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Edited by Mary C. Rawlinson and Caleb Ward

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HUNGRY BECAUSE OF CHANGE

Food, vulnerability, and climate

Alison Reiheld

Introduction: the problem

While many still seek to prevent or mitigate anthropogenic climate change, others focus on adaptation to the consequences of climate change. One much-discussed consequence of climate change is sea level rise. It has become the subject of many an article, editorial, and speculative fiction novel, including Paolo Bacigalupi's books *The Drowned Cities* and the award-winning *Ship Breaker*, both of which are set in a future US where the coastal areas are much changed and a civil war grips areas which did not take adaptive measures. More serious still are the impacts climate change is likely to have not only on the production of food but on the global supply chains of food on which so many now depend, impacts which render people vulnerable and give rise to moral obligations to reduce that vulnerability.

These impacts are already visible. In California, drought has afflicted farmers 11 of the last 14 years. More than \$2 billion in agricultural losses in California were due to drought in 2014 (Fischetti 2015). In recent years, US growing zones were shifted north by the USDA. David Wolfe, professor of plant and soil ecology at Cornell University, argues that "this revision of the hardiness zone map gives us a clear picture of the 'new normal'" (Samenow 2012). While monitoring agencies note large-scale changes, laypersons in some areas are beginning to viscerally feel the initial effects of what *may* be global climate change, but is certainly a change in local climate.

Indeed, farmers across the world have been noticing shifts in climate that affect their food production. In Peru, farmers and community members in Sullucuyoc Village have observed an increase in minimum temperatures ("It is warmer in the evenings") and changes in rainfall patterns such as heavier rainy seasons and increased erosion and landslides. Scientific climate projections suggest this will only worsen, as more rain comes in the rainy season and, during the dry season, rains decrease by up to 40% along with continued temperature increases of entire degrees Celsius (CARE 2011). Community members in Sullucuyoc Village identified the following food-related impacts of these climate change hazards: lower productivity of coffee, passion fruit, and avocado; loss of food crops such as manioc and vegetables; new pests and diseases in plants and animals; and loss of biodiversity through the disappearance of plant species (CARE 2011). Alone, such local data indicate nothing about climate change. A hot summer in St. Louis, Missouri, doesn't prove global warming; neither does a bitterly cold winter prove it is not happening, despite the

pithy sarcasm in the common wintry remark “so much for global warming.” It is large-scale data which show that such local phenomena are not isolated but rather part of a larger pattern. The Intergovernmental Panel on Climate Change (IPCC) claims that we will see more such shifts in rain and drought and temperature in the future, perhaps with drought, flooding, hunger, diseases, and stunted economic growth beginning sooner than previously estimated (Fischetti 2014). Shifts in rain, drought, and temperature are features of the environment that, along with soil, are major determinants of food production and are contributors to both hunger and thirst. Arid regions require more irrigation, making access to water of even greater importance. We see this in the increasingly tense battles over water rights in California and Colorado as drought affects farmers and those seeking drinking water in regions that, when first settled, were too arid to support the large-scale agriculture which now dominates local economies and feeds the US. NASA climate research scientist Benjamin Cook points out that, “Even where rain may not change much, greater evaporation will dry out the soils” as temperatures rise (Fischetti 2015).

In addition, many nations’ food consumption has shifted away from traditional foods produced locally to more processed foods produced abroad. Such nations are particularly subject to disruptions in global food production and chains of sale. They include the various nations known collectively by the UN as the Pacific Islands, such as American Samoa, Fiji, New Caledonia, and the Cook Islands. These patterns of food production and consumption are well-established. Indeed,

the foods that are most commonly consumed in Pacific communities have changed significantly. In particular, people have shifted away from traditional foodstuffs toward westernized, high-fat foods. . . . Corresponding with a fall in local food production, imported foods comprise between 30 and 90 percent of all foods eaten in the Pacific.

(World Health Organization 2002)

Such patterns are the case even in developed nations, which also import significant portions of their food. In the US, winter fruits and vegetables can come from as far away as Chile or Argentina, and most food is produced hundreds of miles away from where it is consumed. Saudi Arabia imports 80% of its food, much from East Africa. Mozambique has become a banana exporter as a result of corporate farms that have pushed local farmers off of their subsistence farming lands, such that food grown there no longer stays in the country. In Liberia, land which once grew food for local markets has been converted to growing oil palms for Malaysian palm oil giants such as Sime Darby. In Europe, as in Saudi Arabia, many food items come from the “African breadbasket” where commercial farms with the aim of exporting crops and selling only some to local markets continue to displace farms growing food for local distribution and consumption (Bourne 2014). While the conversion to corporate farming in many regions of Africa has value for locals who find that wages on commercial farms are more dependable than their own enterprises, it increases the proportion of the world’s population which depends on global food supply chains for their food and on globalized markets for their pay, even as local water supplies are used up.

In such a situation, it is easy to lose sight of the fact that not only do we need to maintain food production and distribution in the face of climate change, we need to increase it: by 2050, we must be able to feed 2 billion more people than the over 7 billion people we are already attempting to feed. And it is around this time that we expect to begin feeling the most severe impacts of climate change (Fischetti 2015) on freshwater, temperature, and other features of the environment which affect crops.

This complicated system of agricultural production and distribution has already made some people vulnerable and, when disrupted by climate change, may exacerbate existing vulnerabilities and create new ones. Such vulnerability creates an ethical demand, the enormity of which

might seem impossible to address given how widely it expands our moral community. However, an adequate conception of vulnerability coupled with an adequate conception of obligation can make it possible to address even this most transnational and cosmopolitan of demands.

Vulnerability

Vulnerability is a notion many people deploy without adequate reflection. There is a tendency to formulate it primarily in terms of vulnerability to exploitation, in which case it is conceived of as vulnerability to coercion, due either to diminished autonomy or constrained circumstances. This conception of vulnerability appears in medical ethics with respect to patients’ ability or inability to give autonomous, informed consent. Ruth Faden and Tom Beauchamp famously delineate an institutional or legal sense of informed consent from a philosophical sense of informed consent as: autonomous authorization. When informed consent as autonomous authorization has taken place, the patient (1) has substantial understanding of the risks and benefits of the recommended treatment, (2) is *not being coerced by outside forces*, and (3) autonomously authorizes the treatment in question (Faden and Beauchamp 1986, my emphasis). As established in guidelines for research on human subjects, vulnerability can also be presented in a related way as a compromised ability to advocate for oneself. Indeed, on at least one view, “vulnerable persons are those with reduced capacity, power, or control to protect their interests relative to other agents” (Mackenzie et al. 2014: 6).

In this sense, we are all vulnerable to climate change because of the global food supply chain. But this conception of vulnerability, alone, will not suffice. Mackenzie, Rogers, and Dodds propose a *taxonomy of vulnerability*, outlining three different sources of vulnerability (inherent, situational, and pathogenic) and two different states of vulnerability. Vulnerability can exist in two states: dispositional or occurrent, a distinction which “refers to the states of potential versus actual vulnerability” (Mackenzie et al. 2014: 8). A generalized universal vulnerability to climate change because of the global food supply chain would be dispositional for all but occurrent for some. But despite its universality, I contend that this vulnerability would *not* be what Mackenzie et al. call *inherent* vulnerability, which “refers to sources of vulnerability that are intrinsic to the human condition” (2014: 6). So, while all patients who participate in biomedical research are vulnerable to coercion and manipulation, and this is an inherent universal, this is not the case with universal vulnerability to climate change’s effects on the global food supply chain: that vulnerability is based not in the human condition per se, but rather in the economic context of food production and distribution. Such context-specific vulnerability – despite the universality of the context – is what Mackenzie et al. refer to as *situational* vulnerability. Such vulnerability “may be caused or exacerbated by the personal, social, political, economic, or environmental situations of individuals or social groups” and may be “short term, intermittent, or enduring” (Mackenzie et al. 2014). Particularly ethically troubling are *pathogenic* vulnerabilities, which can be generated by a variety of sources (including abusive or dysfunctional interpersonal relationships, but also sociopolitical oppression or injustice), and can even occur when a response intended to ameliorate vulnerability paradoxically exacerbates other vulnerabilities or creates new ones (Mackenzie et al. 2014: 9). With a sufficiently large scale of causation, I suspect even pathogenic vulnerabilities could be universal. However, Florencia Luna (2009) argues that such universal notions of vulnerability, while perhaps true in some sense, provide little or no traction for anyone seeking to explain how some people seem to be more vulnerable than others to the threats they may face in common. This would be the case whether the universality is inherent, situational, or pathogenic. To fail to attend to differences in vulnerability between groups is to ignore ethically salient factors of the world as it is.

And yet, labeling particular populations as vulnerable is not the right way to address this problem, either. Luna (2009) contends that labeling particular populations as vulnerable risks eliding real differences in vulnerability. CARE international also addresses this concern when it argues that the United Nations Framework Convention on Climate Change (UNFCCC) negotiations look at vulnerability at the wrong level by comparing nation-states' relative vulnerability to change, as though vulnerability were universal within each country. Indeed, CARE says, "Rarely does the UNFCCC process consider the critical issue of differential vulnerability within countries and communities based on socio-economic and political factors such as age, gender and social or political marginalization" (CARE 2011).

Such a granular approach is entirely consistent with Luna's analytic approach to vulnerability. Luna (2009) advocates attention to *layers of vulnerability* which allow us to see how vulnerability is cumulative and affects some folks more than others, even within the same households or subpopulations, and even when there are global food networks that might seem to affect all equally. Such layers of vulnerability can be quite particular. As CARE (2011) notes, women are less educated and less mobile, tied as they are to families of birth and of marriage in many cultures. This reduced mobility makes many women even more vulnerable than men in their families, men who may in fact be expected to move away to work and send money home. Of course, such expectations for men can create vulnerabilities for certain men, as evidenced by the large numbers of Bangladeshi and other Asian men who work dangerous, fast construction jobs in the sparkling cities of Malaysia and of Abu Dhabi, Saudi Arabia, and Arab Gulf states more generally (labor rules in host and donor nations often forbid women to perform contract migratory labor) (Kibria 2011).

Let us now consider further Luna's layers of vulnerability. Luna argues that vulnerability should be understood "dynamically and relationally" rather than as a series of too-rigid necessary and sufficient conditions:

... there might be different vulnerabilities, different layers operating. These layers may overlap: some of them may be related to problems with informed consent, others to social circumstances. The idea of layers of vulnerability gives flexibility to the concept of vulnerability. For example, if the situation of women is considered, it can be said that being a woman does not, in itself, imply that a person is vulnerable. A woman living in a country that does not recognize, or is intolerant of *reproductive rights* acquires a layer of vulnerability. ... In turn, an educated and resourceful woman in that same country can overcome some of the consequences of the intolerance of reproductive rights; however, a *poor woman* living in a country intolerant of reproductive rights acquires another layer of vulnerability. ... Moreover, an *illiterate* poor woman in a country intolerant of reproductive rights acquires still another layer. And if she is migrant and does not have her documentation in order or she belongs to an aboriginal group, she will acquire more and more layers of vulnerabilities. She will suffer these overlapping layers. ... Another way of understanding this proposal is not by thinking that someone *is* [essentially or inherently] vulnerable, but by considering a particular situation that *makes or renders* someone vulnerable. If the situation changes, the person may no longer be considered vulnerable.

(2009: 128–129)

This is the great practical strength of Luna's conception of vulnerability. The conditions that give rise to a situational or pathogenic vulnerability can be changed as well as responded to, while an inherent vulnerability can only be responded to. The granularity of Luna's conception allows us to look at the specifics of situations and ask, *how can we remove at least some of these layers of*

vulnerability? Or as Luna herself puts it, "After we identify different layers of vulnerability ... we can think of various ways of avoiding or minimizing those layers" (2009: 131). Luna wisely acknowledges that in some cases, it may not be possible to minimize the layers of vulnerability identified. What of climate change, and hunger and thirst? Can these be mitigated? Or are we stuck with all the layers of vulnerability implied by climate-change-related shifting factors in access to food and water? I think not.

One of the keys to reducing vulnerability to climate change is to attempt to strip away layers where possible. Let us consider this with a particular layer of vulnerability, namely, dependence on global agricultural markets for pay and for food. For farmers in Mozambique or Liberia, it is essential to retain control over their land rather than giving it to foreign corporations. Consider the story of 45-year-old Chirime, who farmed her land in Mozambique, land which had fed her and her five children for years. Farming is a respectable form of work for a woman to undertake to provide for her family, and comparable options may be very limited for women in patriarchal societies. And yet, this livelihood was taken from Chirime. As Joel Bourne (2014) writes for *National Geographic*:

She never saw the big tractor coming. First it plowed up her banana trees. Then her corn. Then her beans, sweet potatoes, cassava. Within a few, dusty minutes, the plot ... was consumed by a Chinese corporation building a 50,000-acre farm. ... 'No one even talked to me. ... Just one day I found the tractor in my field plowing up everything. No one who lost their *machamba* has been compensated!' Local civil society groups say thousands lost their land and livelihoods to the Wanbao Africa Agricultural Development Company – all with the blessing of the Mozambican government, which has a history of neglecting local farmers' rights to land in favor of large investments.

While Chirime's story is not a story of climate change yet, it is a story of how individuals are made or rendered vulnerable by power structures around them and by global food distribution systems and economic globalization.

As climate change advances, it is unclear whether nations such as Mozambique will have the water necessary to support continued corporate involvement. Indeed, corporate involvement in large-scale oil palm plantations can have its own negative environmental impact on local water quality and hydrology (Carlson et al. 2014; Jordan 2014). If this structure collapses due to climate change to any degree, people who once farmed their own land and were able to make use of low-tech irrigation techniques will now have neither land nor skills nor outside pay. Without the land and the skills to farm it, they cannot grow their own food. Without pay, they cannot import it. The threats posed by large-scale oil palm plantations to local citizens in need of food and water are compounded by the "significantly eroded water quality" in hydrological systems around these plantations, freshwater systems which local people depend on for drinking water and food (Jordan 2014). Worse still, according to Lisa Curran of the Stanford Woods Institute for the Environment, a drought could combine with these existing effects to cause local collapse of freshwater ecosystems (Jordan 2014). This situational and pathogenic vulnerability is dispositional and serious. As Bourne (2014) notes,

the thorniest question is, who will do the farming in Africa's future? Will it be poor farmers like Chirime working one-acre plots, who make up roughly 70 percent of the continent's labor force? Or will it be giant corporations like Wanbao, operating industrial farms modeled on those of the American Midwest?

USAID's Gregory Myers says that the key to making such projects benefit locals is "protecting the land rights of the people" (Bourne 2014). We may not be able at this point to alter the effects of climate change on temperature and access to freshwater, and the layers of vulnerability these will impose, but we can address property rights so as to strip away other layers of vulnerability. We can also mitigate harm done by large-scale oil palm plantations to freshwater systems by ensuring that natural vegetative cover near streams and rivers is not cleared, that dense road networks used to move and process palm crops do not intersect directly with waterways (Jordan 2014), and that other means of reducing layers of vulnerability are undertaken.

Another layer of vulnerability, as mentioned above, is lack of mobility. Adaptation to climate change will require that people be able to move away from regions no longer habitable at all, or no longer habitable in the same numbers. It will be tempting for nations with broad food production capacities, especially ones which may not be hard hit by climate change, to close their borders. Yet this adds a layer of vulnerability for others. The prospect of a massive influx of people from, say, North Africa into Europe or into the African Breadbasket nations is a legitimate concern. But to attempt to prevent it altogether is to render vulnerable populations even more vulnerable.

Who should address these ethical demands to reduce vulnerability? Neither the UN nor any single nation – not even the US – is in a position to singlehandedly remove layers of vulnerability produced by global food supply chains, transnational corporations, and global climate change. How are we to determine *which* moral agents, whether individual or collective, should both consider themselves responsible and be held accountable by others?

Obligations regarding vulnerability to hunger

Thomas Pogge describes an agreement between 186 nations, at the 1996 World Food Summit in Rome, that there is a human right to be free from hunger. Yet, he notes, the US government under then-President Bill Clinton went out of its way to claim that the attainment of any such right "is a goal or aspiration to be realized progressively that does not give rise to any international obligations" (Pogge 2001: 2). A nation which is arguably one of the most powerful agents for change in the world acknowledged a universal moral claim and then stated that *this universal moral claim implies no universal obligation*. How, then, to handle claims of obligation arising from vulnerability to hunger and thirst? Mackenzie et al. rightly contend that both inherent and situational vulnerability can "give rise to specific moral political obligations: to support and provide assistance to those who are occurrently vulnerable and to reduce the risks of dispositional vulnerabilities becoming occurrent" (2014: 8). But who should be held responsible? To consider the assignment of responsibility and accountability, we should consider twin grounds for doing so: culpability and capability. One of these grounds, capability, can be found in the work of Onora O'Neill, whose work on assigning agency lies within the realm of justice and ethics.

O'Neill (2001) focuses on the connection between moral claims and moral obligations. With complex or sweeping claims, such as those of global justice – her focus – or the vulnerabilities which are our topic, O'Neill suggests that it is problematic to assign obligations. In a sense, Clinton was correct. There cannot be universal obligations that every potential agent must meet because the moral claims in question are positive claims which not everyone can fulfill: hunger cannot be alleviated without exertion of effort to reform systematic problems with food distribution, as O'Neill herself notes. A universal obligation in response to a universal demand would require that every agent must put forth positive effort, not just negative restraint, and not all agents are capable of doing so. Meeting these kinds of demands is hard: "don't tread on me" – negative responsibility – is a lot easier to accomplish than "tread over here while doing x and over there while doing y" – positive responsibility. Yet the latter is certainly the sort of response required to

meet the ethical demands of vulnerability: not just refraining from action, but taking action. Who, then, should act, if not all can fairly be asked to do so? As O'Neill sees it, if everyone has the capability to fulfill the remedy (as they do with "don't tread on me"), then they have the obligation to fulfill the remedy (O'Neill 2001: 184–185). However, she takes it further, acknowledging that some positive claims are too big. The issue now becomes not whether every agent can fulfill the remedy, but whether *any agent* can fulfill the remedy in whole or in part. Anyone who does have that capability, even in part, will have a share in the obligation.

O'Neill goes on to describe two major kinds of agent with respect to large-scale social problems such as justice and injustice or, for our purposes, vulnerability to food and water shortages due to the effects of climate change on a globalized food distribution system. These two major kinds of agents are *primary* agents and *secondary* agents. Primary agents have the capacity to determine how principles of justice and ethics are to be institutionalized within a certain domain. They also have the ability to construct other agents or agencies with specific competencies regarding that institutionalization. With respect to hunger, primary agents which are member-states of the United Nations have constructed agencies such as the World Health Organization (WHO) and World Food Programme (WFP), in addition to agencies within their own nation-states such as the US Food and Drug Administration and the Temporary Aid to Needy Families program. Primary agents typically have some means of coercion. Secondary agents, on the other hand, are typically thought of as contributing to justice by meeting the demands of primary agents (O'Neill 2001: 181). Primary agents could be a well-organized body like a legislature, one without a formal structure like a loosely organized town meeting, or an individual like a monarch or head of state. Either way, contends O'Neill, *it is the primary agent that must be convinced certain principles of justice and ethics apply, for without the primary agent, nothing will change*. I am not sure she is correct in this, but certainly change will be slower and cultural rather than rapid and institutional without the work of a primary agent.

Hints of this approach with respect to food ethics can be found in the work of Amartya Sen. Sen established the importance of access to food, versus mere availability, as critical to food security (Drèze and Sen 1989) and food security as critical to human freedom (Sen 1981; 1987) and thus to ethics. Sen recounts Bertolt Brecht's aphorism, "Grub first, then ethics," before famously arguing that in fact food is a central issue in general social ethics. Why? "Since so much in human life does depend on the ability to find enough to eat" (Sen 1987: 1–2). For this reason, vulnerability in the area of food security has a profound and cascading effect on the quality of human lives. In the Sir John Crawford Memorial Lecture, Sen notes that effective public policy "to combat hunger and starvation . . . may depend on the existence and efficiency of political pressure groups to induce governments to act" in order to get food to "vulnerable groups" (1987: 2). In O'Neill's language, these would be secondary agents acting to persuade the primary agent to render aid by pressing the primary to develop a "public distribution system geared to the needs of the vulnerable sections of the community" to "bring the essentials of livelihood within easy reach of people whose lives may remain otherwise relatively untouched by the progress of real national income" (Sen 1987: 8). But this presumes a strong central government, and seems also to presume limited forces above and beyond governments. Such forces do indeed exist and have great power, such as globalized economies operating largely without regulation, based in some nations such as China but operating in others with impunity such as Mozambique. I suspect the overarching transnational structure of agencies like WHO and WFP may call over-reliance on primary agents of justice into question, or even change our conception of what a primary agent can be.

O'Neill acknowledges that many theories of obligation concerning large social issues, like hunger and access to clean water, end up being highly statist. For instance, John Rawls' framework of obligation in his major political works – including *Theory of Justice* and *Law of Peoples* – is deeply statist. Although Rawls occasionally claims otherwise, O'Neill's justification for this claim

is that for Rawls, the state is always the primary agent. O'Neill is well aware that all too often states have been agents of *injustice* and *immorality*. Furthermore, even when their ends are just, they may be weak. Thus O'Neill delineates two kinds of states: rogue states, whose ends are not those of justice; and weak states, whose ends may be just but which lack the power to implement them (O'Neill 2001: 182). In the case of a weak state, those who might otherwise be secondary agents are reduced to powerlessness because they cannot rely on an impartially enforced legal code, may have to engage in bribery or nepotism to go about their daily business, or buy protection and make corrupt deals (O'Neill 2001: 182–183). In looking back on the case of palm oil plantations in Mozambique, where the government has made deals with transnational corporations like Wanbao at the expense of its citizens' property rights, we can see evidence for a failed state, or at least a state that has failed in these kinds of cases.

While O'Neill has doubts about the ability of states as agents in some specific cases, Andrew Kuper argues more forcefully that "where there are transnational bodies such as the World Trade Organization, the World Court, and the World Bank," we should do everything in our power to "encourage the entry of players other than nation-states." Kuper calls for an "end [to] the dominance of what David Luban has called 'the romance of the nation-state' and to discern principles for a more complex and promising global institutional configuration" (Kuper 2000: 665–667). UN entities like the WHO and WFP can, and do, serve as secondary agents in an advisory and policy-making capacity. But these groups can also fulfill obligations and, insofar as they have enforcement or implementation powers or can bring compelling pressure to bear, may be able to serve as primary agents. And because they have the capability to act, they must. In addition, primary agents such as Mozambique or the governments of various Pacific Island nations also have an obligation to act because they have the capability to effect regulation of food imports, encourage local production, protect watersheds, and undertake other related tasks. Other primary agents, such as the government of China, may have to balance the desire to encourage economic development with their very real capability-based obligations to remove layers of vulnerability pathogenically caused by their own companies' unrestrained actions.

We have already begun to put this capability-based view of determining which agents are responsible together with a layered analysis of food and water vulnerability due to climate change. We need such a sprawling notion of how to assign obligation and responsibility, for the complexity of moral claims about global justice and the ethical demands of vulnerability with which we are working may have remedies so complicated that *no single agent has the capability to meet them, not even the romantic nation-state*. Thus, *no single agent may be able to remove vulnerability*. However, each layer of vulnerability may carry with it a set of agents who are capable of answering the ethical demands of that layer. And this capability engenders obligation. According to O'Neill, the obligations any particular agent has are determined by assessing that agent's capabilities in light of the overall task of achieving justice and eliminating injustice. Correspondingly and for our purpose, *the obligations any particular agent has are determined by assessing that agent's capabilities in light of the overall task of eliminating layers of vulnerability*.

In some cases, those who are capable of remedy are also culpable. Culpability would stem from having created the very situations that give rise to situational vulnerability, even if those situations are not obviously wrong in and of themselves, or from being the source of pathogenic vulnerability which is more directly and predictably dispositional for vulnerability. As Thomas Pogge (2002) has famously argued, our obligations to those we have harmed can take precedence over our obligations to compatriots, even when those we have harmed are distant strangers. The strength of this cosmopolitan obligation depends not on nation-state associations, but rather on the directness of our causal responsibility and on how avoidable the harm was. In certain situations, such as the

case of Wanbao's bulldozing of private farmland to establish a palm oil plantation, avoidability is high and so culpability is clear and resulting obligations are strong.

Both capability to remedy vulnerability and culpability in rendering persons vulnerable provide grounds for assigning obligation. Non-governmental organizations, whether local, national, or transnational, have capabilities that can contribute to addressing the ethical demands of vulnerability to hunger and lack of water from climate change. A few may also be culpable, thereby enhancing their responsibility. Nation-states and for-profit corporations may have a similar balance of capability, culpability, and the corresponding level of responsibility. Even individual moral agents may be culpable or have some capacity-based obligations, which may be met either through grass roots organizing or through their own individual contributions to food and water security for themselves and their neighbors. Indeed, most agents will have capabilities that work for some layers of vulnerability but not others. At the governmental, institutional, and personal levels, agents are responsible for the layers of vulnerability which they can remedy, and especially for the subset of these to which they have contributed.

Conclusion

I have mounted a case for vulnerability as a firm ground for obligations and responsibilities with respect to shortages in food and water, and to explain how we might assign such obligations and responsibilities. Climate change stands to exacerbate underlying vulnerabilities, and this framework implies that even agents who did not cause climate change must stand ready to intervene in climate-change-induced hunger and thirst. I urge the reader to think carefully about how moral agents would effectively reduce layered vulnerability to hunger and thirst. These will be agents who can not only refrain from wrong actions but also undertake positive remedies that render layers of vulnerability progressively weaker, eliminating them where possible. Where vulnerability cannot be removed entirely, agents with the capacity to remove layers can still do what they can to answer its ethical demands. The burden weighs more heavily on those whose actions have rendered persons situationally or pathogenically vulnerable.

Focusing on vulnerability to climate change's effects on food leads us to consider how people are made vulnerable, and in particular how global food supply chains and globalized agribusiness render some people more vulnerable than others. This vulnerability leads to ethical demands which are more cosmopolitan in nature than we might expect, for the chains of cause and effect involved in rendering people vulnerable to climate change's effects on food and water cross national and regional boundaries.

And yet, by refusing to treat the problem of vulnerability as inherent, or as requiring a total solution, we see that it is possible to address these ethical demands. It is not the case that vulnerability is endemic to certain populations and thus impossible to address. Nor is it true that vulnerability is binary and must be resolved in its entirety or not at all. Despite the size of the globalized food production system that is threatened by climate change, we can make an ethically significant difference one layer at a time. Some people will become hungry because of climate change. It is up to us to determine how many, and how hungry, by addressing layers of vulnerability where we are capable and where we are culpable.

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