

Procreation and Consumption in the Real World

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Abstract: The cause of global environmental decline is clear: an immense and rapidly growing human economy. In response, environmentalists should advocate policies leading to fewer people, lower per capita consumption, and less harmful technologies. All three of these must be addressed, not just one instead of the others. That is our best remaining hope to create sustainable societies and preserve what global biodiversity remains. Sharing Earth justly with other species and protecting it for future human generations are achievable goals, but only if we recognize limits to growth, show restraint in both consumption and procreation, replace maximizing thinking with sufficiency thinking, and cultivate gratitude for what we receive from nature. Efficiency cannot take the place of ethics. Cleverness cannot take the place of wisdom. Humanity must learn to recognize and appreciate ‘enough.’

There are numerous threats to global ecological sustainability; one well-known approach speaks of nine planetary boundaries for safe human use of the biosphere (Steffen et al. 2015). These include the two defining environmental challenges of our time: climate disruption and biodiversity loss. The first threatens a much less hospitable world for our descendants, the second a world where millions of other species leave no descendants. We are well on the way to creating such a dangerous and depauperate world. Most of the fossil fuels ever used and most of the anthropogenic warming ever caused have been in the last forty years—and we are burning more fossil fuels and heating the world faster than ever (IPCC 2022). The number of wild vertebrates declined 69 percent in just the past fifty years, extinction rates across all major taxa are hundreds to thousands of times above background rates—and these rates are increasing (IPBES 2019).

The cause of global environmental decline is clear: an immense and rapidly growing human economy, which was twenty-five times larger at the end of the twentieth century than it was at the beginning (McNeill and Engelke 2014). Our carbon emissions are a function of feeding, clothing, housing, warming, cooling,

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transporting, and amusing unprecedented numbers of people in unprecedented luxury with unprecedentedly powerful technologies (IPCC 2022). So are the habitat loss and degradation driving biodiversity loss: *we* are replacing *them* with *us*, our economic support systems, our domestic animals, and our trash (IPBES 2019). Ocean acidification, excessive freshwater withdrawals, toxins poisoning soils and waters; in every case, immense human economic demands are driving the rush past boundaries for biospheric health (Higgs 2017).

The obvious solution is to decrease the size of the human economy. Under the “if you find yourself in a hole, quit digging” principle, we might at least pause our ceaseless scaling it up (Rees 2020). Unfortunately, humanity has built a powerful global economy around the primary goal of rapid, continuous growth. People want their economic demands met, not questioned, and there are more of us than ever—billions more. Furthermore, a dominant economic ideology espouses the possibility, necessity, and goodness of endless growth (Daly and Farley 2010). This makes it hard to appreciate what we are destroying or consider serious economic alternatives, and especially hard to accept limits to growth. Yet realistically, without limiting growth, global environmental decline will continue (Crist et al. 2021).

Imagine a doctor examining a new patient suffering from hypertension, high cholesterol, hyperglycemia, joint pains, chest pains, and shortness of breath—and weighing 360 lbs. Whatever else she suggested, it is hard to imagine a conscientious physician not prescribing diet changes with a goal of significant weight loss. She would warn the patient of his elevated risk of stroke, heart attack, and diabetes. She might talk up other common benefits of lower weight, such as higher energy levels and positive mood. What she would not do is encourage him to eat three desserts instead of two, while simultaneously scheduling him for bariatric surgery. Yet that is what contemporary environmentalism has become, cheering on economic growth, while advocating expensive and dangerous technological fixes to ameliorate its worst environmental impacts (Asafu-Adjaye et al. 2015). With this approach, we cannot consider using fewer resources or less energy. In fact, we need to use much more—but we can make this use “green.” We can “decarbonize” our economies, even “decouple” our economic activity from its material impacts altogether.

We indulge these fantasies to distract ourselves from unappealing realities. The obvious solution to our global environmental problems is also the only feasible solution. Maintaining the human economy at its current size is unsustainable. Scaling it up even further will extinguish numerous other species and could degrade the global environment enough to seriously harm our descendants (Ripple et al. 2020). As a matter of interspecies justice and intergenerational prudence, the global economy needs to shrink, not grow. This is the overarching context in which we should discuss procreation and consumption.

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According to Kalle Grill (2023), procreation and consumption both have costs and benefits. Therefore, we should consider these comprehensively when making

personal procreation and consumption decisions, or advocating demographic and economic policies for our societies. In particular, we can choose more procreation and less consumption, or vice versa. The implication is we can use this understanding of costs and benefits “in a wide, moral sense” to maximize personal or societal wellbeing, however we define these. The framework is broadly consequentialist, although Grill himself does not commit to consequentialism.

All this sounds reasonable—yet the results are not particularly clear or action guiding. Perhaps consequentialism’s maximizing framework is unsuited to solving problems caused by our unwillingness to say “enough.” Perhaps this framework is the right one and we just have to work harder to clarify all the harms and benefits and their fair distribution. As Grill (2023) notes, “benefits [and harms] are morally relevant in some sense on any plausible theory” seeking to clarify the ethics of procreation and consumption, including those focused on rights, liberties, or justice defined in non-consequentialist terms.

However, Grill’s discussion of these harms and benefits is marred by several dubious empirical assumptions. He assumes most procreation will have little environmental impact, suggesting four-fifths of the world is so poor and consumes at such a subsistence level that increasing their numbers will not contribute much to total environmental impacts. This view is seriously outmoded, ignoring the rise in recent decades of an immense global consuming class numbering in the billions (Kharas 2017). For a sense of its importance to global environmental impacts, see the figures for carbon emissions by country income groups in Table 1 below, showing nearly two-thirds of current global carbon emissions now come from middle income countries. Consumption by a growing global middle-class also has helped empty many African forests of “bushmeat” species and fill large swaths of the Pacific Ocean with plastic. Its future numbers matter. So, of course, do future numbers in wealthy countries, where many populations continue to grow (Tamburino et al. 2023), and where they instead should be encouraged to decline to sustainable levels (Crist et al. 2022). Here, too, Grill (2023) is somewhat dismissive, speculating that increasing populations and consumption in wealthy societies could so speed up “social and technological innovation” that these societies could become super-efficient and actually decrease their global environmental impacts.

Table 1. Carbon emissions in 2019 by national income group. Source: Tamburino et al. (2023). World Bank’s division of countries into four income-based groups in 2019: low income (< US \$1035 average GNI/capita), lower middle income (\$1036–4045), higher middle income (\$4046–12,535) and high income (> \$12,535).

Country Group	Per capita emissions (tons)	Total emissions (gigatons)	% of global population	% of global emissions
High income	9.9	11.88	15.6	35.1
Upper middle income	6.0	17.29	37.3	51.0
Lower middle income	1.5	4.51	38.3	13.3
Low income	0.3	0.2	8.8	0.6

The actual history of industrial capitalist societies illustrates an opposing trend. Social and technological innovations are plugged into a system whose goals are increased profits and wealth, thus vastly *increasing* consumption, production, and overall ecological impacts (McNeill and Engelke 2014). Without a change in the fundamental goals of this economic system, it is safe to assume efficiency improvements and increased human numbers will primarily serve to ramp up human economic utilization of the world, not to decrease our environmental impacts (Dilworth 2010).

The very framing of “procreation vs. consumption” is empirically misleading. It assumes a flexibility and ease in decreasing consumption that is implausible. Grill asserts wealthy people can consume a lot less without losing much of real value. Perhaps, but parents also can get most of the benefits of parenting with one or two children rather than ten (Conly 2016). More to the point, most wealthy and middle-class people do not want to consume less. Getting them to do so for the common good is hard, and often impossible. Grill’s approach also downplays the fact that any act of procreation necessitates more consumption in the decades to come, barring the untimely death of children. “Procreation vs. consumption” actually means procreation *then* consumption—in the case of most children born today, a lot more consumption (Wiedmann et al. 2020).

Again, the necessary context is a world in which average consumption in most countries, developed or developing, is much higher than in the past, the overwhelming majority of citizens do not want to cut their personal consumption, and the businesses that cater to them certainly do not want them to do so. Furthermore, the international community has committed to significantly raising the consumption of the one to two billion poorest people on the planet, through achievement of the UN’s sustainable development goals. Yet the size of the global economy apparently must *decrease* to avoid a ghastly future (Bradshaw et al. 2021). Any ethical framing that does not make a central place for discussing limits to human demands on the biosphere cannot guide us through this difficult situation. Grill’s approach may be able to take limits on board, but he has not shown that in his essay.

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An even more objectionable aspect of Grill’s analysis is its anthropocentrism. He discusses human procreation and consumption solely in terms of their costs and benefits to people, despite the obvious existential stake other species have in our limiting both of these (Foreman and Carroll 2014). He emphasizes human procreation “entails the creation of inherent value,” while ignoring the fact that other species seek to procreate, too, but are increasingly prevented from doing so by human pre-emption and degradation of their habitat (Cafaro et al. 2022).¹ Although Grill claims his approach can accommodate the inherent value of other species, he

¹ Excessive and growing human numbers are a leading cause of decreasing biodiversity in many parts of the world. See Cafaro et al. 2023, a comprehensive bibliography of recent scientific work on population and biodiversity with more than 160 entries.

makes no attempt to do so. He tries to argue away Thomas Young's (2001) point that creating more human beings displaces other inherently valuable beings this way:

The claim that human beings have inherent value in no way implies that non-human animals lack inherent value. . . . [I]f human beings cause the loss of other valuable beings, this downside is not tied to the creation of inherent value but to the resulting consumption. Consumption is the more direct cause of harm both in the case of current consumption and in the case of procreation-induced future consumption. The relevance of inherent value to the comparison between procreation and consumption is, or should be, that if one can have the same environmental impact either with or without the creation of an entity with inherent value, then the former is preferable. (Grill 2023)

This will not work, as ecology or ethics. Any organism impacts its environment; in our modern world, creating a new human being typically generates large environmental demands over many decades. There is no creating and maintaining an inherently valuable human with "the same environmental impact" there would be without him. To say it is solely the consumption of that person that harms or displaces other organisms is mere word play. If an inherently valuable person persists over time, it is only through repeated acts of consumption.

There is no way to disentangle procreation from consumption, or to deny their synergistic impacts on other species. To repeat: human numbers *and* per capita consumption are both at unprecedented levels which, *together*, are driving numerous other species into oblivion (IPBES 2019). The very titles of recent publications from the conservation biology literature make the case:

"Disassembled Food Webs and Messy Projections: Modern Ungulate Communities in the Face of Unabating Human Population Growth" (Berger et al. 2020).

"Linking National Wood Consumption with Global Biodiversity and Ecosystem Services Losses" (Chaudhary et al. 2017).

"Growth in Human Population and Consumption Both Need to Be Addressed to Reach an Ecologically Sustainable Future" (Ganivet 2020).

"Global Human Appropriation of Net Primary Production Doubled in the 20th Century" (Kraussman et al. 2013).

"Parks Protect Forest Cover in a Tropical Biodiversity Hotspot, but High Human Population Densities Can Limit Success" (Krishnadas et al. 2018).

"Increasing Impacts of Land Use on Biodiversity and Carbon Sequestration Driven by Population and Economic Growth" (Marques et al. 2019).

"Human Population Density and Growth Validated as Extinction Threats to Mammal and Bird Species" (McKee et al. 2013).

"Housing Growth In and Near United States Protected Areas Limits Their Conservation Value" (Radeloff et al. 2010).

“We Have a Steak in It: Eliciting Interventions to Reduce Beef Consumption and Its Impact on Biodiversity” (Selinske et al. 2020).

“Global Human Consumption Threatens Key Biodiversity Areas” (Sun et al. 2022).

As a report last year from the Intergovernmental Panel on Biodiversity and Ecosystem Services put it: “The sustainability of the use of wild species in the future is likely to face challenges due to climate change, increasing demand and technological advances. . . . For many practices, demand is linked to demographic trends and consumption patterns. Growing human populations and consumption will result in greater pressure on wild species (well established)” (IPBES 2022).

This is what people are doing. It is what we will continue to do under status quo economic and demographic trends. Those of us who care about these losses need to advocate for fewer people *and* lower per capita consumption, not quibble about which is more important (Crist et al. 2021). It is a further step to argue people have a moral duty to scale back our numbers and our economic demands and allow other species to live.² But debating population and consumption policies while ignoring their implications for other species effectively denies such a duty. As I have argued elsewhere, this is a grave moral error. Reducing human numbers and the size of our economies is necessary to avoid a mass extinction and share Earth justly with other species (Cafaro 2015, 2022).

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I have been fairly critical of Kalle Grill’s essay. One thing I think he gets right is the great value and meaning people find in raising children. In her systematic treatment of population ethics, Sarah Conly (2016) agrees, and claims this justifies a general right to have children. However, she goes on to argue preserving this right for our descendants could depend on limiting it to a right to have one or two children, so human demands on the natural world remain within safe bounds. Otherwise, we risk creating an ecologically degraded world in which our descendants may not have the opportunity to raise any children safely. Conly also notes how recognition of other species’ intrinsic value provides reasons for further limiting human numbers and economic demands.

Like Grill, Ingrid Robeyns (2022) argues procreation has greater moral value than discretionary luxury consumption. She speaks convincingly of “the valuable and unique relationship” between parents and children, and the intense intimacy and love parenthood typically engenders. Yet in the end, she admits despite the “specialness” of procreation, “our moral right to have children is limited to protect the natural resources that will be available to future generations, natural resources that future generations will need to meet their fundamental interest in parenting or

² Valuable recent defenses of this position include Donaldson and Kymlicka 2011, Shoreman-Ouimet and Kopnina 2015, Borràs 2016, Mathews 2016, Bradshaw 2018, Washington et al. 2018, Wienhues 2018, Chapron et al. 2019, Hedberg 2020, Rolston 2020, and Wienhues 2020.

to meet their basic needs.” Robeys’ analysis, like Grill’s, is anthropocentric. Yet despite ignoring the interests of the rest of the biosphere, a recognition of ecological limits leads her to accept moral limits to both human procreation and consumption.

Rather than speaking of procreation versus consumption, a realistic environmental ethics will recognize their inseparable connection. Paul Ehrlich and John Holdren’s (1972) influential IPAT formula for quantifying human beings’ environmental impacts does this: $I = P \times A \times T$, where P equals population, A equals per capita consumption or “affluence,” and T represents how efficiently and safely current technologies service human demands. As Kalle Grill notes, increasing a nation’s numbers or its affluence will increase human impacts on the environment; increasing both intensifies those impacts. Technological changes can help limit environmental impacts, but T cannot drive those impacts down to zero, particularly since technological changes are not typically driven by sustainability concerns, but by the profit motive. They often increase resource use and pollution, frequently in unexpected ways.

The success of the Kaya identity (a version of IPAT) in helping atmospheric scientists explain and predict changes in global CO₂ emissions has vindicated IPAT as a tool for furthering environmental understanding (Kaya and Yokobori 1997). The role of the Green Revolution in helping drive humanity past several planetary boundaries for safe use of the biosphere vindicates Ehrlich and Holdren’s warning against relying solely on technofixes to create sustainable societies (Crist et al. 2017). Yet we seem poised to repeat the same mistake with regard to climate change, by using geoengineering to force more economic activity onto the earth, rather than restraining our numbers and economic demands.

IPAT can guide and improve environmental decision-making; the same may be true of Kalle Grill’s (2023) “cost-benefit analysis, in a wide, moral sense.” But only if we use them as tools to chart credible paths for reducing humanity’s current excessive environmental impacts. As Michel Bourban (2019) convincingly argues, the time is past for misusing IPAT to try to prove the pre-eminence of one or another factor. Bleeding hearts cannot imagine the world might not be able to accommodate all the good people who inhabit it; heartless capitalists cannot imagine that it cannot accommodate their pursuit of ever more wealth; optimistic technophiles cannot imagine human ingenuity will not somehow accommodate endless growth. But serious environmentalists need to face reality (Ripple et al. 2020). We should advocate policies leading to fewer people, *and* lower per capita consumption, *and* less harmful technologies, particularly in agriculture and energy use. Only thus can we hope to create sustainable societies and preserve what global biodiversity remains.

Sharing Earth justly with other species and protecting it for future human generations are noble goals. We can achieve them, but only if we act nobly. Only if we recognize limits to growth, show restraint in both consumption and procreation, discipline maximizing thinking with sufficiency thinking, and cultivate gratitude for what we receive from nature. Efficiency cannot take the place of ethics. Cleverness cannot take the place of wisdom. We must learn to recognize and appreciate enough. That’s the way forward.

REFERENCES

- Asafu-Adjaye, John, Linus Blomqvist, Steward Brand, Barry Brook, Ruth Defries, Erle Ellis, Christopher Foreman, David Keith, Martin Lewis, Mark Lynas, Ted Nordhaus, Roger Pielke, Jr., Rachel Pritzker, Joyashree Roy, Mark Sagoff, Michael Shellenberger, Robert Stone, and Peter Teague. 2015. *An Ecomodernist Manifesto*. Oakland, CA: Breakthrough Institute.
- Berger, Joel, Tshewang Wangchuk, Cristobal Briceño, Alejandro Vila, and Joanna Lambert. 2020. "Disassembled Food Webs and Messy Projections: Modern Ungulate Communities in the Face of Unabating Human Population Growth," *Frontiers in Ecology and Evolution* 8: 128.
<https://doi.org/10.3389/fevo.2020.00128>
- Borràs, Susana. 2016. "New Transitions from Human Rights to the Environment to the Rights of Nature," *Transnational Environmental Law* 5: 113–143.
<https://doi.org/10.1017/S204710251500028X>
- Bourban, Michel. 2019. "Croissance Démographique et Changement Climatique: Repenser Nos Politiques dans le Cadre des Limites Planétaires," *La Pensée Ecologique* 3: 19–37. <https://doi.org/10.3917/lpe.003.0019>
- Bradshaw, Corey, Paul Ehrlich, Andrew Beattie, Gerardo Ceballos, Eileen Crist, Joan Diamond, Rodolfo Dirzo, Anne Ehrlich, John Harte, Mary Ellen Harte, Graham Pyke, Peter Raven, William Ripple, Frédéric Saltré, Christine Turnbull, Mathis Wackernagel, and Daniel Blumstein. 2021. "Underestimating the Challenges of Avoiding a Ghastly Future," *Frontiers of Conservation Science* 1: 9.
<https://doi.org/10.3389/fcosc.2020.615419>
- Bradshaw, Karen. 2018. "Animal Property Rights," *University of Colorado Law Review* 89: 809–861.
- Cafaro, Philip. 2015. "Three Ways to Think About the Sixth Mass Extinction," *Biological Conservation* 192: 387–393.
<https://doi.org/10.1016/j.biocon.2015.10.017>
- Cafaro, Philip. 2022. "Reducing Human Numbers and the Size of Our Economies Is Necessary to Avoid a Mass Extinction and Share Earth Justly with Other Species," *Philosophia* 50. <https://doi.org/10.1007/s11406-022-00497-w>
- Cafaro, Philip, Pernilla Hansson, and Frank Götmark. 2022. "Overpopulation Is a Major Cause of Biodiversity Loss and Smaller Human Populations Are Necessary to Preserve What Is Left." *Biological Conservation* 272: 109646.
<https://doi.org/10.1016/j.biocon.2022.109646>
- Cafaro, Philip, Pernilla Hansson, and Frank Götmark. 2023. "Population's Effects on Biodiversity and Climate Change: Evidence from Recent Scientific Literature, 2010–2022." *Indian Journal of Population and Development* 3: 149–206.
- Chapron, Guillaume, Yaffa Epstein, and José López-Bao. 2019. "A Rights Revolution for Nature: Introduction of Legal Rights for Nature Could Protect Natural Systems from Destruction," *Science* 363: 1392–1393.
<https://doi.org/10.1126/science.aav5601>

- Chaudhary, Abhishek, Roman Carrasco, and Thomas Kastner. 2017. "Linking National Wood Consumption with Global Biodiversity and Ecosystem Services Losses," *Science of the Total Environment* 586: 985–994. <https://doi.org/10.1016/j.scitotenv.2017.02.078>
- Conly, Sarah. 2016. *One Child: Do We Have a Right to More?* New York: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780190203436.001.0001>
- Crist, Eileen, Helen Kopnina, Philip Cafaro, Joe Gray, William Ripple, Carl Safina, John Davis, Dominick DellaSala, Reed Noss, Haydn Washington, Holmes Rolston III, Bron Taylor, Ewa Orlikowska, Anja Heister, William Lynn, and John Piccolo. 2021. "Protecting Half the Planet and Transforming Human Systems Are Complementary Goals," *Frontiers in Conservation Science* 2: 781292. <https://doi.org/10.3389/fcosc.2021.761292>
- Crist, Eileen, Camilo Mora, and Robert Engelman. 2017. "The Interaction of Human Population, Food Production, and Biodiversity Protection," *Science* 356: 260–264. <https://doi.org/10.1126/science.aal2011>
- Crist, Eileen, William Ripple, Paul Ehrlich, William Rees, and Christopher Wolf. 2022. "Scientists' Warning on Population," *Science of the Total Environment* 845: 157166. <https://doi.org/10.1016/j.scitotenv.2022.157166>
- Daly, Herman, and Joshua Farley. 2010. *Ecological Economics: Principles and Applications*. Second edition. Washington, DC: Island Press.
- Dilworth, Craig. 2010. *Too Smart for Our Own Good: The Ecological Predicament of Mankind*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511840357>
- Donaldson, Sue, and Will Kymlicka. 2011. *Zoopolis: A Political Theory of Animal Rights*. Oxford: Oxford University Press.
- Ehrlich, Paul, and John Holdren. 1972. "One-dimensional Ecology," *Bulletin of the Atomic Scientists* 28(5): 16–27. <https://doi.org/10.1080/00963402.1972.11457930>
- Foreman, Dave, and Laura Carroll. 2014. *Man Swarm: How Overpopulation Is Killing the Wild World*. Live True Books.
- Ganivet, Elias. 2020. "Growth in Human Population and Consumption Both Need to Be Addressed to Reach an Ecologically Sustainable Future," *Environment, Development and Sustainability* 22: 4979–4998. <https://doi.org/10.1007/s10668-019-00446-w>
- Grill, Kalle. 2023. "Procreation vs. Consumption: Harms and Benefits," *Environmental Ethics* 45(3): 265–286. <https://doi.org/10.5840/enviroethics20238860>
- Hedberg, Trevor. 2020. *The Environmental Impact of Overpopulation*. London: Routledge. <https://doi.org/10.4324/9781351037020>
- Higgs, Kerry. 2017. "Limits to Growth: Human Economy and Planetary Boundaries," *Journal of Population and Sustainability* 2: 15–36. <https://doi.org/10.3197/jps.2017.2.1.15>

- Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES). 2019. *Summary for Policymakers: Global Assessment Report on Biodiversity and Ecosystem Services*. Bonn: IPBES Secretariat.
- Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES). 2022. *The Assessment Report on the Sustainable Use of Wild Species: Summary for Policymakers*. Bonn: IPBES Secretariat.
- Intergovernmental Panel on Climate Change (IPCC). 2022. *Climate Change 2022: Mitigation of Climate Change: Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. <https://doi.org/10.1017/9781009157926>
- Kaya, Yoichi, and Keiichi Yokoburi. 1997. *Environment, Energy, and Economy: Strategies for Sustainability*. Tokyo: United Nations University Press.
- Kharas, Homi. 2017. "The Unprecedented Expansion of the Global Middle Class: An Update." Working Paper 100. Brookings Global Economy and Development.
- Krausmann, Fridolin, Karl-Heinz Erb, Simone Gingrich, Helmut Haberl, Alberte Bondeau, Veronika Gaube, Christian Lauk, Christoph Plutzer, and Timothy Searchinger. 2013. "Global Human Appropriation of Net Primary Production Doubled in the 20th Century," *Proceedings of the National Academy of Sciences of the United States of America* 110: 10324–10329. <https://doi.org/10.1073/pnas.1211349110>
- Krishnadas, Meghna, Meghna Agarwala, Sachin Sridhara, and Erin Eastwood. 2018. "Parks Protect Forest Cover in a Tropical Biodiversity Hotspot, but High Human Population Densities Can Limit Success," *Biological Conservation* 223: 147–155. <https://doi.org/10.1016/j.biocon.2018.04.034>
- Marques, Alexandra, Inês Martins, Thomas Kastner, Christoph Plutzer, Michaela Theurl, Nina Eisenmenger, Mark Huijbregts, Richard Wood, Konstantin Stadler, Martin Bruckner, Joana Canelas, Jelle Hilbers, Arnold Tukker, Karlheinz Erb, and Henrique Pereira. 2019. "Increasing Impacts of Land Use on Biodiversity and Carbon Sequestration Driven by Population and Economic Growth," *Nature: Ecology & Evolution* 3: 628–637. <https://doi.org/10.1038/s41559-019-0824-3>
- Mathews, Freya. 2016. "From Biodiversity-Based Conservation to an Ethic of Bio-proportionality," *Biological Conservation* 200: 140–148. <https://doi.org/10.1016/j.biocon.2016.05.037>
- McKee, Jeffrey, Erica Chambers, and Julie Guseman. 2013. "Human Population Density and Growth Validated as Extinction Threats to Mammal and Bird Species," *Human Ecology* 41: 773–778. <https://doi.org/10.1007/s10745-013-9586-8>
- McNeill, John, and Peter Engelke. 2014. *The Great Acceleration: An Environmental History of the Anthropocene Since 1945*. Cambridge, MA: Harvard University Press. <https://doi.org/10.4159/9780674970731>
- Radeloff, Volker, Susan Stewart, Todd Hawbaker, Urs Gimmi, Anna Pidgeon, Curtis Flather, Roger Hammer, and David Helters. 2010. "Housing Growth In and Near United States Protected Areas Limits Their Conservation Value,"

- Proceedings of the National Academy of Sciences of the United States of America* 107: 940–945. <https://doi.org/10.1073/pnas.0911131107>
- Rees, William. 2020. “Ecological Economics for Humanity’s Plague Phase,” *Ecological Economics* 169: 106519. <https://doi.org/10.1016/j.ecolecon.2019.106519>
- Ripple, William, Christopher Wolf, Thomas Newsome, Phoebe Barnard, and William Moomaw. 2020. “World Scientists’ Warning of a Climate Emergency,” *Bioscience* 70: 8–12. <https://doi.org/10.1093/biosci/biz088>
- Robeyns, Ingrid. 2022. “Is Procreation Special?,” *The Journal of Value Inquiry* 56: 643–661. <https://doi.org/10.1007/s10790-021-09797-y>
- Rolston, Holmes III. 2020. “Wonderland Earth in the Anthropocene Epoch,” in *Climate Change Ethics and the Non-Human World*, ed. Brian Henning and Zack Walsh, 196–210. London: Routledge. <https://doi.org/10.4324/9780429356988-15>
- Selinske, Matthew, Fiona Fidler, Ascelin Gordon, Georgia Garrard, Alexander Kusmanoff, and Sarah Bekessy. 2020. “We Have a Steak in It: Eliciting Interventions to Reduce Beef Consumption and Its Impact on Biodiversity,” *Conservation Letters* 13: e12721. <https://doi.org/10.1111/conl.12721>
- Shoreman-Ouimet, Eleanor, and Helen Kopnina. 2015. “Reconciling Ecological and Social Justice to Promote Biodiversity Conservation,” *Biological Conservation* 184: 320–326. <https://doi.org/10.1016/j.biocon.2015.01.030>
- Steffen, Will, Katherine Richardson, Johan Rockström, Sarah E. Cornell, Ingo Fetzer, Elena Bennett, Reinette Biggs, Stephen Carpenter, Wim de Vries, Cynthia de Wit, Carl Folke, Dieter Gerten, Jens Heinke, Georgina Mace, Linn Persson, Veerabhadran Ramanathan, Belinda Reyers, and Sverker Sörlin. 2015. “Planetary Boundaries: Guiding Human Development on a Changing Planet,” *Science* 347: 1259855. <https://doi.org/10.1126/science.1259855>
- Sun, Zhongxiao, Paul Behrens, Arnold Tukker, Martin Bruckner, and Laura Scherer. 2022. “Global Human Consumption Threatens Key Biodiversity Areas,” *Environmental Science & Technology* 56: 9003–9014. <https://doi.org/10.1021/acs.est.2c00506>
- Tamburino, Lucia, Philip Cafaro, and Giangiacomo Bravo. 2023. “An Analysis of Three Decades of Increasing Carbon Emissions: The Weight of the P Factor,” *Sustainability* 15: 3245. <https://doi.org/10.3390/su15043245>
- Washington, Haydn, Guillaume Chapron, Helen Kopnina, Patrick Curry, Joe Gray, and John Piccolo. 2018. “Foregrounding Ecojustice in Conservation,” *Biological Conservation* 228: 367–374. <https://doi.org/10.1016/j.biocon.2018.09.011>
- Wiedmann, Thomas, Manfred Lenzen, Lorenz Keyßer, and Julia Steinberger. 2020. “Scientists’ Warning on Affluence,” *Nature Communications* 11: 3107. <https://doi.org/10.1038/s41467-020-16941-y>
- Wienhues, Anna. 2018. “Situating the Half-Earth Proposal in Distributive Justice: Conditions for Just Conservation,” *Biological Conservation* 228: 44–51. <https://doi.org/10.1016/j.biocon.2018.10.009>

- Wienhues, Anna. 2020. *Ecological Justice and the Extinction Crisis: Giving Living Beings Their Due*. Bristol: Bristol University Press.
<https://doi.org/10.1332/policypress/9781529208511.001.0001>
- Young, Thomas. 2001. "Overconsumption and Procreation: Are They Morally Equivalent?," *Journal of Applied Philosophy* 18: 183–192.
<https://doi.org/10.1111/1468-5930.00185>