects associated with global climate change” (Caney 2006, 263).

Revisiting the evidence Caney presents to ground this claim is beyond the scope of this paper. However, it must be noted that problems of scale, such as climate change, would not exist in a world with far fewer people, even if they pursued many relatively trivial interests. Such problems, then, could be reduced either by limiting our population or by limiting consumption and pollution. As there is no downward trend in the world’s population, at some future point it might no longer be possible to satisfy all the interests we now consider vital, particularly if we fail to take stronger action. Therefore, in order to prevent an erosion of the category of fundamental interests (and their associated rights), the duty to refrain from pursuing some relatively trivial interests comprises not only a duty to abstain from excessive consumption, but also a duty to abstain from excessive procreation.

Regarding a more general theory of human justice, Caney’s conclusion may be modified to the view that (4) others have a right not to suffer from significant health costs produced by another’s activities that serve relatively trivial interests. This could be called a right to health protection. The need to generalise Caney’s theory follows logically from the fact that this right can be jeopardized not only by the actions one individual undertakes to satisfy his or her trivial interests where these contribute to dangerous climate change, but by a wide range of negative GHIs that could be produced by the things an individual might do to fulfil those trivial interests. An example is the

negative GHIs associated with using a particular resource to satisfy trivial interests, whereby others are denied access to this resource to satisfy their right to health protection. While many human activities produce both positive and negative GHIs, the overall GHIs of any activity that serves trivial interests should never be allowed to jeopardize any human being's right to health protection, even in situations where many people could obtain relatively trivial positive GHIs at the expense of one person's right to health protection.

The negative GHIs produced by our present generation (5) undermine the conditions suitable to safeguard the right to health protection of future generations. This is an empirical premise supported by the Millennium Assessment of Ecosystems and Human Wellbeing, a large study aimed at examining the effects of ecosystem changes on human health (Reid et al. 2005). It concludes that the benefits future generations will be able to receive from ecosystems will be reduced significantly unless we take urgent, much more drastic action to curtail the rapid degradation of ecosystems that is caused by the growth in consumption and pollution of the expanding human population (Reid et al. 2005). Two examples of issues that cause significant concern are climate change and the growth of the farm animal sector. With regard to the former, the fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) reveals that, relative to the third Assessment Report, "there is now higher confidence in the projected increases in droughts, heat waves and floods" (IPCC 2007b, 19). Evidence also indicates that "specific groups, such as the poor and elderly" will be more vulnerable and that "low-latitude and less developed areas generally face greater risk"

(IPCC 2007b, 19). A range of health risks, including heat wave impacts, diseases associated with exposure to high concentrations of air pollutants, diarrheal diseases, and flood-related health risks are expected to increase (Schneider et al. 2007, 791; IPCC 2007a, 27). As agricultural production likely will decrease in some areas, low-latitude countries are expected to experience reduced food security and increased malnutrition (Schneider et al. 2007, 781, 787, 791). Between 5 and 170 million people are expected (with medium confidence) to be "at risk of hunger by the 2080s as a consequence of climate change" (Schneider et al. 2007, 791; see also Schmidhuber and Tubiello 2007). With regard to the farm animal sector, some of its negative GHIs have been documented in a report with the title "Livestock's Long Shadow," published by the Livestock, Environment, and Development Initiative, a group coordinated by the Food and Agriculture Organization of the United Nations (Steinfeld et al. 2006). It claims that the "sector enters into more and direct competition for scarce land, water and other natural resources" and that "the environmental impact of livestock production will worsen dramatically … in the absence of major corrective features" (Steinfeld et al. 2006, xxi, 275). These environmental impacts include the unsustainable use of land and water resources, as well as negative impacts on air quality and atmospheric gas concentrations (especially those that contribute to climate change). Whereas it may not be immediately apparent how some of these might produce negative GHIs, there is no doubt that there is growing concern about the links between the sector and human disease, exemplified also by the rise in zoonoses, including swine flu (Woolhouse and Gowtage-Sequeira 2005).

The negative GHIs we must consider when we think about our negative duties toward future generations, however, are much more diverse than the negative GHIs associated with climate change and the farm animal sector. The ecological footprint concept can be usefully deployed to understand a wide range of negative GHIs associated with our activities (Wackernagel and Rees 1996). While the GHI concept measures the impact of human actions on the health of all biological organisms in one common unit, the concept of "ecological footprint" measures the impact of human activities on the nonhuman environment in one common unit: the use of bioproductive (biologically productive) space, or the quantity of biological resources that is used to provide for any particular human activity. While human health is affected by much more than by the use of bioproductive space, it has nevertheless been claimed that the ecological footprint is "the most comprehensive and most widely adopted overall measure of threats to environmental sustainability," and this indicator has itself been understood as one of the most important ways to measure the impact of "environmental stressors" on human health (Dietz et al. 2009, 118). The notion of "ecological footprint" was coined in the 1990s by William Rees and Mathis Wackernagel (1996) and stands for the "amount of biologically productive land and water area an individual, a city, a country, a region, or all of humanity uses to produce the resources it consumes and to absorb the waste it generates under current technology and resource management practices" (Kitzes and Wackernagel 2009, 813; Rees 2003, 898). It is important to emphasize that only biological material and waste products are taken into consideration. The effects on biological systems of materials that are neither created

nor absorbed by biological processes, such as plastics, are included, but no ecological footprint is provided for these products themselves (Kitzes and Wackernagel 2009, 814).[2]

Rees has calculated that there are only 1.8 hectares of biologically productive water and land per person on this planet, which is exceeded by the 2.2 hectares that are used by the average person living today. Since the global biocapacity or human carrying capacity is exceeded by more than 20 percent, Rees (2003; 2006) therefore concludes that the world is in "overshoot" as biological resources are consumed at a faster rate than the rate by which they can be replenished.[3] Since most people living in affluent countries exceed the average amount of "global hectares"—the amount of land that is needed to produce any particular commodity that is consumed and to deal with its waste—available per person by a large margin, Rees concludes that "most so-called 'advanced' countries are running massive unaccounted ecological deficits with the rest of the planet" (1996, 195). For example, the average ecological footprint of a citizen of the United Kingdom is 5.3 global hectares, or about three times the amount of biologically productive hectares that are available for each person in the world (Global Footprint Network 2008). Whereas the population of the United Kingdom is fairly stationary, there are other countries, for example the United States of America, that combine a large national ecological footprint with a significant increase in population, a very worrying combination (Ehrlich and Ehrlich 1997, 1198).

If we assume Rees is correct regarding this overshoot, we are faced with the question of not only what overshooting countries should do to reduce their ecological deficit, but also how many resources and how much waste each of us should be allowed toconsume and produce, respectively, and how many children we should be allowed to have, without jeopardising the right to health protection of others unfairly. To address this issue, ecological footprint calculators that gauge the footprints of individuals can be used. On the other hand, while the ecological footprint is a fairly inclusive measure, it is an inadequate tool to evaluate the moral character of human actions: while some activities may use relatively few resources and produce little waste, they might nevertheless undermine human and nonhuman health. An example would be killing someone, which might be considered positive if our sole aim was to reduce the ecological footprint of the entire human population. Therefore, a relatively large negative GHI need not be associated with a relatively large ecological footprint. Likewise, a relatively large ecological footprint need not be associated with a relatively large negative GHI. Compare, for example, the ecological footprint of a factory that produces shoes at a greater ecological footprint per shoe compared to a factory that produces shoes at a smaller ecological footprint. Should the former produce shoes that are significantly better for human health, for example by reducing bacterial infections, its average GHI per shoe produced might be more positive. In summary, if the ecological footprint is an important indicator of environmental stress on human health, there is reason to scrutinise whether those with relatively large individual ecological footprints might violate any human being's right to health protection.

Whether the negative GHIs produced by our present generation undermine the right to health protection of future generations may remain open to debate; however, if the validity of this premise is assumed, Caney's partial theory of intergenerational justice can be extrapolated to make the claim that (6) the negative GHIs of our present generation must be reduced to a fair level. Similarly, a commitment to intra-generational justice supports the view that (7) each person must be allocated a fair share of negative GHIs that should not be exceeded.[4] Whether this is done by limiting procreation, by using public instead of private transport, by changing one's diet, or by limiting one's water consumption, what matters is that negative GHIs are restricted, rather than how this is achieved.

While the ecological footprint provides a quantifiable measure, a similar calculator has not been developed yet for the GHI concept. Regardless, the GHI concept is useful, and we perhaps should seek a means for quantification. It is impossible to say categorically that those who produce relatively large amounts of greenhouse gas emissions or those who have relatively large ecological footprints act immorally. In order to evaluate the morality of our actions, we must consider the negative and positive GHIs that might be produced by them, allowing ourselves to be guided by the question of what we owe to every organism that possesses a right to health protection and promotion. The summation of a person's negative and positive GHIs could then be expressed by means of a combined GHI value. Quantifying GHIs would be particularly useful to evaluate the moral quality of those actions that might not be intrinsically wrong (e.g., travelling by plane), yet that would be wrong if done a number of times

and/or for reasons that are insufficiently good. As for ecological footprints, it must be emphasised that a fair share of negative GHIs does not mean an equal share. Some people might justifiably be allowed to produce a relatively larger share of negative GHIs than others, not because their interests would be more important, but because more negative GHIs might need to be produced to fulfil the positive GHIs associated with their interests. For example, to keep themselves warm, people who live in colder climates might claim that they should be allowed to produce more greenhouse gas emissions than those who live in warmer climates. This is justifiable where they need to burn more fossil fuels, at least in situations where it would not be reasonable to expect them to use alternative modes of heating that would produce fewer emissions or to relocate. Some variations in diet-related negative GHIs must also be tolerated to account for the fact that people live in different environments, rely on different foods, and may have different metabolic demands. The fact that people live in a wide range of environments also could be used to justify the view that some people should, *ceteris paribus*, be allowed to reproduce more compared to others, for example where this would be necessary to provide sufficient labour. And, some variations in job-related negative GHIs must also be tolerated, not because some people would be excused from jeopardising others' rights, but because some of their negative GHIs might be offset by the relatively greater amount of positive GHIs that their actions produce for others. For example, it may be advantageous to allow those who can use substances that produce greenhouse gases in more efficient ways (e.g., because they have developed better technologies) a greater share of greenhouse gas emissions if the positive GHIs that are thus produced

are conferred to others (such as a large factory owner who, *ceteris paribus*, uses energy more efficiently to produce shoes than the amount of energy smaller factories would need to produce an equal number of shoes).

Because a theory of negative GHIs focuses on the right to health protection, it is consequentialist—the morality of human actions is decided by assessing the consequences, measured in terms of whether the associated negative GHIs jeopardise others' interests in health protection—and not utilitarian. Actions that sacrifice the right to health protection that we should grant to every human being, including those who belong to future generations, are not acceptable, even if they promote the health of some. A more complete theory would need to include an assessment of how much moral weight should be given to human interests in health promotion up to and beyond a minimum threshold of health care and to the interests of nonhuman organisms in health protection and promotion. While no precise answer has been provided to the question of what should count as a fair share of negative GHIs, there can be little doubt that many people are under a moral obligation to curtail their negative GHIs if they take the right to health protection of all human beings, including those who will belong to future generations, seriously. Future generations of human beings will have a fundamental interest in adequate health protection. If the view that valuing their like interests as much as our own interests is morally justified, it is unfair for people living today to jeopardize their rights to health protection.

Objections and refutations

Considered here are three objections to this conclusion. A first objection stems from those who support the legitimacy of what Nordhaus has labelled as "growth discounting" (1997, 317). Since future generations might be able to use resources more efficiently, or find (the ability to use) new resources which will make them wealthier, the argument has been made that people who emit relatively large amounts of greenhouse gases should not necessarily restrict their emissions (Lomborg 2001, 314; Nordhaus and Boyer 1999). More generally, this would provide a reason why those who produce relatively large amounts of negative GHIs that would be unfair if future generations did not become wealthier should not be obliged to reduce their negative GHIs. This proposal is subject to several problems.

First, the claim that future generations will be wealthier is highly speculative, whereas it is highly likely that they will need more financial and other resources to deal with a wide range of negative GHIs that current generations have contributed. For example, the IPCC estimates with "high confidence" (which is defined in terms of an 80 percent chance) that some of the health benefits associated with climate change will be outweighed by the negative impacts, including "increased malnutrition," an increase in "the number of people suffering from death, disease and injury from heatwaves, floods storms, fires and droughts," and increased "cardiorespiratory morbidity and mortality" (Confalonieri et al. 2007, 393; IPCC 2007a, 27, 48). If some of these negative GHIs materialise, there can be little doubt that their financial and other resources would be

compromised. Even if we assume that nobody will be affected by any of these negative outcomes, a well-known report by Nicholas Stern (2006) claims that the costs of dealing with climate change now are smaller than the costs of dealing with it later. If this is correct, more resources will be required the longer it takes to develop an appropriate global framework, whether or not future generations will be wealthier.

Second, the objection fails to recognise that the possibility that future generations may not be harmed unfairly is not a necessary condition for the argument that positive action to reduce our negative GHIs is required. What it ignores is that the lifestyles of many people with relatively large negative GHIs may not only be problematic because of their consequences for future generations, but also because they already affect, in adverse ways, people who live today. Regarding climate change, the IPCC reports that there have already been human deaths attributable to climate change and that there is "very high confidence" that people living on many islands and in polar regions have already been adversely affected by climate change (Schneider et al. 2007, 781; IPCC 2007a, 33). Some of the adverse effects that these as well as other populations have experienced (including increases in water- and vector-borne diseases) have been documented recently by anthropologists Hans Baer and Merrill Singer, who present a wealth of evidence that those who have been and will be affected the worst by climate change are predominantly those populations who are marginalised already (Baer and Singer 2009, 15). The Millennium Assessment of Ecosystems and Human Wellbeing has reached a similar conclusion: "The changes that have been made to ecosystems have contributed to … the exacerbation of poverty for some groups of

people" (Reid et al. 2005, 1). Likewise, philosopher Peter Singer has claimed that, based on his assessment of the available evidence, "the greenhouse gas emissions of the industrialized nations have harmed, and are continuing to harm, many of the world's poorest people—along with many richer ones, too" (2009, 33).

Third, the argument that a later generation should deal with a problem that was created by an earlier generation simply because they are assumed to be wealthier clashes with the intuition behind the "polluter pays" principle. This point has been made poignantly by Caney: "If, for example, I leave rubbish in the street then, ceteris paribus, I have primary responsibility to clear it up—not some other actor who happens to have more wealth than me" (2009, 172).

A second objection stems from the perception that there is a morally relevant difference between activities such as littering and some other human activities that might produce negative GHIs, such as those related to greenhouse gases. It would be appropriate to give greater moral consideration to activities that pose almost certain threats to human interests than to activities that may be less likely to produce negative GHIs. For example, it could be argued that those who litter, at least if they do so in many public spaces, or those who steal, are almost certain to undermine the interests of other people, while it is less certain that those who produce negative GHIs by emitting greenhouse gases will harm others, who would therefore be at less risk. We might call this objection—discussed in a paper by Derek Bell (2011)—the "risk discounting" view.

In response to this "risk problem," Bell (2011) has argued that if we are serious about human rights, we should not only be concerned with certain violations of those rights (in which case—incidentally—action would be deferred until the violations had actually occurred), but also with what Henry Shue has called "predictable remediable threats" (1980, 33). This raises the question of whether these potential violations might be preventable. On this issue, Bell (2011) and Caney (2008, 538–539) support the view adopted by the IPCC, namely that we can at least in part remedy the threat posed by climate change and that we can do so without jeopardising any human being's vital interests. More generally, we should be concerned with all human activities that threaten to violate anyone's right to health protection, rather than just with those activities where threats are virtually certain.

A third objection starts from the view that any individual decision to forgo some activities that are associated with relatively large negative GHIs, such as reducing one's greenhouse gas emissions, achieves very little in terms of reducing negative GHIs overall (e.g., the total amount of anthropogenic greenhouse gas emissions) and therefore yields very little in terms of doing something about the associated human rights violations. On this basis, an objection could be made that, in the absence of appropriate policies to promote adequate collective action, nobody would have a duty to curtail his or her negative GHIs. We might label this the (severe) collective action discounting view, whereby moral priority is given to actions that do not require cooperation from others to produce positive or avoid negative effects. The collective action discounting objection might be based on recognition of either of the following two problems: The first is what

Bell (2011) has referred to as a problem of non-compliance; the second is the fact that it may not be clear what might be expected from us (i.e., no policy has been developed yet on what should count as a reasonable threshold of negative GHIs), what Bell deems a problem of allocation.

With regard to the first issue, it is true that little is achieved by the efforts that some individuals may make to reduce their negative GHIs without positive action from a large section of the whole human population. Because of this "tragedy of the commons" (Hardin 1968), collective action is required in order for positive actions to have substantial effects. Without collective decisions, people who voluntarily decide to curtail their negative GHIs might argue that they pay the costs for doing so by forgoing some of the positive GHIs that are associated with them, while others may grab hold of the opportunities they forgo or reap the benefits of living in a world with less negative GHIs overall. Indeed, it has been pointed out that, in a situation wherein a large share of the benefits of any particular optimal strategy would not manifest themselves until the present generation is no longer around (as with global climate change), the best collective decision from a shallow, self-interested perspective is for the whole present generation to avoid the adoption of such a strategy (Gardiner 2001, 403–404). The possibility that individual efforts may have little effect since others might defect, however, does not provide a legitimate excuse for non-compliance. Rather, "if we take human rights seriously and we expect some people not to comply with the duty not to personally violate human rights, then we should recognise a duty to promote effective institutions for the protection of human rights" (Bell 2011). It should be added that the

same should be said about any rights, including the rights that nonhuman organisms might possess.

With regard to the second problem, there may be wide social disagreement on what should count as GHIs as well as on how we can establish reliable knowledge about the GHIs that might be associated with human activities (for example, in relation to scientific uncertainties about the effects of increasing the concentration of greenhouse gas emissions into our atmosphere). On the other hand, if we take human rights seriously and no correlative duties have been specified and allocated, then we must create new or tweak existing institutions to specify as well as allocate duties (Bell 2011).[5] Broadening this issue to establish what Hardin (1968) called a system of "mutual coercion" that is "mutually agreed upon," each of us has a duty to contribute to the creation of (inter)national institutions and (inter)national policies on what counts as a fair cap of negative GHIs and on how individual allowances should be allocated. Since many different parameters must be considered to determine what should count as a negative GHI, working together with others and drawing on a wide range of expertise also can develop our understanding of how our activities might produce negative GHIs.

Policy-makers might decide that the production of some negative GHIs by some activities is so bad that they should be prohibited, as is the case already for some actions (for example, killing a human being without good reason). For other negative GHIs, systems could be put into place to try to ensure these stay within fair limits, either by limiting negative GHIs or by offsetting them through the production of positive GHIs.

This could be done either indirectly through taxation or directly through the development of strategies to make sure those who produce negative GHIs deal with the problems they produce themselves. In the former system, governments could raise and use GHI taxes to fund activities that produce positive GHIs in order to counterbalance the negative GHIs produced by the taxed activities. In the latter system, governments could force those who produce negative GHIs to offset these by producing positive GHIs. These options have been discussed elsewhere in relation to the policies we might develop to curtail the negative GHIs associated with the consumption of farmed animal products (Deckers 2010). In the interim, the fact that we lack a global political project to allocate and police negative GHI thresholds does not excuse us from the duty to make a fair contribution to the creation of such a project.

Do individuals have a duty to curtail their negative GHIs in the absence of adequate policies? Given that those who adopt voluntary measures to curtail their negative GHIs may pay the price for doing so, the expectation that others will be free-riders could foster the view that there is no specific duty to curtail negative GHIs. This view, however, is not persuasive (see, for example, Bell 2011). It is not because we are uncertain about the consequences of our actions or about whether others will adopt similar actions that we should not commit ourselves to adopting actions that accord with the demands of justice. The sheer fact that we need to develop policies does not provide an excuse for failing to decide personally how negative GHIs should be measured and constrained, how maximum thresholds of negative GHIs should be allocated, and how to live accordingly. If we do not make such decisions for ourselves,

we may enjoy lifestyles that produce more negative GHIs than the amount of negative GHIs that would be allowed if a theory of justice were agreed upon and implemented through regulations. In other words, we would be benefiting from our own and others' unwillingness to contribute adequately to the creation of policies to constrain negative GHIs. To the extent that these violate the human right to health protection, we would be benefiting from human rights violations. If we take this right seriously, these violations are unacceptable. On this basis, Bell (2011) has argued in the context of a discussion of the ethics of climate change that each person must "reduce their greenhouse gas emissions to a level that they can reasonably believe would be consistent with the specification and allocation of duties by effective institutions." Since some people's emissions may be below that level, the word "reduce" should be replaced by "limit" to be accurate. Applying this rule to our more general concern with negative GHIs, it is clear we all have a duty to ensure we limit our negative GHIs to a threshold we think would be agreed to by just institutions. The duty to develop policies does not diminish the duty for each person to decide for himself or herself when an action might harm others unjustifiably.

Conclusion

The GHI concept is useful to throw light on the bioethical question of what our duties are toward future generations. Future generations of human beings have fundamental interests in health protection, and it should not be too demanding for us to safeguard

these interests. We can fulfil our negative duties if we fail to exceed our fair share of negative GHIs.

There are some challenges and limitations to this argument that have not been discussed here. A baseline of human health care sufficient to ground a human right as well as what might count as a fair share of negative GHIs should be defined, and positive duties that contribute to health promotion should be explored. A further issue is the question of how the fundamental interests of nonhuman organisms should weigh in the balance with human interests. As argued elsewhere, even if the fundamental interests of other organisms are not as morally weighty as those of human organisms, many human beings nevertheless should severely reduce their negative GHIs to safeguard the rights of other animals, for example, by adopting minimal moral veganism (Deckers 2011). A theory examining the moral significance of interests of nonhuman organisms is needed. In spite of these limitations, there are reasons to suspect that Jamieson (2008) may be right: the price of many current lifestyles is unfair on future generations. If they adopt the view that the fundamental interests of other human beings, including those who will belong to future generations, should take precedence over their own more trivial interests, the world's affluent populations must take drastic and immediate action to reduce their negative GHIs.

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Notes

[1] One of the dictionary definitions of "to flourish" is "to be in good health" (Hawkins and Allen 1991, 541).

[2] Since Rees and Wackernagel included the areas needed for waste assimilation, emissions of carbon dioxide have been included, yet no other emissions. The relative weight of these emissions within one's ecological footprint has been determined by the area of forest that would be required to assimilate those emissions, an approach that has been criticized not only because there are other ways in which carbon emissions could be sequestered, but also because subjective opinions might influence the used conversion rates (Van den Bergh and Verbruggen 1999). A similar problem underlies the calculation of the ecological footprint of nuclear energy, which has been "set at par with fossil fuel energy, for lack of a consensus on an alternate methodology" (Moran et al. 2009, 1943). In other words, it has been determined by the amount of land that would be required to offset the CO_2-equivalent of nuclear energy.

[3] Rees (2006) refers to Catton (1980) for the concept of "overshoot."

[4] A similar claim is made by Gerald Gaus, who argues that, "if (1) an accumulation of X-ing sets back other people's interests, and if (2) the harm is serious enough such that its prevention warrants limiting the

liberty to X (either by regulating or prohibiting X-ing), then (3) everyone should carry their fair share of the burden" (1999, 197).

[5] A similar point has been made by Maltais, yet it is my view that his call for "a new global political project" is necessary for a wide range of "global collective actions problems" (2008, 597) rather than just for problems related to climate change.