

Greening the Universe: The Case for Ecocentric Space Expansion

Andrea Owe
Global Catastrophic Risk Institute
<https://gcri.org>

Published in *Reclaiming Space: Progressive and Multicultural Visions of Space Exploration*,
edited by James S.J. Schwartz, Linda Billings, and Erika Nesvold,
Oxford University Press, 2023, pages 325-336,
[DOI 10.1093/oso/9780197604793.003.0027](https://doi.org/10.1093/oso/9780197604793.003.0027).
This version 10 July 2023.

Abstract: The idea of becoming multiplanetary is relevant to many moral values inherent in the Earth ecosphere. Contra many of my fellow environmentalists' hesitation toward a civilizational expansion into space, I make a deeply environmental case for space expansion in this chapter. Specifically, I advance an argument for ecocentric space expansion and an ecocentric argument for space expansion: the long-term space future is about the continuation and potentiality of the total story of life on and from Earth. I put forth the claim that while humanity's greatest immediate challenge is to survive the next century or two, our greatest achievement will be eventually greening the universe and bringing it to life.

Keywords: space expansion; nonhumans; ecosphere; long-term future; ecocentrism; anthropocentrism; global catastrophic risk

Introduction

We live in a peculiar time, and I have a peculiar job. I am neither a space scientist, nor a STEM scientist. I am an artist turned environmental moral philosopher working in the cheerfully named field of *global catastrophic risk*.¹ Essentially, my job has two major parts. The first is to figure out how we may avoid going extinct, or at least avoid being harmed to such an extent that life and civilization as we know it might never recover. It is examining and avoiding these trajectories that define the field of global catastrophic risk. The other part is studying the moral potential of the long-term future that could be realized if we overcome these risks, and how we may realize this potential. Current humans do not necessarily have the answers to these moral questions, but we should strive toward ensuring they can be answered and realized in the future. Therefore, we must think quite far ahead – hundreds, thousands, sometimes millions of years into the future. Such a future is likely to entail space expansion.

As an environmental philosopher, I differ from most of my colleagues in that I define catastrophic risks as they pertain to the total Earth-life-system, not just the human species. By the Earth-life-system, I mean the living and evolving ecosphere that characterizes planet Earth. I further differ from some of my colleagues in that my intuitions about a morally optimized long-term space future neither point toward some space technotopia nor the maximization of intelligence and pleasure only (Bostrom 2008). Rather, they reflect a broader view on the entire world we are a product of – a rich and everchanging ecosphere with an extraordinary story to tell.

In this chapter, I take the liberty to be ambitious and idealistic, as I bring together my perspectives on environmental ethics, global catastrophic risk, and a long-term space future to make a deeply environmental case for space expansion.

An argument for ecocentric space expansion

An environmental motivation for space expansion holds a question of what *nonhuman* entities and values humans should aim to protect and promote throughout spacetime. As an *ecocentric* environmental philosopher, I see Earth's ecosphere and its continued story as the primary moral object to protect and promote.² Ecocentrism is grounded in the sciences of the Earth system and sees moral value holistically in the systems that make up the natural world, of which humans, all other life, and abiotic natural elements are part, through myriad interdependent and symbiotic relationships.³ Ecocentrism further entails a historical perspective that sees the evolutionary Earth-story as a whole, stretching from its past, through to the present, and further into its potential future. Independent of any utility for humans, all of this has intrinsic value – value in its own right.^{4,5} Ecocentrism is also value pluralistic. While the highest level of intrinsic value is the ecosphere with its continued story, sub-ecospheric things, such as the wellbeing of the different organisms within the ecosphere, also have intrinsic value.⁶

Inherent in the ecocentric view, is a rejection of ontological and ethical anthropocentrism – ontology being about the nature of the world, whereas the ethical concerns how the world should be. This means a rejection of the beliefs that humans are distinct from, more important, and/or better than the rest of nature, solely on grounds of being human. While the ethical rejection is expanded on in the next section,⁷ modern science provides the ontological rejection. There is no human and nonhuman world; there is one ecosphere. Humans are part of ecosystems and the animal kingdom alike. We are all subject to the same physical laws. Anthropocentrism is a modern illusion, making humans behave in ways that destroy our own home, other living beings, and ultimately ourselves.

Why ecocentrism?

While I endorse ecocentrism, it is important to note that when we talk about moral value in the far future, it is unlikely that present humans can identify all future values accurately. Ecocentrism is what I propose as a viable strategic starting point for optimizing the potential for moral value in the long-term future, by ensuring maximal optimization at both the ecospheric and sub-ecospheric levels. By optimization, I mean making something be the best it can be (discussed further toward the end of the chapter). There are several reasons why I advocate considering intrinsic value at these levels.

First, I am sympathetic to moral realism⁸ and find ecocentrism to accurately reflect natural history and science. Second, I find all instances of life, evolution, and nature's creative force to be extraordinary and of moral value. Importantly, I find the whole world to be very much alive, and recognize that all life, both individual organisms and holistic entities such as species and ecosystems, have an innate drive to live and flourish, they have interests, and they have wellbeing. I find all this morally relevant. I also strongly suspect that sentience/consciousness/intelligence⁹ – commonly considered of moral significance – permeates much of, if not the entire, natural world.¹⁰ Third, I recognize the inherently relational and symbiotic structure of the Earth-life-system, which makes it difficult to single

out certain entities, qualities, or properties as the sole container of moral value. Intuitively, the holistic view on Earth's entities and components has always made sense to me, whereas the hierarchical one never has. Ecocentrism reflects my actual experience of the world.¹¹ Fourth, I find moral value in diversity of these instances of evolution, life, and creativity, as central to the ecosphere's realization of potential. The fifth is pragmatic. I believe it is in the best interest of humans and nonhumans alike, that humans value the natural world in this holistic manner. I think the failure to do so is central to our current socio-environmental predicament, as well as to more subtle harms, such as to our characters and loss of meaning. The sixth is the simplest reason: as far as we know, what has happened on Earth – an astonishing diverse and living world – is so cosmically extraordinary that there is good reason to value its totality rather than singling out only a fraction of it. Going further, moral uncertainty (MacAskill et al. 2020) and the prospect of moral progress (Sauer et al. 2021) give us reasons to promote a “radically” inclusive ethic, especially when considering long-term trajectories. For example, just as moral consideration of nonhuman animals has gained ground over past decades, moral consideration across also the plant kingdom could be regarded common sense in a century or two (I hope sooner).

In short, this holistic perspective avoids the pitfall of missing the forest for the trees and is precautionary, open-minded, and humble toward the unknown future. Focusing moral effort on making the ecosphere be the best it can be entails embracing that the world and its myriad past, present, and future inhabitants do not exist for human purpose, that we are all part of an intricate, everchanging web which value and potentiality goes far beyond that of our own species, and that all are better off living in a world (or worlds) humans respect and cherish, including into our distant cosmic future.

What does this mean for space expansion?

Unfortunately, standard accounts of space exploration and expansion carry strong bonds to anthropocentrism. For example, the idea that biological humans can detach from the rest of terrestrial nature and survive alone is ontological anthropocentrism. The idea that humans are destined to conquer the universe, and entitled to do so, is ethical anthropocentrism. Consequently, many environmentalists oppose the ongoing pursuit of a space future.¹²

However, in a cosmic perspective on Earth, space expansion is not about one particular species in its current form. It is about the continuation of the extraordinary story that is the *story of life on and from Earth*. This story holds a broad range of moral values, including beauty, knowledge, diversity, subjective experiences, creativity, love, and life itself. They are all worthy of promotion. A truly non-anthropocentric perspective on the pursuit of a space future will not only consider what humans exclusively think and feel about nature. It will also consider the perspectives, interests, and values of nonhumans. Simultaneously, it must recognize that the Anthropocene human is indeed distinct, in that our collective agency now has long-term, evolutionary, planetary, and possibly multiplanetary implications. We have, therefore, an equally encompassing responsibility. The time when the proper environmental ethic was to “leave nature alone” is over. In its place must come active aid and assistance – on Earth and beyond.

Indeed, an ecocentric vision of space expansion leaves behind anthropocentric ideas of a cosmic manifest destiny and interstellar subjugation. It contrasts with the ideas of safeguarding the human species alone, of escaping the “Earth cradle”, of leaving Earth for nonhumans, and in the process fleeing from our destruction of Earth. Ecocentric space

expansion entails the core motivation being the protection and promotion of the totality of the story of life on and from Earth, where the optimization of moral value is built upon the broadest possible foundation of bio- and ecosystem diversity, even if “life” and “ecosystems” will come to be fundamentally different from how they are today.¹³ The idea is not to preserve the exact current state of the ecosphere – there is no status quo in nature – but to create the largest possible opportunity space for ecospheric value: if many elements within the ecosphere have intrinsic value, then the future potentiality of each element together accumulate in the greatest opportunity space.

As the only species currently capable of space expansion, as well as contemplating the ethics of planetary and cosmic trajectories, humans have a unique instrumental role in the continuation of this story.¹⁴

What does this mean for humans in space?

Importantly, an ecocentric space expansion equally has humans’ and any posthuman descendants’ best interests in mind, as the ecocentric project is to reconcile human culture with the reality of the world we come from, toward flourishing for all, instead of for the few (Curry 2011). The physical, psychological, and moral distancing that modern economic and social paradigms have enforced between humans and the rest of nature has already caused much self-harm, including the onset of anthropogenic catastrophic risks (more on catastrophic risk in the following section). Evidence shows that humans not only instrumentally depend on a healthy ecosphere but find in it much meaning and moral value (Bruskotter et al. 2015; Johansson-Stenman 2018; Berry et al. 2018). To pursue an even more existentially lonely way of being human beyond this planet, therefore, appears not only exceptionally risky but deeply undesirable.

Most importantly, we must ask ourselves why we would *want* to separate ourselves from what is by all known accounts the most extraordinary phenomenon in the universe. Even if it should prove possible to eventually cut the human-ecosphere umbilical cord (Holt 2021), how can an astronomical future with only one form of being (human? posthuman? AI?) be better than a future filled with trillions of them? How can such a future be better for humans? How can the potential of what humans can become and create be greater in this narrow cone of light, than in one that illuminates the full creative and moral potential of the Earth story?

Space expansion that takes the terrestrial ecosphere as its starting point will enable future worlds that can sustain and optimize human flourishing, that are rich in value and meaning *for* humans, and where the potential human impact across space can be as positive as possible.

An ecocentric argument for space expansion

Many reasons for pursuing space expansion have been proposed, some more convincing than others. Here, I present three interrelated reasons that apply to all Earth-originating entities and show what they imply for ecocentric space expansion.

Global catastrophic risk

One reason for space expansion comes from a practical observation of current global catastrophic risks on Earth. Some catastrophic risks are natural, such as supervolcanic eruptions or Earth getting hit by a large asteroid, while others are human caused, such as nuclear war or unaligned artificial intelligence.¹⁵ While the unfolding of any catastrophe would not necessarily entail the complete annihilation of life, it would likely involve mass extinction, the destruction of ecosystems, and a massive blow to human civilization. The exact window of time for spreading beyond Earth in terms of catastrophic risk is unknown. Space expansion is therefore, generally speaking, a viable risk mitigation strategy. By spreading beyond Earth, we would become more resilient to risk. This applies to all Earth-originating entities (Tonn 2007; Baum 2010). For the ecocentric case, this means that all life and the total ecosphere has an interest in avoiding catastrophic risk and pursuing a long-term future.

Importantly, this strategy relies on there being no or minimal risk correlation between the different locations. For example, a Mars habitat dependent on Earth provisions is vulnerable if catastrophe hits Earth, whereas a fully self-sustaining habitat is more resilient. Currently, anthropogenic risks are the most pressing. Therefore, in the immediate future, this first of all means that great effort should be taken toward mitigating anthropogenic risks on Earth, so we have enough time to achieve the conditions necessary to pursue space expansion in a risk-resilient manner. For example, if the present human generation fails to act on climate change and the destruction of the living world, then many things worthy of protection and promotion could be irreversibly lost by the time space expansion is undertaken. We could bring the underlying causes of the environmental crisis with us to space, or civilization could be left incapable of space activities all together. This is vital for all terrestrial life as space expansion requires a technologically advanced civilization.

Still, overcoming immediate risks are not enough. It is highly unlikely that we can reach a sustainable state of zero risk while remaining on Earth only. If nothing else, Earth will eventually become uninhabitable due to the expansion and warming of the sun (Wolf & Toon 2015). In light of catastrophic risk, any long-term future necessarily entails space expansion (Baum et al. 2019).

Equality across spacetime

A second reason is motivated by an ethical principle of equality across space and time. This means that someone or something of moral value is of the same value independent of the time in which they happen to exist (Cowen & Parfit 1992; Tonn 2018), and the location they happen to be in (Smith 1998). This matters for the future in general, such as morally accounting for future generations (Tonn 2018). However, it also matters for space expansion. By expanding in space, and by effect mitigating the risks inherent in remaining on Earth only, we open an exceptionally larger tempo-spatial frame that allows for astronomical opportunities to advance moral value. These opportunities are vastly larger than those available for the present and the near-term future, and in trajectories where life remains restricted to Earth (Baum et al. 2019). In effect, the act of ensuring we can expand into space has a compounding effect on moral value realization.

Therefore, on the ecocentric account, pursuing space expansion might prove the equivalent of keeping the door open to a multitude of possible futures for *all moral values inherent in the ecosphere*, whereas not expanding into space would effectively close the door on all of them. Despite our past and present misconduct toward the rest of Earth's life, it

would be even more immoral to deliberately shut the door, including on behalf of future beings that could be more moral than present humans. In the same way that it is deeply unethical to blame all humans equally for the ongoing environmental crisis, it is deeply unethical to condemn all future life for what a few generations of one species have done. If there is a possibility for continuing the incredible story of terrestrial life into the far future by expanding into space, then it is deeply anti-environmental, and deeply anthropocentric, to deny the pursuit of this possibility.

Optimization of moral value

Thirdly, in order to realize the potential for moral value at great scales, we must go beyond just ensuring the expansion of Earth-life into space. We must work to create conditions necessary for, not only the continuation, but the flourishing of, life and civilization. We want the future to be better than the present and, ideally, we want the future to be as good as it possibly can be. Ensuring that life exists in some form in some cosmic locations might be good, but ensuring that life and civilization can flourish, continuing to advance and improve moral goods at great scales and into the distant future, is much better (other things being equal).

This difference can be understood as that between sustainability and optimization (Owe & Baum 2021). Optimization is more demanding and provides reason to pursue space expansion sooner rather than later. For example, sustaining life could potentially be secured through relatively simple measures, such as planetary seeding, where terrestrial microorganisms are deliberately sent to other celestial bodies. Optimizing the flourishing of a diversity of life, on the other hand, requires the establishment of complex and resilient large-scale environments.

For ecocentric space expansion, this means the most promising methods are either to make other planetary bodies suitable for Earth-life (while leaving billions of others as they are), such as through terraforming,¹⁶ or constructing Earth-like environments from scratch, mimicking a symbiotic whole.^{17,18} The latter may be less adaptationally demanding for living beings, whether naturally or through biotechnology, than terraforming existing planets with challenging planetary conditions. Constructed habitats could have further benefits such as less moral loss from uprooting existing planets, better safety and risk resilience from mobility, and potentially less cost and effort to make ideal habitats. In either case, as the source of creative and moral potential in our world is the entire ecosphere, trying to make terrestrial life start over by adapting to abiotic extraterrestrial environments is a much poorer starting point than advancing the full preconditional sphere for ecospheric flourishing. After all, the ecosphere is a “billions of years stress-tested form of adaptive complexity” (Holt 2019). Even in the trajectory of natural evolution merging with or being replaced by technological design, the total available environment will determine its potentiality. Quite possibly, an astronomical future holds myriad of hybrid beings and systems very different from life we know today, ideally also incorporating extraterrestrial nature for increased diversity.¹⁹

Significant efforts have been made to expand human environmental considerations to space environments *as they are* (Rolston 1986; Milligan 2015; Schwartz 2018), including a proposed cosmocentric ethic (Lupisella 2020). I fully endorse these efforts and many of their sentiments. However, while ecocentric space expansion can incorporate extraterrestrial nature, it necessarily entails to bring terrestrial nature into space nature in the best interest of

humans and nonhumans alike, and, in cases of trade-offs, to prioritize terrestrial over extraterrestrial nature.²⁰ An ecocentric ethic that considers the perspectives, interests, and values of also nonhumans and the greater terrestrial ecosphere has its primary moral obligation to the Earth-life story, not to everything that exists in the universe, nor to the universe itself.

A universe of weird and beautiful Earths?

An ecocentric account of space expansionism leaves us a tentative objective that considers a universe of myriad flourishing Earth-inspired worlds as morally good. Each of these worlds would be as extraordinary as the original, each distinct in their own right, but all part of the overarching story of life that came from Earth. If the ecosphere itself and its story is of utmost moral value, then a diversity and optimization of and within Earthly ecospheres throughout spacetime is of even greater value. This ecocentric account also presents a common policy and ethics compass for humans as morally responsible stewards of the total Earth story.

Naturally, there are many challenges toward such an idealistic objective, including those that arise from disunity among people, and between people and the rest of Earth's life. A significant task is to develop the adequate environmental and technological expertise. Establishing and investing in educational programs in Earth design is a good start. Other challenges include to create comprehensive collections of seeds, microorganisms, DNA, etc., and to minimize suffering in Earth reproductions.

The long-term future requires ambitious goals. As we potentially are at the very beginning of a vast opportunity space, the observations laid out in this chapter give strong incentives to prioritize a long-term space future, and to approach it by our most optimistic visions. Still, I hold that in our search for meaning and value across the universe, we need not look so very far, certainly not inward only. Importantly, we need to leave the door open to the ecospheric potential, even if that potential is unrecognizable to us today.

Space expansion grounded in the reconciliation of humans (and our technologies) with the rest of nature, rather than the further ostracism and condemnation of humans from nature, will not only allow our mutual continued existence, but lay a solid foundation for our flourishing and realization of moral potential. While humanity's greatest immediate challenge is to survive the next century or two, our greatest achievement will be eventually greening the universe and bringing it to life.

Acknowledgments

The views in this chapter are the author's alone and not that of the Global Catastrophic Risk Institute. Thanks to Lauren A. Holt, Seth D. Baum, and Tyler T. Barrott for comments on an earlier version.

References

- Baum, S.D. 2010. Is humanity doomed? Insights from astrobiology. *Sustainability* 2(2): 591-603.
- Baum, S.D. et al. 2019. Long-term trajectories of human civilization. *Foresight* 21(1): 53-83.
- Beckoff, M. & Pierce, J. 2009. *Wild Justice: The Moral Lives of Animals*. University of Chicago Press.

- Berry, P.M. et al. 2018. Why conserve biodiversity? A multi-national exploration of stakeholders' views on the arguments for biodiversity conservation. *Biodiversity and Conservation* 27(7): 1741-1762.
- Bostrom, N. 2008. Letter from Utopia. *Studies in Ethics, Law, and Technology* 2(1): 1-7.
- Bostrom, N. & Ćirković, M. 2008. *Global Catastrophic Risks*. Oxford University Press.
- Bruskotter, J.T., Nelson, M.P., & Vucetich, J.A. 2015. Does nature possess intrinsic value? An empirical assessment of Americans' beliefs. *The Ohio State University*. DOI: 10.13140/RG.2.1.1867.3129
- Calvo, P., Gagliano, M., Souza, G.M., & Trewavas, A. 2020. Plants are intelligent, and here is how. *Annals of Botany* 125: 11–28.
- Cowen, T. & Parfit, D. 1992. Against the social discount rate. In *Justice Between Age Groups and Generations*, Laslett, P. & Fishkin, J.S. (Eds.), pp. 144–161. Yale University Press.
- Curry, P. 2011. *Ecological Ethics. An Introduction* (2nd ed.). Polity Press.
- De Waal, F. 2006. *Primates and Philosophers: How Morality Evolved*. Princeton University Press.
- Goff, P. 2017. *Consciousness and Fundamental Reality*. Oxford University Press.
- Holt, L.A. 2019. Why the 'post-natural' age could be strange and beautiful. *BBC Future* May 3, 2019. <https://www.bbc.com/future/article/20190502-why-the-post-natural-age-could-be-strange-and-beautiful>
- Holt, L.A. 2021. Why shouldn't we cut the human-biosphere umbilical cord? *Futures* 133: 102821.
- Johansson-Stenman, O. 2018. Animal welfare and social decisions: Is it time to take Bentham seriously? *Ecological Economics* 145: 90-103.
- Lupisella, M. 2020. Meaning and ethics. In *Cosmological Theories of Value*, pp. 171-194. Springer.
- MacAskill, W., Bykvist, K., & Ord, T. 2020. *Moral Uncertainty*. Oxford University Press.
- Margulis, L. & West, O. 1997. Gaia and the Colonization of Mars. In *Slanted Truths*, pp. 221-234. Springer.
- Milligan, T. 2015. *Nobody Owns the Moon: The Ethics of Space Exploitation*. McFarland and Company.
- Morton, T. 2016. *Dark Ecology: For a Logic of Future Coexistence*. Columbia University Press.
- Ord, T. 2020. *The Precipice: Existential Risk and the Future of Humanity*. Bloomsbury Publishing.
- Owe, A. & Baum, S.D. 2021. The ethics of sustainability for artificial intelligence. *Proceedings of AI for People: Towards Sustainable AI, CAIP'21*.
- Parise, A.G., Gagliano, M., & Souza, G.M. 2020. Extended cognition in plants: Is it possible? *Plant Signalling and Behavior* 15(2): 1710661.
- Randolph, R.O. & McKay, C.P. 2014. Protecting and expanding the richness and diversity of life, an ethic for astrobiology research and space exploration. *International Journal of Astrobiology* 13(1): 28-34.
- Reber, A. 2019. *The First Minds: Caterpillars, 'Karyotes', and Consciousness*. Oxford University Press.
- Rolston III, H. 1986. The preservation of natural value in the solar system. In *Beyond Spaceship Earth: Environmental Ethics and the Solar System*, Hargrove, E. (Ed.), pp. 140-182. Sierra Club Books.

- Rowlands, M. 2012. *Can Animals be Moral?* Oxford University Press.
- Sauer, H., Blunden, C., Eriksen, C., & Rehren, P. 2021. Moral progress: Recent developments. *Philosophy Compass* 16(10): e12769.
- Schwartz, J.S.J. 2018. Where no planetary protection policy has gone before. *International Journal of Astrobiology* July: 1-9.
- Smith, D.M. 1998. How far should we care? On the spatial scope of beneficence. *Progress in Human Geography* 22(1): 15-38.
- Tonn, B.E. 2002. Distant futures and the environment. *Futures* 34(2): 117–132.
- Tonn, B.E. 2007. Futures sustainability. *Futures* 39: 1097-1116.
- Tonn, B.E. 2018. Philosophical, institutional, and decision making frameworks for meeting obligations to future generations. *Futures* 95: 44-57.
- Washington, H., Taylor, B., Kopnina, H., Cryer, P., & Piccolo, J.J. 2017. Why ecocentrism is the key pathway to sustainability. *The Ecological Citizen* 1: 35–41.
- Wolf, E.T. & Toon, O.B. 2015. The evolution of habitable climates under the brightening sun. *Journal of Geophysical Research: Atmospheres* 120(12): 5775-94.

¹ Also called *existential risk*. See e.g., Bostrom and Čirković (2008) and Ord (2020).

² Others who have argued similar cases in a space context include Margulis and West (1997), Tonn (2002), and Randolph and McKay (2014).

³ On ecocentrism, see e.g., Curry (2011) and Washington et al. (2017).

⁴ That is not to say all things within the ecosphere are morally good.

⁵ The concept of intrinsic value has many interpretations and is subject to much debate, but I will not entertain these matters here.

⁶ Importantly, wellbeing/suffering are defined differently for different entities. We should be careful not to consider wellbeing/suffering by conceptions grounded in human experience.

⁷ There are many ways to reject ethical anthropocentrism. For example, I reject the sanctity of human life (only) also on grounds of speciesism, but this is not unique to ecocentrism.

⁸ Moral realism is the metaethics view that moral goods and truths can be derived from objective features of the world.

⁹ However, and to what extent, you want to distinguish the three.

¹⁰ See e.g., Reber (2019), Calvo et al. (2020), Parise et al. (2020), and Goff (2017).

¹¹ I spend time in wild nature on a daily basis. In my opinion, I would have no business calling myself an environmental philosopher if I did not.

¹² See the *Futures* 2019 special issue “Human colonization of other worlds” for a variety of arguments <https://www.sciencedirect.com/journal/futures/vol/110/suppl/C>

¹³ Such as through biology-technology hybrids and postbeings.

¹⁴ In my opinion, it is this capacity that morally denies us the option to be self-centric, in contrast to other lifeforms.

¹⁵ Value aligned AI is the problem of ensuring that advanced AI does what we want it to do, or otherwise is benevolent.

¹⁶ To modify the conditions of a celestial body to make it habitable for Earth-life.

¹⁷ This can be contrasted with directed panspermia/planetary seeding, advocated by panbiotic ethics, as that entails intrinsic value of life alone.

¹⁸ Inherent in this symbiosis is a principle of equity. Extreme inequities are discouraged because they are unsustainable for the total system. The needs and interests of all parties must be met to a roughly equal extent. This also applies within social animals, which includes humans and at least some other animals, who psychologically experience such inequities as unjust, which can encourage social unrest, mistrust, etc. (de Waal 2006; Beckoff & Pierce 2009; Rowlands 2012). Therefore, the cargo for space expansion cannot be a random collection of organisms, nor a disproportional favoring of certain system elements over others, whether human or nonhuman.

¹⁹ Possibly, such a trajectory could even be an important part of the human-nature reconciliation (Morton 2016). It could, of course, also entail utter horror.

²⁰ While the general premise would stand, special considerations apply in scenarios involving extraterrestrial life.