

The Health Reframing of Climate Change and the Poverty of Narrow Bioethics

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A growing number of voices are calling attention to the catastrophic ways climate change will impact human health.¹ The trend seems to be more than just increasingly linking our health to the changing climate. Instead, it often appears as a much grander move, one that more thoroughly and definitively reframes the phenomenon of climate change in terms of its consequences for human health. The trend implies that it is as if by reframing climate change as essentially or most significantly a health issue, we are seeing it aright for the first time.

On the one hand, there are reasons to welcome this development. First, it has the truth on its side: Climate change really is harming and will continue to take terrifying tolls on human health. So, a health-centered reorientation provides accurate descriptions, generates useful and reliable predictions, and outlines a research program that can inform policy aimed at mitigation and adaptation. Second, reframing climate change as a health issue promises to motivate action more than abstract metrics and unmet events ever could. Thus, the health reframing might overcome “psychological obstacles” that Dale Jamieson identifies in *Reason in a Dark Time*:

Evolution built us to respond to rapid movements of middle-sized objects, not to the slow buildup of insensible gases in the atmosphere. Most of us respond dramatically to what we sense, not to what we think. As a result, even those of us who are concerned about climate change find it difficult to feel its urgency and to act decisively.²

We can vividly imagine and more meaningfully grasp impacts on health, which are personally relevant and deeply concerning. In general, imaginables are more motivationally potent than intelligibles. Unlike climatologists’ abstract data (e.g., annual increase in average global temperature, rate of increase in atmospheric concentrations of greenhouse gases), the climate change–health story is told in a common language. The scenarios it depicts are graphically represented in the imagination, while the climate scientists’ abstracta are confined to the intellect. Because we care about health, and because we are witnessing an increasingly clear and distinct image of how climate change threatens it, the health-focused reframing of climate change might move us to take action to advance the mitigation agenda.³ This potential is empirically supported: Malbach and colleagues found that participants

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responded positively to presentations giving voice to climate change's health implications, especially to public health-related benefits of mitigation-aiming policy actions.⁴

On the other hand, reframing climate change in terms of human health should cause concern for other reasons. For one, the health framing is just one among many. Given the stupefying complexities and world-sized scope of climate change, it is a phenomenon — or a constellation of phenomena — that can be framed in various ways. Since climate change can be engaged from multiple perspectives, it is natural to wonder whether the health framing is complete, whether it conflicts or coheres with other framings, and whether it should be prioritized or privileged if

discussion to the ethics of research on climate change mitigation and adaptation strategies. I argue that the research ethics associated with narrow bioethics and the regulatory frameworks developed for research on human subjects — particularly the principles and guidelines that emerged during the last century of medical and social-scientific research — are inadequate for evaluating and governing research in this space. Although mitigation and adaptation strategies promise benefits and minimized harms to human health, the health-centered ethics frameworks of narrow bioethics are the wrong tools for evaluating and regulating research on those strategies. Narrow bioethics cannot capture all that is at stake ethically and, therefore, reframing climate change as a health issue

I argue that the research ethics associated with narrow bioethics and the regulatory frameworks developed for research on human subjects — particularly the principles and guidelines that emerged during the last century of medical and social-scientific research — are inadequate for evaluating and governing research in this space. Although mitigation and adaptation strategies promise benefits and minimized harms to human health, the health-centered ethics frameworks of narrow bioethics are the wrong tools for evaluating and regulating research on those strategies.

and when conflicts with other framings occur. Relatedly, another reason for concern is the possible inadequacy of the ethical frameworks the health-centered framing brings along. By reframing climate change as a health issue, we risk fooling ourselves into thinking that the ethics of health care and health research supply all of the normative categories in terms of which we should analyze climate change. To put the point another way, if we adopt a human health-oriented stance towards climate change, we risk viewing all of its ethical issues along the dimensions of medical ethics, public health ethics, and the ethics of research on human participants. However, this perspective provides biased and incomplete analyses of the relevant ethical problems and similarly distorted evaluations of potential solutions. Although the health reframing of climate change contains truth and utility, it cannot capture the whole moral picture.

In this essay, I explore and motivate these worries, and I caution against wholly transposing the ethics of climate change into the key of narrow bioethics. By “narrow bioethics,” I mean the ethical frameworks normally employed in medicine, public health, and human research. To illustrate this point, I limit my

leaves much moral value out of view. Narrow bioethics omits values and principles that are familiar to environmental philosophy and that deserve a place in our deliberations about how we ought to respond to climate change. In particular, biocentric and ecocentric frameworks deserve a place in our deliberations. While narrow bioethics and environmental ethics need not be at odds, the former without the latter yields incomplete — and thus unreliable — moral analyses and evaluations of ethical problems and possible solutions. The remedy is either to grant that other framings are indispensable, in which case we must admit that narrow bioethics is just one of many normative approaches; or, to create — or rediscover — a broader bioethics, one that includes but does not reduce to or automatically privilege human health-centric ethical frameworks.

In section 1, I explain how anthropocentrism permeates the traditional research ethics framework in that it identifies human health and human-directed values as the center of moral gravity. In section 2, I explore the incompleteness of this framework when it is exported from narrow bioethics and used to evaluate proposed research on strategies to mitigate climate

change. In section 3, I explore the same incompleteness in the context of research on adaptation strategies. Finally, in section 4, I sketch alternatives to — or ways of augmenting — narrow bioethics, highlighting ecocentric and biocentric values and principles that should occupy roles in our evaluations and governance of research on climate change mitigation and adaptation strategies.

1. Narrow Bioethics and Its Anthropocentrism

Anthropocentrism is a worldview that puts human beings and their interests at center stage. The centrality can be literal or spatial as evidenced by the prominence of geocentric theories of the universe in the history of Western thought. The centrality can also be, and often is, figurative — evaluative and deontic in character. In this latter sense, anthropocentrism is the view that human beings and human interests are either the only entities having noninstrumental moral value (i.e., “exclusive anthropocentrism”) or the entities with the most significant noninstrumental moral value (i.e., “inclusive anthropocentrism”). Of a piece with either form of moral centrality is moral ultimacy: Anything nonhuman having moral value has that value instrumentally or by virtue of its relation to human welfare.

Environmental philosophers and other writers have discussed anthropocentrism in the context of environmental ethics and the implications of an understanding our relationship to nature in this way. In a landmark paper, “The Historical Roots of Our Ecological Crisis,” the historian of science and technology Lynne White Jr. famously suggested that anthropocentrism, clad in a shroud of Christianity, has been the prime mover in creating the environmental crises we now face.⁵ For the worldview’s dominant tendencies find expression in our scientific and technological exploitation — and corollary destruction — of nature, all of which seem justified given our purported dominion over nature and our monopoly over the spiritual. The environment is there for us. Its contents and materials are resources at our disposal. We owe nature nothing, and enjoy a near-perfect freedom to alter, consume, use, and discard nature however we see fit and limited only by anthropocentric constraints related to how human welfare is helped, harmed, or hindered by the environmental consequences of our actions.

As I shall use the term, “anthropocentric” describes ethical frameworks that either exclusively consider human beings and their interests or automatically privilege or assign greater weight to them. In anthropocentric ethical frameworks, nature’s value is either merely instrumental or second-rate and discount-

able. In this section, I submit that narrow bioethics — understood as the ethical frameworks in medical ethics, public health ethics, and research ethics as they are typically understood — is anthropocentric. For each of narrow bioethics’ frameworks casts human interests as the center of moral gravity.

Medical ethics is anthropocentric, and rightfully so. For it is a framework or tool designed for use in the interrelations between humans in the clinical encounter. Its values and principles concern and are applied to the health and wellbeing of patients, the responsibilities of physicians and institutions, and the fair allocation of medical goods. As a two-and-a-half-millennia old tradition reaching back to Hippocrates, medical ethics is about a thoroughly human endeavor in both its activities and aims as well as the scientific knowledge that makes the practice of medicine possible. When ethical dilemmas arise in clinical settings, they involve conflicts between principles, both sides of which refer to human-directed values. For instance, beneficence and the duty to provide care can conflict with a patient’s autonomy. And when an autonomous choice to refuse care results in preventable death, it is the tragic triumph of one human value or interest over another. Health is indeed a good, though not the only human good. But dilemmas and conflicting duties in medicine always pertain to human goods. In Part VI of the *Precepts*, Hippocrates tells us, “For where there is love of man (*philanthropia*), there is also love of the art [of medicine].”⁶ My claim can be expressed by revising the Hippocratic quote: Where there is medical ethics, there is also anthropocentrism.

There are practices in medicine, which warrant ethical appraisal, that do not just pit one human interest against another. For example, xenotransplantation produces a human benefit at the cost of nonhuman harms. And medical procedures — through manufacturing involved, waste produced, or energy consumed — result in environmental harms. The fact that we so readily find these practices justified is a symptom of our anthropocentrism. Exclusive anthropocentrism sees no trade-off. Inclusive anthropocentrism usually sees a favorable benefit-harms ratio, except when the environmental harms result in even greater harms to human welfare.

Public health ethics begins when we wonder about the moral justifications for public health interventions, realize that our public health-related aims outstrip our resources, or perceive conflicts between individuals’ values and desired population-health outcomes. There are two dominant philosophical approaches to public health ethics: the maximizing-welfare approach and the social-justice approach.⁷ While these approaches offer different framings, anal-

yses, and evaluations of public health issues and interventions, both neglect the noninstrumental value or moral considerability of nonhuman nature. In framing public health's ethical dilemmas, these approaches will either pit one human-directed value against another (e.g., herd immunity vs. individual liberty in the context of mandated vaccination) or argue that one intervention better promotes social justice than another. On either approach, the values are typically human-directed values; that is, the values at stake are those we assign to human interests. Here, nonhuman nature is only instrumentally valuable — as a means to or on the way towards human health, justice, and flourishing — and never independently morally considerable. Thus, public health ethics is largely, if not completely, anthropocentric.⁸

Research ethics, at least the human subjects-concerning research ethics normally practiced in narrow bioethics, is likewise anthropocentric. The duties to minimize risks to participants, to ensure a favorable risk-benefit ratio, to receive each participant's voluntary and informed consent, to select subjects fairly, and to distribute the benefits and burdens of research in accordance with justice — all of these commitments are designed to protect the health and wellbeing of human subjects while at the same time promote the interests of their host communities and greater society through the production of knowledge and all it affords. It is not wrong for human subjects research ethics to be anthropocentric. In fact, it is a byproduct of the history that led to its principles and governance, including atrocities in Nazi Germany and at Tuskegee. Research ethics developed as a response to these events. The very purpose of Institutional Review Boards (IRBs) is to protect the rights and welfare of human participants in biomedical and behavioral research.⁹ Both the research and its regulation, then, aim at human-directed goods. The ethical principles articulated in the Belmont Report and reflected in U.S. regulatory requirements for IRBs are anthropocentric for very good reasons.¹⁰

Of course, there are inclusive anthropocentric and non-anthropocentric tendencies in research ethics, which we find in Russell and Burch's replacement, reduction, and refinement (3Rs) of humane animal research¹¹ and which get institutionally expressed in Institutional Animal Care and Use Committees (IACUCs) and ethics-based limitations and guidelines on the use of nonhuman animals in scientific research. Although these commitments are not made on anthropocentric grounds, some anthropocentrism is often at work in the ethical justifications offered for such research. So, although Singer-type sentientism¹² or Regan-type concerns about animals' being "sub-

jects-of-a-life"¹³ make nonhuman animals morally considerable, the party line in narrow bioethics is that the human interests served by conducting research on these creatures are more morally significant. On this matter, the road oft traveled in narrow bioethics is like the one mapped out by Bonnie Steinbock, which leads us to the vista where human interests can be seen as mattering most and the need to "take care of our own" gives us sufficient reason for privileging our own core interests in the practice of animal experimentation.¹⁴ In the latter case, we come home to anthropocentrism after realizing that our non-anthropocentric values and commitments unmask animal experimentation as needing moral justification.

There are important exceptions and new additions to the above pattern in more recent literature in bioethics and moral philosophy. David DeGrazia and Tom Beauchamp's recent book, for example, proposes a new, more comprehensive framework for animal research ethics, one that fills in gaps in the 3Rs approach and treats animal welfare as a noninstrumental value.¹⁵ And Christine Korsgaard's recent book makes the case for direct obligations to nonhuman animals in a Kantian framework, a framework that traditionally generated only deal-breakingly bad implications for what we owe our fellow creatures.¹⁶ Still, while these advances might move the philosophical *Geiste* forward, it remains to be seen whether they will shape the culture and practice of scientific experimentation on animals. And the views are either inclusively anthropocentric, as in the case of DeGrazia and Beauchamp, or creaturely, individualistic, or atomistic, as in the case of Singer, Regan, and Korsgaard. By "creaturely," I mean that they refrain from assigning noninstrumental moral value to nonanimal nature. By "individualistic" and "atomistic," I mean that they limit such status to individual animals, thereby excluding holistic entities or collectives like species and ecosystems. As a result, these views cannot take biocentric or ecocentric perspectives, and thus leave much of nature outside the scope of direct moral concern.

We do hold, albeit often not dearly enough, non-anthropocentric values and commitments. And the frameworks of which they are a part might be used to evaluate research on mitigation and adaptation strategies. But animal-regarding values discussed above cannot assign noninstrumental value to the rest of nature (i.e., nonanimal nature). Nonanimal entities like plants and whole ecosystems have no moral considerability, according to these frameworks, except insofar as they are instrumentally valuable to human and nonhuman animals. Furthermore, animal-regarding values are vulnerable to anthropocentric return. That is, inclusive anthropocentrism

allows for a human-first ranking of interests. Most of us are likely to discount or find justified great suffering of nonhuman animals if it is necessary to achieving some good, however small and insignificant, to human beings. Although it is clear that this is unwarranted speciesism in the case of gustatory pleasures or entertainment, it is more difficult to persuade others that human health is insignificant or that nonhuman goods are as equally significant as human health and wellbeing. The view that human and nonhuman interests are of equal significance remains a minority opinion despite compelling arguments in its favor.¹⁷ While this status does not undermine its claim to the truth, it does mean that our practices are shaped by policies and frameworks that fail to reflect its insights.

As environmental philosophers understand, anthropocentrism and nonhuman animal-directed values are not the only possible approaches to assigning moral worth to the environment. In section 4, I identify biocentrism and ecocentrism as alternatives or augmentations warranting due consideration. Next, in sections 2–3, I characterize the poverty of narrow bioethics in the context of evaluating and governing research on climate change mitigation and adaptation strategies.

Before turning to this task, I must introduce a distinction to ward off misunderstanding. There is a difference between values being anthropocentric and their being anthropogenic. And this is due to the difference between the object of value (i.e., that which is valued) and the origin of value (i.e., that which is valuing). On my view, human beings and human cultures may very well be the origin of all moral value in the sense that it is we who do the valuing, coloring the otherwise sterile and valueless world with our moral attitudes and practical commitments. However, even if we are sole authors or discerners of value — the lone moral valuers — it does not follow that we are the only objects of value. Human valuing can and often do have nonhuman entities as their objects, and these valuing can occur in a noninstrumental manner. In “Must a Concern for the Environment Be Centred on Human Beings?” the philosopher Bernard Williams puts the point well, maintaining what I call the anthropocentric–anthropogenic distinction about values:

It is one thing to ask whose questions these are; it is another matter to ask whose interests will be referred to in the answers.... [T]he answers must be human answers: they must be based on human values, values that human beings can make part of their lives and understand themselves as pursuing and respecting.¹⁸

It is worth noting this difference because I will be criticizing narrow bioethics for its anthropocentrism and its corollary incompleteness in the context of climate change. In encouraging an environmental turn in bioethics — or expanding the scope of its values, principles, and considerations — I do not mean to be importing or demanding validation of alien values. Rather, I am inviting bioethicists to engage in activities of valuing that they will find both familiar and sources of renewal. It will be our valuing activity that move us away from anthropocentrism. As Williams puts the point, “our refusal of the anthropocentric must itself be a human refusal.”¹⁹

2. Research Ethics and Climate Change Mitigation Strategies

Many human activities, primarily those that involve burning of fossil fuels, emit greenhouse gases (GHGs) like carbon dioxide into the atmosphere. These gases in turn trap incoming solar radiation and warm the earth. Anthropogenic global warming is causing climate change, which will have — indeed, is already having — devastating impacts on our health, our ways of life, and our world as we know it. Given our understanding of the causes, scientists have developed several mitigation strategies, which are becoming more significant due to our habitual failure to reduce our greenhouse gas emissions and to the fact that significant warming has already occurred. There is a lack of cultural, economic, and political will to redesign our ways of life so that we sufficiently reduce GHG emissions.²⁰ And so, one might pin hopes on mitigation strategies not requiring serious changes in our collective behavior. The strategies have scientific underpinnings: We can remove GHGs from the atmosphere; and we can decrease the amount of sunlight that reaches our atmosphere or sticks around to the point of warming the earth.

Various climate engineering or “geoengineering” strategies have been proposed along the two pathways I have just sketched. These strategies fall into two general categories: solar radiation management (SRM) strategies, which aim to reflect sunlight and thereby reduce global warming; and carbon dioxide removal (CDR) or GHG removal, which aim to remove such gases from the atmosphere and sequester them at a volume and rate that results in net negative emissions. CDR or GHG-removal strategies range from the increased planting of trees to enhancing weathering, direct air capture, and ocean fertilization.²¹ Similarly, SRM strategies range from painting roofs white to deploying space mirrors and injecting aerosols into the stratosphere.²²

Implementing any of these strategies can, in principle, be perceived as a public health intervention in that by mitigating global warming and climate change, one mitigates or prevents the health impacts those phenomena would cause; the predicted increased mortality due to heat stress and heat stroke, related respiratory diseases, allergic diseases, the mortality and morbidity relate to extreme weather events, drought- and flooding-related challenges to food production, famine, as well as other society-destabilizing events of the biblical sort, and the death and violence that would accompany migration of environmental refugees and related conflict.²³ The health-centered reframing of climate change thereby reframes mitigation strategies as public health interventions, reimagining geoengineering as akin to immunization programs.

There is a vast literature on the ethics of geoengineering. Most of it deals with the ethics of implementation. This literature identifies a host of ethical issues: the risks of unforeseen, uncontrollable, and irreversible consequences and uncertainties attaching to alleged benefits;²⁴ challenges in obtaining meaningful consent from all stakeholders and participation in deliberations;²⁵ distributive justice-related inequalities in the distribution of burdens and benefits;²⁶ the lack of adequate governance structures and regulatory frameworks and questions of institutional legitimacy;²⁷ the hubris of our faith in technological saviors, and that faith's potential to deter other mitigation efforts.²⁸

It is noteworthy that, except for the point about hubris, these ethical issues fall into categories bioethicists often employ with familiarity and relative ease: beneficence and nonmaleficence; autonomy; and justice. However, because many of these sources grapple with geoengineering from outside of its health framing, the values at play are not identical to those we find in narrow bioethics.

Although it is difficult to clearly distinguish implementation from research in this context,²⁹ and although the ethics assessments we make about geoengineering research can apply to its implementation and vice versa,³⁰ it remains fair to say that there has been relatively little discussion of the ethics of research on geoengineering strategies.³¹ It is important to distinguish between three phases of research on these strategies: modeling, engineering, and climatic.³² At this last phase, the distinction between research and deployment or intervention is virtually nonexistent except perhaps in the minds and intentions of the agents who are performing the activity. Before any of these strategies can even be considered for deployment, their hypotheses must be empirically tested. If we consider implementation, then research is required. But how

can it be conducted ethically? And how should such research be regulated?

One of the best efforts to answer these questions was made by Morrow, Kopp, and Oppenheimer, who propose explicit ethical guidelines for research in this domain.³³ Following their lead, I shall limit my concern to research on stratospheric sulfate injection to increase planetary albedo, but I think my points generalize to research on other geoengineering strategies. They propose ethical guidelines for research that would empirically test climate-engineering hypotheses, guidelines they derive from the ethics of research on human and animal subjects: a Principle of Respect, which requires representative consent from all potentially affected nations, provided the right institutions are in place; a Principle of Beneficence and Justice, which requires that the risk-benefit ratio is favorable and the risks and benefits are fairly distributed; and a Minimization Principle, which mandates that no experiment should last longer, have greater geographic scope, or have greater impacts on climate, ecosystems, animals, and humans than is necessary for testing the hypothesis. The first two principles are derived from the Belmont Report.³⁴ The third principle is modeled on Russell and Burch's replacement, reduction, and refinement of animal research.³⁵

We should agree with Morrow, Kopp, and Oppenheimer on the importance of settling the oversight and collective governance issue, which they discuss in the context of their Principle of Respect. We need to decide on a system of collaborative governance given the scope of the phenomena being researched. In climatic research, the usual bodies — universities and individual nation-states — may not suffice: The global community might need to consent when all nations are potentially affected. Independent of whether one agrees with this point, answering the *who* question is not enough. We also need better answers to the *how* question — that is, what is the content of the principles the regulators use to evaluate and govern proposed research activity? It is likely that even if we have a truly global regulatory system established, the interests it promotes will be nationalistic, socio-economic, and anthropocentric.

One criticism of Morrow, Kopp, and Oppenheimer's approach is their limit to climatic studies, which are gargantuan in scale and the scope of their potential impacts on human populations and the biosphere. We need to develop a set of principles that can evaluate — and a regulatory system that can govern — middle-stage research exemplified by smaller-scale engineering studies. These are the field trials of geoengineering research. We are at the doorstep of this era of geoengineering research, and the work needed to govern that

research is more urgent than the further-off-in-time programs involving climatic studies.

Another criticism is that the guidelines are mostly echoes of narrow bioethics. Their principles are the application of research ethics principles found in the narrow-bioethics tradition. This is evidenced in their focus on consent and the account of benefits and risks that only make explicit reference human and animal interests. If their guidelines are not mere applications of Belmont-type principles, then they are at best analogies. As they acknowledge, the principles do not “apply straightforwardly” to geoengineering research.³⁶ Still, they claim that researchers should respect “the basic values that lie behind them.”³⁷ However, the values that lie behind the Belmont Report’s principles are

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anthropocentric values. Thus, we continue practicing narrow bioethics when we extract those values from human subjects research and employ them in geoengineering-research setting.

There have been recent calls to rethink and overhaul the Belmont Report, coupled with the observation that biomedical research on human subjects has dramatically changed since its principles were first authored.³⁸ But none of the proposed overhauls move us away from narrow bioethics. Morrow, Kopp, and Oppenheimer’s extending and analogizing Belmont-type principles to climate engineering research are similar in this regard. Because the Belmont Report’s principles were designed as tools for evaluating and governing research on human participants, they are unfit sources when the target is environmental research. Except for the 3Rs approach and this non-anthropocentric streak familiar to practitioners of narrow bioethics, the principles need to be augmented by additional values and principles from environmental philosophy and environmental ethics. I identify biocentrism and ecocentrism as candidates in section 4. But first, in section 3, I make a similar point about narrow bioethics and its incompleteness in the context of research on climate change adaptation strategies.

3. Research Ethics and Climate Change Adaptation Strategies

Since mitigation may fail, and since climate change is already having harmful consequences, there is and will likely remain a need to adapt. Climate change adaptation strategies consist in adjusting to actual or predicted climate change, thereby modifying impacts. A variety of adaptation strategies have been proposed.³⁹ Adaptation strategies range from rethinking management of water supply to redesigning urban landscapes with rising sea levels in mind, from reimagining food production to engineering drought-resistant crops. Whether the health threat is a direct (e.g., heat stress) or indirect (e.g., food insecurity) impact of climate change, adaptation strategies amount to prepared defenses against or maneuvers to dodge them or lessen their blows.

One of the most interesting threats, which I will focus on in this section, concerns expanded and enhanced threat of mosquito-borne infectious disease, which has received a great deal of attention in the bioethics literature. As climates change, so do the habitable conditions of dengue-, Zika-, chikungunya-, yellow fever-transmitting mosquitoes *Aedes aegypti* and *Aedes albopictus*. As these mosquito populations expand range, there is a massive increase in the world’s population at risk of infection.⁴⁰ One strategy to counter this threat is a genetic engineering strategy known as a gene drive. The technique involves introducing and propagating a desired set of genes in a population or whole species by enhancing the probability that a specific allele will transmit to offspring.⁴¹ In the context of mosquito-borne diseases and the climate change-related threat of their expansion, some have proposed using gene drives to eradicate or suppress mosquito populations, thereby eliminating or lessening the threat to human health.⁴²

There is a massive and ever-growing literature on the theoretical and empirical underpinnings of climate change adaptation strategies.⁴³ Alongside this empirical work, there has been active discussion of the ethical and regulatory issues arising from the prospects of deploying adaptation strategies. However, there has been comparatively little discussion on the ethics of research needed to better understand, design, and assess these strategies.⁴⁴ As with the mitigation-aiming geoengineering strategies discussed in section 2, climate change adaptation strategies must be empirically vetted by rigorous research programs. And that means there is a need for robust and reliable ethics review and governance of research in this area.

I shall limit my discussion to field trials of gene-drive technology. Such research is already underway, though only recently. In New York State, the USDA permitted researchers to release genetically engineered diamondback moths to test hypotheses crucial to assessing gene drives' potential to control agricultural pests.⁴⁵ In May 2020, the U.S. Environmental Protection Agency (EPA) granted Experimental Use Permits, approving Oxitec's plans to release one billion genetically modified mosquitoes in Texas and Florida.⁴⁶

The existing literature has identified several important ethical issues surrounding research, development, and deployment of gene-drive technology: the need for adequate assessment of risks and potential benefits, including ecological risk assessments;⁴⁷ international laws' demand for consent from potentially affected nations and indigenous communities;⁴⁸ the need for substantive community engagement and incorporating communities' meaningful participation and informed decision making in research governance;⁴⁹ and distributive justice-related issues concerning access-prohibiting cost and patents.⁵⁰ Valuable discussions in the literature have also concerned regulatory institutions and international law. Meghani and Kuzra, for example, argue that the FDA's risk assessment of the Oxitec GH mosquito was insufficiently rigorous and misinterpreted relevant data, concluding that the FDA is unprepared for effectively regulating animals with gene drives.⁵¹ Laverly and colleagues explore the implications of the Cartagena Protocol for policy and regulatory infrastructure for importing and using genetically modified organisms, emphasizing its relevance to site selection and identifying key regulatory authorities.⁵² Finally, analogous points about hubris and mitigation deterrence can be made about adaptation.⁵³ The promise of infrastructure- and engineering-based adaptation might undermine current efforts at mitigation, especially since those adaptation strategies do not ask us to change our behaviors.

However, the overwhelming majority of ethics literature on gene-drive research is animated by the spirit of narrow bioethics. Because of this, it generates an incomplete picture of the moral dimensions of gene-drive research. One symptom that the bioethics literature has engaged with gene-drive research in the narrow-bioethics framework is that each of the aforementioned issues bioethicists have identified fall into the usual categories: beneficence and nonmaleficence, autonomy, and justice. Although the "big four" principles can provide helpful ethical analyses of familiar issues in clinical medical ethics and research on human subjects, we must not unreflectively and uncritically

accept them as fit for the work of evaluating gene-drive field trials or other programs of research on climate change adaptation strategies.

In this literature, there are apparent examples of non-anthropocentric values, typically when authors write about risks and harms to the ecosystems. For example, Meghani and Kuzma argue that the FDA should revise its regulatory process to allow for a broader and more thorough study of possible ecological impacts and to give the public a role in deciding which values shape risk assessments.⁵⁴ Despite this virtue, they offer no reason to think that public attitudes will include non-anthropocentric values. Predicted ecological impacts might only seem good or bad to the public based on how they affect their own interests. What matters for the anthropocentrism issue is why the public finds an impact morally significant. In another example, Neuhaus and Caplan call for ecological risk assessments (ERAs) in evaluating proposed field trials and in selecting sites for their conduct, which are superior to National Environmental Protection Act (NEPA)-mandated environmental assessments and impact statements.⁵⁵ However, although ERAs "evaluate the likely benefits and harms of a proposed activity on the wellbeing of humans and environment,"⁵⁶ the values that color assessments of environmental benefits and harms are anthropocentric. The National Academies of Science, Engineering, and Medicine (NASEM) Report contains no specification of any noninstrumental value in environmental wellbeing.⁵⁷ I submit that although ERAs are superior to NEPA-mandated assessments of environmental impact, ERAs make no moves to broaden bioethics; they just do narrow bioethics better.

There is another merely apparent example of non-anthropocentric valuing from the ethics literature on gene-drive research. In their discussion of the NASEM Report, Emerson and colleagues identify "respect and humility for the broader ecosystem in which humans live" as a hallmark of good stewardship and governance.⁵⁸ Tellingly, the only use of "humility" in the NASEM report occurs alongside "prudence," which is said to require deference to public perceptions of what outcomes count as benefits and harms.⁵⁹ Similarly, the report does not use "respect" in relation to nature or for ecosystems. Instead, there is discussion of governed communities' respect for authorities and processes governing economic and social activities.⁶⁰ The closest we get to respect for nature is in the following passage, which is worth quoting at length:

... [T]he arc from the President's Commission in 1982 to the Presidential Commission in 2010 reveals a set of questions that are less easily

articulated but are sometimes very deeply felt and have often been important in the public's reception of genetic technologies. The central theme in these questions is the possibility that some ways of using genetic technologies conflict with underlying moral norms that are implicit in how human beings understand the world, including their own nature and relationship to the rest of the world. In 1982 the President's Commission considered, and dismissed, a variety of objections to the very idea of "splicing life," such as that it would usurp powers properly left to God (p. 53) or would constitute an "arrogant interference with nature" (p. 55). In 2010, the Presidential Commission agreed that engineering a genome is not intrinsically wrong: "After careful deliberation, the Commission was not persuaded by concerns that synthetic biology fails to respect the proper relationship between humans and nature" (p. 139). It allowed, however, that the use of that power should adhere to a principle of "responsible stewardship," and it elaborated this principle as a responsibility to be good "stewards of nature, the earth's bounty, human health and well-being, and the world's safety" (p. 123). This way of talking about stewardship leaves some room for asking questions about the human relationship to nature: Although genetic engineering can be consistent with social standards for the human relationship to nature, using it to destroy significant natural phenomena might not be. Moreover, it might not be responsible even if the destruction of those natural phenomena were consistent with human health and well-being.⁶¹

Narrow bioethics is impoverished in that it lacks the theoretical resources needed to say why it would be ethically wrong or irresponsible stewardship to destroy natural phenomena when doing so would cohere with or advance the pursuit of human health and well-being. Next, in section 4, I identify biocentrism and ecocentrism as alternatives to anthropocentric values, alternatives that a broader bioethics would include and that ought to play a role in our ethical appraisals of the research programs discussed above.

4. Broad Bioethics and Non-Anthropocentric Values

As the non-anthropocentric streak familiar to practitioners of narrow bioethics reveals, there are features besides being human or instrumentally valuable to humans that can make nonhuman animals morally considerable. Singer identified sentience (i.e., the

capacity for sensory experience, particularly experience of pleasure and pain) as the criterion for moral considerability, the disregard for which renders much human use of animals morally abhorrent.⁶² Regan, on the other hand, thought that nonhuman animals status as "subjects-of-a-life" is what makes them morally considerable and bearers of rights.⁶³ As mentioned in section 1, although narrow bioethics is familiar with these alternatives to anthropocentrism, the values animating most advocacy for animal welfare stop short of incorporating other value frameworks familiar to environmental philosophers. Sentience and subjectivity do nothing to supply noninstrumental value to non-sentient entities like plants or holistic entities like species ecosystems.

Environmental philosophers are quick to point out that although sentience and subjectivity might represent nonhuman animals as noninstrumentally valuable and having moral standing, those theories leave the rest of nature untouched. Proponents of alternative value frameworks think that sentience and subjectivity are the wrong criteria for an organism's or entity's being morally considerable. In what follows, I very briefly characterize these alternative value frameworks.⁶⁴ Without endorsing any one of them, I submit that they warrant a place in our deliberations about climate change and how we ought to respond to it. Until they are included and given due consideration, our discourse and deliberations about environmental problems retains an anthropocentric bias, and our ethical analyses remain incomplete.

One non-anthropocentric alternative is biocentrism, according to which all life is morally considerable and noninstrumentally so.⁶⁵ Depending on how one ranks different forms of life, however, such biocentrism can be compatible with inclusive anthropocentrism. Another non-anthropocentric alternative is ecocentrism, according to which whole ecosystems, rather than the lives of individual organisms, are the centrally morally considerable entities.⁶⁶ According to ecocentrism, the "biotic community," as Aldo Leopold called it, has moral standing and bears ultimate moral value.⁶⁷

Along with these alternative values, there come alternative principles for action. Values imply duties. So, if we adopt biocentric or ecocentric values, we simultaneously take on corresponding practical commitments, commitments which might lead us down different paths than those we follow with anthropocentric commitments. To illustrate with just one example, consider the biocentrist Paul W. Taylor's rules of conduct, which he thinks are entailed by the attitude of respect for nature: nonmaleficence, which is "the duty not to do harm to any entity in the natural

environment that has a good of its own”;⁶⁸ noninterference, which contains “two sorts of negative duties, one requiring us to refrain from restricting the freedom of individual organisms, the other requiring a general ‘hands off’ policy with regard to ... whole ecosystems and ... individual organisms”;⁶⁹ fidelity, which requires remaining faithful to the trust and meeting the expectations of individual animals by neither deceiving nor betraying them;⁷⁰ and restitutive justice, which is “the duty to restore the balance of justice between a moral agent and a moral subject when the subject has been wronged by the agent.”⁷¹

would be a homecoming, one that honors bioethics’ and environmental ethics’ common ancestry in Leopold and Potter. Both thinkers invited us to rethink our place in nature, to recognize our dependence on the natural world, and to act more rationally and cautiously in response.

Conclusion

I have argued that narrow bioethics, because of its anthropocentrism, leaves us with a biased and incomplete ethical framework in the context of research on climate change mitigation and adaptation strategies.

I conclude with a dilemma: Either bioethics must be broadened to include principles related to non-anthropocentric values, which are already familiar to those working in environmental philosophy; or, bioethics remains narrow, in which case it will provide incomplete ethical analyses of climate change-related research and will be forced to outsource much moral-philosophical labor to other disciplines.

Evaluating and governing geoengineering and gene-drive research would look radically different if reviews and governance structures made use of these principles or reflected the values underlying them. But they do not. Why is that? It is not because effective arguments have been made against them or a stronger case has been made for opposing values and principles. It is because they are either ignored or dismissed without making the rationale explicit. The neglect or dismissal is not for good, articulated reasons. It might simply be the result of historical contingencies of bioethics’ development as a discipline. Again, without claiming that biocentrism or ecocentrism provide the correct ethical framework, and without endorsing Taylor’s respect for nature-based rules for conduct, I submit that such outlooks must be duly considered and that doing so requires rethinking bioethics and moving away from its narrowness and towards a pluralism about values and practical commitments. If there are good reasons for prioritizing human interests, then those reasons ought to be made explicit. And this is more likely to happen when non-anthropocentric values and principles are employed in earnest and taken seriously in deliberations.

Multiple authors have recently called for broadening bioethics in such a way that it incorporates the conceptual repertoire of environmental ethics. Lee⁷² and Jamieson⁷³ represent such broadening as a movement of return and rediscovery. A broader bioethics

As such, we have reason to be cautious and reflective about thoroughly reframing of climate change in terms of human health. Climate change is indeed a health issue. But it is also so much more than that. Our stance toward its ethical challenges, then, cannot be simply modeled on the postures and positions of narrow bioethics.

I conclude with a dilemma: Either bioethics must be broadened to include principles related to non-anthropocentric values, which are already familiar to those working in environmental philosophy; or, bioethics remains narrow, in which case it will provide incomplete ethical analyses of climate change-related research and will be forced to outsource much moral-philosophical labor to other disciplines.

In the end, it may turn out that, as MacPherson, Smith, and Rieder recently argued, environmental protection is a form of health promotion.⁷⁴ But even if these two pursuits complement each other, we should not think automatically think human health is always or the only moral reason for respecting nature. And if conflicts do occur, if we must choose between respecting nature and promoting human health, may we at least see the choice as an ethical dilemma. Until non-anthropocentric ethical frameworks are included in our analyses of environmental issues, including analyses of how climate change and human health intersect, we have incomplete and biased understandings of the moral challenges we face. Similarly, when we evalu-

ate research aimed at testing strategies for mitigating and adapting to climate change, those evaluations risk incompleteness and bias when they fail to include non-anthropocentric ethical frameworks. I do not mean to suggest that the outcomes of our deliberations must reflect biocentric or ecocentric prioritizations. Rather, I am suggesting that biocentric and ecocentric values must be part of our moral deliberations. Otherwise, our deliberations will fail to be honest, rigorous, and thorough. My point is that narrow bioethics leaves its practitioners without the resources for perceiving potential conflicts as such. When carried out in the context of a sufficiently broadened bioethics, our work on the ethical challenges related to climate change grows only more complex and difficult. But in return, our labor becomes all the more valuable.

Finally, in the beginning of this paper, I mentioned that abstract data from climatologists lack motivational import. Although these data are intelligible, they are not imaginable. And the imagination's failure to grip and depict them means they fail to move us towards action. The story of how climate change harms our health is more graphic and thus more moving. One might observe that the considerations I have brought forward are more like the climatologist's abstract data than the storyteller's concrete images. Philosophers routinely work with abstract raw materials to construct equally abstract questions, theses, and theories. It follows that philosophical contributions to discourse and deliberations about the environment are, like the climatologist's data, unlikely to motivate people to act. But this failure to motivate does not mean a failure to achieve truth. Although it is not the philosopher's job to motivate the masses, the philosopher's truth gains value when it is practically relevant and liberated from idleness. What environmental philosophers and philosophically oriented bioethicists ought to do is identify how their abstract ideas are at stake in practical decision making and show how they are expressed in imaginable, perceptible, and measurable ways in the actions and policies we consider. This will require meaningful interdisciplinary collaboration and a lifetime of learning for all parties involved.

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