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Offsetting, Denialism, and Risk²

In *Climate Matters* John Broome defends two claims. First, if you live a “normal life” in a rich country, you will probably cause significant harm by your emissions of greenhouse gas (GHG), violating a moral duty of harm-avoidance. Second, you can satisfy this duty by offsetting your emissions. Some would deny Broome’s first claim on the grounds that an individual’s emissions of GHG do no harm. Broome calls this position “Individual Denialism” (ID) and in a recent paper he attempts to refute it. I explain how, if Broome’s refutation of ID were successful, it would undermine his claim that you can satisfy your duty of harm avoidance by offsetting. I suggest an alternative defence of the claim that you can satisfy your individual duty to reduce your carbon footprint by offsetting. This alternative defence assumes that your duty to reduce your carbon footprint derives from a duty of risk-avoidance.

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² For very helpful discussion of the issues in this paper, I would like to thank Vuko Andric, Gustaf Arrhenius, Dan Baras, Katharina Berndt Rasmussen, Paul Bowman, John Broome, Gunnar Björnsson, Krister Bykvist, Hilary Greaves, Anders Herlitz, Karim Jebari, Julia Mosquera, Joe Roussos, Orri Stefánsson, and participants at the 2020 Stockholm Workshop in Philosophy. I am especially grateful to Håkan Salwén for extremely helpful written comments on an earlier draft of this paper. Financial support from Riksbankens Jubileumsfond (grant M17-0372:1) is gratefully acknowledged.

1. Introduction

Anthropogenic climate change causes harm. As global greenhouse gas (GHG) levels increase, global temperatures increase, and people in the developing world (and elsewhere) die from heat exhaustion, tropical disease, and a host of other causes. It seems that states have a moral duty to reduce the harm of climate change by reducing their emissions of GHG.³

But what does this mean for you? Do you have a moral duty to reduce your personal carbon footprint? John Broome (2012) claims that if you live a “normal life” in a rich country, you will probably do significant harm by your emissions of GHG. Specifically, he claims, your lifetime emissions will probably wipe out (roughly) more than six months of healthy life, and that you would thereby violate a moral duty to avoid inflicting harm.⁴

However, Broome also claims that if you offset your GHG emissions you do *no harm* by emissions, and hence, satisfy your individual duty of harm-avoidance (other things being equal). Offsetting your emissions means you ensure that for every amount of GHG you cause to enter the atmosphere, you cause that much GHG to be subtracted from the atmosphere (Broome 2012, p. 85). In theory, you could achieve this by funding one or more of several ongoing emissions reduction projects, such as conserving or planting forests, replacing energy-inefficient stoves in the developing world with cleaner ones, or building and maintaining wind farms. If the amount of GHG that you remove from, or prevent from entering, the atmosphere by funding some such project is at least as much as the amount you emit, then you offset your emissions; your carbon footprint is neutral.

However, some would deny that your moral duty of harm-avoidance requires that you offset, or even reduce, your GHG emissions. They claim that an individual’s emissions of GHG do *no harm*.⁵ Broome calls this claim Individual Denialism, and in a recent paper he attempts to show that it is almost certainly false.⁶ In this paper, I

³ Reducing global carbon emissions is one important goal. Another is to help the developing world adapt to environmental changes that climate change causes.

⁴ This assumes you would emit 800 tonnes of carbon dioxide (Co2) over your lifetime, which is an estimate for the average person born in a developed country in 1960. The estimate of harm from this amount of Co2 emitted is derived from the social cost of carbon. The moral duty that Broome thinks you would violate if you were to emit this much Co2 does not derive from your status as a citizen of any state or as a member of any collective; it is a non-derivative individual moral duty.

⁵ For arguments that an individual’s emissions do no harm, see e.g. Cripps (2013, pp. 119–24) and Maltais, Aaron 2013. “Radically Non-Ideal Climate Politics and the Obligation to at Least Vote Green,” *Environmental Values* 22: 589–608. The view that an individual’s emissions of GHG do no harm is sometimes attributed to Walter Sinnott-Armstrong (2005). Although Sinnott-Armstrong never explicitly endorses this view, he does claim that certain activities, such as going for a joyride in a gas-guzzling SUV, do no harm and that there is no moral requirement to refrain from engaging in them.

⁶ “Against Denialism” (2018).

explain how Broome's case against Individual Denialism undermines his claim that you can satisfy your duty of harm avoidance by offsetting your emissions. I then suggest an alternative defence of the claim that by offsetting your emissions you can satisfy your individual duty to reduce your carbon footprint. This alternative defence, which is consistent with Broome's argument against Individual Denialism, assumes that your individual duty to reduce your emissions derives from a duty of risk avoidance rather than from a duty of harm avoidance.

Section 2 of the paper discusses Broome's defence of offsetting in *Climate Matters* as well as his argument against Individual Denialism in a recent paper, and explains how his argument against Individual Denialism undermines his claim that you can satisfy your duty of harm-avoidance by offsetting. Section 3 suggests an alternative defence of the claim that you can satisfy your individual duty to reduce your carbon footprint by offsetting and considers some possible worries that a more developed version of this defence must address. Section 4 concludes.

2. Broome on Offsetting and Individual Denialism

2.1 Broome's defence of offsetting

In *Climate Matters* Broome claims that offsetting your emissions is sufficient to satisfy your duty to avoid causing harm by emissions. He acknowledges some important concerns about offsetting. For example, he admits that if offsetting were a widely accepted practice, this might cause countries to delay cutting their emissions, thus slowing progress on climate change mitigation (Broome 2012, p. 94). But Broome thinks that this concern is primarily about what governments should do, and his defence of offsetting is presented in the context of discussing what an ordinary individual's duties are.

In this context, one important concern about offsetting that Broome considers is based on the claim that offsetting cannot undo the harm that is done by whatever greenhouse gasses one causes to enter the atmosphere. This worry has been voiced by Greenpeace, an organization to which Broome attributes the following statement:

The truth is, once you've put a tonne of CO₂ into the atmosphere, there's nothing offsetting can do to stop it changing our climate.⁷

⁷ The 2007 statement is quoted on page 89 of *Climate Matters* and is attributed to Charlie Kronick of Greenpeace.

The concern underlying Greenpeace's statement seems to be that offsetting one's emissions would not prevent harm done by whatever GHG one emits but would at best avert further harm from emissions. According to Greenpeace, you cannot avoid doing harm by emissions simply by offsetting.

Broome dismisses Greenpeace's statement as "disingenuous", and claims

... As far as the climate is concerned, emitting a tonne of carbon dioxide and offsetting it is exactly as good as not emitting it in the first place, providing that the offset is genuine.⁸

He also claims

Offsetting does not remove the very molecules that you emit, but the climate does not care which particular molecules are warming it. If you successfully offset all your emissions, you do no harm by emissions. You therefore do no injustice by them.⁹

Here Broome relies on an unstated assumption about the relationship between GHG emissions and harm, namely that an individual inflicts harm by GHG emissions only if that individual increases *cumulative GHG emissions*.

To illustrate the assumption, consider an analogy. Suppose that some people are trapped in a large tank that is slowly filling with water. They are unable to escape, even with outside help. As the water level increases, they struggle to keep their heads above water. The more the water level rises, the more they struggle. If the water level becomes high enough, some of them will drown. Now suppose you come along and dump exactly one litre of water into the tank but then immediately remove exactly one litre. Overall, the water level is exactly what it would have been if you had done nothing. Even if the water level continues to rise to the point at which people drown, it may seem that your behaviour did not contribute to this harm, at least when we compare your behaviour to a baseline in which you have no interaction whatsoever with the people in the tank.¹⁰ In *Climate Matters*, Broome seems to think of the relationship between an individual's emissions and the harm of climate change along similar lines. The accumulation of greenhouse gas in the atmosphere is like the rising water level in the example just described, and the victims of accumulating

⁸ Broome (2012), p. 89.

⁹ Broome (2012), p. 85.

¹⁰ This assumption may be questioned, however. It seems *possible* for your behaviour of adding and removing water to cause harm. Perhaps one should say that it is *very unlikely* that this behaviour would cause harm.

GHG are like the victims trapped in the water tank; they suffer more harm (e.g. they struggle harder to obtain the food and water they need), and are subjected to greater risk of further harm (e.g. greater risk of death), as cumulative emissions increase.

We shall return to the topic of offsetting below. We must first look at a question that Broome addresses in his more recent work, namely whether an individual's GHG emissions do harm at all.

2.2 Broome on Individual Denialism

Whether you can satisfy your duty of harm avoidance by offsetting your emissions is an important question only if an individual's emissions do harm. But not everyone is convinced that an individual's emissions do harm. Sinnott Armstrong (2005) claims that the GHG emissions from your driving a gas guzzler for fun on some occasion would not contribute to the harm of global warming. He compares the addition of GHG from driving to pouring a quart of water into "a river that is going to flood downstream because of torrential rains" (2005, p. 298). He assumes that just as the extra quart of water would make no difference to the victims of the flood, the extra GHG from driving would make no difference to the victims of global warming. Maltais (2013) and Cripps (2013) seem to hold a similar view regarding an individual's lifetime emissions of GHG.

Broome addresses these arguments in his recent paper "Against Denialism" (2018). He refers to the claim that an individual's emissions of GHG do no harm as Individual Denialism, and the paper is devoted to showing that this claim is almost certainly false.

According to Broome, a central problem with arguments for Individual Denialism is that they ignore "the significance of the atmosphere's extreme instability" (Broome 2018, p. 110). Broome thinks that the best available meteorological science supports the claim that the atmosphere is a "chaotic system", meaning that even very small changes in the state of the atmosphere at a given time, can and frequently do cause (or alter the course of) very large meteorological events, such as tropical storms, at other global locations several weeks (and months, years, decades, etc.) later. He cites a famous lecture by the mathematician and meteorologist Edward Lorenz in which Lorenz asks whether the flap of a butterfly's wings in Brazil can set off a tornado in Texas and concludes that "it might". Broome writes

It remains an unresolved question in meteorology whether a disturbance as small as a butterfly-flap can really escalate to a global scale. If it cannot, the reason is that the disturbance of a butterfly-flap is on such a small scale that the viscosity of the air may damp out its effect. For the atmosphere, the scale on which viscosity is significant is less than a centimetre. (Broome, p. 112)

Because the scale on which air viscosity is significant is less than a centimetre, Broome seems convinced that the doubts about the butterfly effect do not arise in the case of most emissions of GHG. Emissions from acts such as driving a gas guzzler will dissipate an amount of energy into the atmosphere that is many times greater than that of a butterfly-flap, and over the next century will cause “more than a trillion joules of energy from the sun to be absorbed by the earth”, some of which “will warm the atmosphere and continue to stir it up” (2018, p. 112).

How is this relevant to assessing the impact of an individual’s emissions? Broome answers this question by focusing on the example of driving a gas guzzler. He asks readers to imagine that going for a joy ride in a gas guzzling SUV would emit 25 kilos of carbon dioxide. He claims

Given the atmosphere’s instability, we should expect global weather in a few decades’ time to be completely different if you go joyguzzling ... from what it would have been had you stayed home. ... Increasing emissions does not cause continuous changes punctuated by occasional discrete events such as a typhoon or a child’s death from cholera. ... Instead it will cause typhoons to form at quite different times and places, and it will lead to a completely different distribution of cholera outbreaks. Your ... drive will cause a completely different group of people to be exposed to cholera and other risks of death. Some who would have died will survive because of your drive, and others who would have survived will die. ... There is literally zero probability that emitting 25 kilos will do no harm and no good. (Broome 2018: 112–113)

Broome is not claiming that the global climate is unpredictable; the climate consists of “long-run averages” of weather and is “much more stable and predictable” than weather. Rather, Broome is claiming that an individual’s emissions of GHG that cause sufficiently large atmospheric disturbances will change weather patterns (e.g. local temperatures, floods, storms, etc.) over a long time horizon, ultimately leading to a distribution of harm that would have been different if the individual’s behaviour had been different.

Apparently, Broome thinks that if the atmosphere is a chaotic system then Individual Denialism is almost certainly false. Although Broome’s discussion in “Against Denialism” focuses mainly on refuting specific “denialist” arguments, it seems one can extrapolate a master argument against Individual Denialism from claims that he makes. In particular, Broome seems committed to what I will call *The Chaos Argument*:

- (1) The atmosphere is a chaotic system.
- (2) If the atmosphere is a chaotic system, then creating sufficiently large atmospheric disturbances almost certainly does harm (there is “literally zero probability” that it does no harm).¹¹
- (3) Your emissions of GHG (e.g. from driving a gas guzzler) create sufficiently large atmospheric disturbances.

Therefore,

- (4) Your emissions of GHG almost certainly do harm.

Therefore,

- (5) It is almost certainly false that your emissions do no harm.

Therefore,

- (6) Individual Denialism (which entails that your emissions do no harm) is almost certainly false.

A crucial assumption underlying Individual Denialism is that your emissions do not make a big enough positive difference to cumulative GHG levels to inflict harm. (Think of Sinnott-Armstrong’s example of pouring a quart of water into a river that will flood.) But according to Broome, your emissions do not inflict harm *only* by causing a significant increase, or even *any* increase, in cumulative GHG levels. Your emissions inflict harm by changing weather patterns. Indeed, if Broome is correct, then even a *decrease* in cumulative GHG levels can (and probably would) inflict harm on some people, although, for some people, it would probably also avert harm.

2.3 A Tension between the Chaos Argument and Broome’s Defence of Offsetting

Unfortunately, the claim that your emissions inflict harm by affecting a chaotic system and altering weather patterns, and not simply by increasing cumulative GHG levels, is very difficult to square with the unstated assumption underlying Broome’s defence of offsetting in *Climate Matters*. If the Chaos Argument is sound (specifically, if the first three premises are true), then your GHG emissions will probably cause harm even if you offset your emissions. When you drive your gas guzzler for fun, your emissions of GHG will create atmospheric disturbances that

¹¹ The qualification ‘almost’ is added because a zero probability of an event is consistent with the occurrence of that event.

will escalate to cause significant changes in large-scale meteorological events, some of which will (probably) result in harm that would not otherwise have occurred. Offsetting your emissions probably would not undo these effects. In fact, insofar as offsetting would also cause (sufficiently large) atmospheric disturbances, offsetting would probably also inflict harm that would not otherwise have occurred.

This does *not* mean that if the Chaos Argument is sound there is no morally relevant difference between increasing and decreasing emissions of GHG. The Chaos Argument is consistent with the claim that *other things being equal*, increasing cumulative GHG emissions increases *the expectation* of total harm from climate change while decreasing cumulative GHG emissions decreases this expectation. Earlier we considered an analogy involving people trapped in a water tank to illustrate Broome's unstated assumption in *Climate Matters* that your emissions do harm only by increasing cumulative emissions. The Chaos Argument calls for a modification of the analogy. Suppose that the potential victims trapped in the tank are currently able to evade death by keeping their heads just barely above water. And suppose that the addition or removal of water from the tank creates waves that spread around the tank. The waves have high peaks and low troughs. The peaks go above the heads of some people and cause them to drown, while the troughs go below the heads of others, allowing them to breathe when they otherwise would not have been able to, and thus, avoid drowning. Adding or removing water from the tank changes how the waves interact, and thus changes the distribution of the peaks and troughs. It therefore alters the distribution of harm. But the expectation of *total* harm still increases with the water level; adding water still imposes a greater risk of harm than removing water, and the more water is added, the greater the risk of drowning for each person. What one cannot reasonably claim is that adding some water and removing the same amount of water results in "no harm".

If the Chaos Argument is sound, then Individual Denialism is almost certainly false, but so is Broome's claim that if you offset your emissions you do no harm by emissions. The Chaos Argument undermines Individual Denialism, but it also undermines Broome's defence of offsetting. How should Broome respond?

3. Harm Avoidance, Risk Avoidance, and Offsetting

In this section, I consider how Broome might respond to the tension between his argument against Individual Denialism and his defence of offsetting in *Climate Matters*. It seems very difficult to maintain both positions. I therefore suggest an alternative defence of the claim that you can satisfy your duty to limit your carbon footprint by offsetting your emissions, where this alternative defence does not depend on the claim that you have a duty to avoid doing harm by emissions. Whether

such a defence is plausible *all things considered* is a question for another paper. This section motivates the alternative defence of offsetting and considers some potential worries that a more thorough defence would need to address.

In *Climate Matters* Broome claims that your moral duty vis-à-vis limiting your carbon footprint is a duty to avoid doing harm. But one possibility is that if the Chaos Argument is sound, such a duty is practically impossible to meet. This would be true if it were practically impossible to avoid causing “sufficiently large” atmospheric disturbances of the kind that escalate to a global scale and that have “literally zero probability” of doing no harm. For example, if “sufficiently large” atmospheric disturbances are not much larger than the flapping of a butterfly’s wings, then it is unclear how you could realistically satisfy your duty of harm avoidance.¹²

If doing climate harm is practically unavoidable, then it makes little sense to claim that your duty to reduce your GHG emissions derives from a duty to “do no harm”. A better option would be to focus on limiting the *risk* of harm that you impose by increasing emissions of GHG. If, as Broome and others have argued, the expectation of climate harm is an increasing function of cumulative GHG emissions, then *other things being equal* increasing GHG emissions imposes a greater risk of harm on the global population than reducing GHG emissions.¹³ Broome might therefore claim that your individual duty to reduce your carbon footprint derives not from a duty of harm avoidance but rather from a duty of risk avoidance.

Whether offsetting your emissions would be sufficient to satisfy your individual duty of risk avoidance depends on the specific content of that duty. One possibility is that the duty is simply to ensure that your lifetime activity is at least *risk neutral* with respect to emissions of GHG. That your lifetime activity is risk neutral in this sense does not mean that “you do no harm by emissions”. Rather, it means that in expectation, the climate harm that you inflict (and avert) by adding GHG to the atmosphere and the climate harm that you avert (and inflict) by subtracting GHG balance out. If your individual duty of risk avoidance is understood in this way then it seems you could, in principle, satisfy the duty by offsetting your emissions.

One potential worry about understanding your duty of risk avoidance in this way is that balancing the expected harm and the expected benefit (i.e. harm averted) by one’s behavior often seems insufficient to satisfy one’s moral duty vis-à-vis risk-imposition. For instance, it may seem implausible that one can justify imposing a serious risk on some person on the grounds that one’s behavior also averts an equally serious risk to some other person, assuming that one has the option of not

¹² Ending your own life would not be sufficient, since even this would have knock-on effects of the kind that would escalate to affect weather patterns.

¹³ Others who have argued that increasing GHG emissions increases the expectation of harm include Hiller (2011) and Nolt (2011).

imposing any risk at all.¹⁴ A defender of offsetting might respond that if the Chaos Argument is sound, then one may not have the option of imposing *no risk* whatsoever. The defender of offsetting might also claim that if the Chaos Argument is sound, then the case of risk-imposition by emissions of GHG is different from a case in which you impose a risk on one person and avert an equally serious risk to someone else. The difference might be that if the Chaos Argument is sound, and if you choose to offset your emissions, then each unidentified person in the global population who might incur harm because of your choice might also avoid harm because of your choice. Suppose that if you were to offset your emissions, the expectation of harm associated with your offsetting would be the same as the expectation of benefit (i.e. harm averted) for each unidentified person in the global population.¹⁵ Then with respect to each unidentified person, your choice of offsetting would be risk neutral. If this were true, then perhaps your choice to offset your emissions could be justified to each individual *ex ante*.

However, there is at least one complication. Offsetting is not sufficient to guarantee risk-neutrality with respect to each unidentified person. Offsetting means only that for any amount of GHG you add to the atmosphere, you subtract at least that much. It is possible to add and subtract GHG in such a way that some people incur *uncompensated* risk of harm. For example, suppose you emit 800 tons of GHG throughout your life and that you offset by giving money to an organization that plants trees. Thanks to your donation, the organization successfully reduces GHG emissions by 800 tons. But suppose that the emissions reduction target is achieved only several decades after your donation is secured (perhaps because it takes several decades for enough trees to be planted). Then many individuals who are subjected to risk by your emissions of GHG will not be alive in several decades (e.g. because they are already near the end of their natural lifespans). These individuals cannot benefit, even in expectation, from your offsetting. Because you subject these individuals to risk by your emissions, they may have complaints against you that would not be addressed by pointing out that, overall, your behavior was neutral regarding the expectation of total climate harm. A fully-developed version of the defence of offsetting that I am suggesting will need to say something about such cases.

¹⁴ Hyams and Fawcett (2013, p. 95) raise a similar objection, although theirs involves a single victim and is not framed in terms of risk. They find it unacceptable that you would fulfil your duty to avoid inflicting harm for the reason that, although you did in fact harm someone, you also prevented an equally serious harm to the same person.

¹⁵ This might include future people, not just those who exist now.

4. Conclusion

I have argued that Broome's claim that offsetting is sufficient to satisfy your duty to avoid doing harm by emissions is in tension with his refutation of Individual Denialism (ID). The refutation of ID is given by the Chaos Argument, but if this argument is sound, then the claim that offsetting is sufficient to do no harm by emissions is probably false. I suggested an alternative defence of the claim that you can satisfy your duty to limit your carbon footprint by offsetting your emissions, one that assumes your duty to limit your carbon footprint derives from a duty of risk avoidance. Your duty might be to ensure that your lifetime activity is at least risk neutral with respect to emissions of GHG. (Of course, there are other possibilities.) I considered the worry that balancing the expected harm and the expected benefit of your behavior may be insufficient to satisfy a duty of risk-avoidance. I also considered the possibility that if you offset, some individuals may incur uncompensated risks. A fully-developed version of the defence that I have suggested will need to address such issues. Yet, the shift to thinking about individual climate-related duties in terms of risk-avoidance seems warranted insofar as one accepts the Chaos Argument.

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