Enhancing Humans and Sustainability: The Reunion of Bioethics and Environmental Ethics

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Emerging technologies are hyped as 'transformative' by their proponents, who prophesize that these new technologies will significantly and beneficially change our world. Concerns have been raised about the potential environmental impacts of these technologies. Emerging technologies and their implications on humans, society, and the environment challenge our understanding of our responsibilities to the environment and future generations. Utilizing Van Potter's sense of bioethics that meant the normative study of humanity's place in the biosphere, I attempt to reintegrate bioethics and environmental ethics, to address questions about human well-being in the future, its dependence on complex environmental systems, and the impact of emerging technologies particularly enhancement technologies upon it. Ultimately, I argue that the future envisioned by proponents of human enhancement technologies is not consistent with our responsibilities to future generations which including leaving certain amounts of natural capital, including human ones.

How many goodly creatures are there here! How beauteous mankind is! O brave new world! That has such people in it!

Shakespeare, *The Tempest*, Act V, Scene I

If science cannot lead us to wisdom as well as power, it is surely no science at all.

Aldo Leopold, *Ecology and Politics*

Emerging technologies, viz., nanotechnology, biotechnology, information technology, and cognitive science are hyped as 'transformative' by their proponents who prophesize that these new technologies will significantly and beneficially change our world – in medicine, communication, transportation, agriculture, energy, and even in the very

makeup of human beings.[1] Like technologies of the past (for example, the internal combustion engine or nuclear power) these new technologies will provide fundamental and pervasive changes to society and the environment. Concerns have been raised about the potential environmental impacts of these technologies, for example, the 'grey goo' of nanotechnology ('out-of-control nanotech replicators wipe out all life on Earth') the unintended proliferation of the 'terminator gene', (gene technology developed (and subsequently abandoned) for genetically modified plants so that the second generation seeds would be sterile), or the detrimental impacts on future generations from the transformation of humans, through genetic engineering and other hardwired changes to human beings. The implications of emerging technologies on humans, society, and the environment challenge our understanding of our responsibilities to the environment and future generations.

The two broad areas of research, emerging technologies and sustainability, although not wholly indifferent to one another's perspectives (for example, some emerging technologies are thought to address sustainability challenges) are largely apathetic to the implications raised by the central concerns of the other. The areas of ethics that addresses the problems raised by emerging technologies and sustainability, bioethics and environmental ethics, though their genesis were one and the same, have drifted far apart. Contemporary discussions of bioethical topics, like the ethical dimensions of emerging technologies, rarely address the environmental issues and vice versa environmental ethicists concerns seem not to overlap with topics standardly covered in bioethics, such as emerging technologies.[2] Van Potter who coined the term 'bioethics' in the 1970s meant the subject matter for the field to be both the stuff of contemporary bioethics and environmental ethics.[3] In other words, he meant bioethics to apply to the integration of what we currently think of as bioethics and environmental ethics. For Potter, bioethics was the consideration of the values constitutive of our relationship with nature necessary to ensure our continued well-being into the future. Potter, inspired by Aldo Leopold's concern about our treatment of the land and the survivability of humans, forged a field of study that would consider humanity's place in the biosphere. He was explicitly concerned to address emerging technologies' role in that survivability. Potter's insight about the unity of the problems we face about acceptable human survival on the planet was correct. In this paper, I will attempt to reintegrate these fields addressing questions about human well-being in the future, its dependence on complex environmental systems, and the impact of emerging technologies particularly enhancement technologies upon it.

[1] For instance, see National Science and Technology Council, 'Nanotechnology: Shaping the World Atom by Atom', Washington, DC. (1999); Mihail C. Roco and William S. Bainbridge, *Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science (*Washington DC: National Science Foundation, 2002); Ray Kurzweil, *The Singularity is Near: When Humans Transcend Biology* (New York: Penguin, 2006).

[2] See, for instance, Peter Whitehouse, 'The Rebirth of Bioethics: Extending the Original Formulations of Van Rensselaer Potter', *American Journal of Bioethics* 3:4 (2003) pp. 26-31, and James Dwyer, 'How to Connect Bioethics and Environmental Ethics: Health, Sustainability, and Justice', *Bioethics* 23:9 (2009), pp. 497–502.

[3] Van Potter, *Bioethics: Bridge to the Future* (New Jersey: Prentice-Hall, 1971); Van Potter, *Global Bioethics: Building on the Leopold Legacy* (Lansing: Michigan State University Press, 1988).

Proponents of emerging technologies, including ones that envision the technologies converging on enhancements for human beings, have not adequately addressed the implications of those technologies for sustainability (not the term that Potter used but certainly what he was referring to when he did address 'acceptable human survival'[4]). Although there is no consensus on the meaning of 'sustainability' there is some general agreement that its focus is on our responsibility to the future. Sustainability requires human survival beyond the current generation; hence it requires that our scope of moral consideration include the effects of our actions and practices on the future of humans. Institutionally, politically, and economically, however, we (the 'we' I am thinking about is Western society) have in policy deliberations been notoriously negligent reflecting on and accounting for the effects on future generations and the planet. Though there are individuals and some states, notably the EU, who are concerned with the environment, encouraging the use of frameworks such as the 'precautionary principle' a cautionary approach to the uncertainty of risks to the environment from new technologies, they have failed to garner widespread support for restraints on technological advancements by all the major industrial nations. And those discussions are usually framed in terms of more proximate risks rather than our responsibility to the future. Current deliberation on climate change legislation and the recalcitrance of governments such as the US to implement restrictions on greenhouse gases illustrates the distance we have to go to integrate widening the scope of our moral consideration to include future generations.

What I want to explore is whether the vision of the future coming from proponents of the transformative effects of emerging technologies on human beings, the range of human enhancements, is in conflict with the demands of sustainability. The proponents of human enhancements provide a vision of the future, one where humans are not plagued by disease or disability, they have technologically enhanced capacities, including merging with machines, and they have radically extended lives. Since the transhumanist's philosophy has this articulated vision of the future, focusing on the implications of those envisioned technological changes provides a felicitous vantage point from which to begin to assess the sustainability of all emerging technologies (although that analysis is beyond the scope of this paper). Coming full circle to the roots of bioethics, I too will draw wisdom about human survival or sustainability in the biosphere from Aldo Leopold. Though he didn't use the term 'sustainability' as it is used today, it is clear that his moral vision of 'land health' and our responsibilities growing out of the land ethic are ones that can ground a rich notion of sustainability.[5] That moral vision was one that requires that we change our normative framework of our relationship to the land. Implementing Leopold's proposed change in our relationship with the land would have significant and positive implications for future generations. The question is whether the implications of emerging technologies and the prescriptive implications of Leopold's moral vision are consistent with one another.

[4] Van Potter, *Global Bioethics*, p. 51.

[5] Leopold did, however, critique the Progressive Era notion of 'sustainability yield'; see Julianne Newton and Eric Freyfogle, 'Sustainability: a Dissent', *Conservation Biology* 19 (2005), pp. 23-32.

Emerging Technologies Converging on Making 'Better' Humans

Proponents of transhumanism argue that the effects of emerging technologies on humans will make us 'better' humans, ultimately transforming us into a posthuman species. The idea of transcending the human condition has a history, Frederick Nietzsche's Zarathustra contends: 'Man is something that shall be overcome...What is ape to man? A laughing stock or painful embarrassment. And man shall be that to overman: a laughingstock or painful embarrassment'.[6] For Nietzsche, overcoming the human condition is done through the will, his so-called 'will to power' – a kind of self-actualization, 'a mastery of the will'. The current transhumanists' methods of transformation (often they call it 'evolution'), on the other hand, are technological. Modern transhumanists (leading academic proponents include: Max More, James Hughes, and Nick Bostrom) concur with Nietzsche's assessment of the condition of man as something that we should overcome because it limits us. More says: 'Our creativity struggles within the boundaries of human intelligence, imagination, and concentration.'[7] He also sees transhumanism, as Nietzsche did, as breaking from among other things the oppression of religion. 'The concept of God has been oppressive: a being more powerful than we, but made in the image of our crude self-conceptions. Our own process of endless progression into higher forms should and will replace this religious idea.'[8] When asked why not accept our human limitation, More says:

> The Enlightenment and the humanist perspective assure us that progress is possible, that life is a grand adventure, and that reason, science, and good will can free us from the confines of the past...Aging and death victimize all humans…to Extropians and other transhumanists, the technological conquest of aging and death stands out as the most urgent, vital, worthy quest of our time. Some fear that life will lose its meaningfulness without the traditional stages of life produced by aging and the certainty of death … Meaningfulness and value require the continual making and breaking of forms, a process of self-overcoming, not a stagnant state.[9]

Transhumanists suppose that beyond triumphing over disease and death we can make our lives better by making ourselves more physically attractive, sexually potent, athletically superior, more intelligent, and less controlled by our emotions.

Proponents of transhumanism argue that the 'technologies that push the boundaries of humanness, can radically improve our quality of life, and that we have a *fundamental right* to use them to control our minds and bodies.'[10] They envision that we will be genetically engineered cyborgs with nano-implants and neuroenhancers. Ray Kurzweil argues that we are heading for what he calls the 'Singularity' where humans emerge with machines and our intelligence, since it will be mostly not biological, will be tremendously more powerful than it is today.[11] For Kurzweil, this is the beginning of a

[6] Frederick Nietzsche, *Thus Spoke Zarathustra* (London: Penguin Classics, [1883-1891] 1961), §§ 3–4.
[7] Max More, 'On Becoming Posthuman', available at http://eserver.org/courses/spring98/76101R/readings/becoming.html (accessed 2014-12-01).
[8] *Ibid*.
[9] *Ibid*.
[10] Robert Hughes, *Citizen Cyborg* (Boulder: Westview Press, 2004), p. xii.
[11] Kurzweil.

new era where we transcend our biological limitations and there is no bright line between humans and machines, reality and virtual reality. Given the transhumanist's vision of the use of these technologies and the resulting transformation of humans, is the transhumanist's vision of the future a sustainable one? Answering that question requires consideration of a number of factors, but central to that endeavor is determining what is meant by 'sustainability'.

Leopold's View of Sustainability

The term 'sustainability' is ubiquitous in academic institutions and in marketing products yet its normative dimensions have been insufficiently explored. One definition often relied upon is from the Brundtland Commission of the United Nations (1987). It states that: 'sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'[12] This doesn't tell us much since we also need to know something about the 'needs' of the present and future, and furthermore whether there are interests beyond the needs of humans that should be taken into account. Nor does the Brundtland's definition provide a justification for taking the future's interests into account.

Following Potter in trying to understand the 'optimum environment' for human survivability, I look to Leopold's 'land ethic' as a foundation for a normative framework for sustainability. Leopold path to his land ethic started as a Progressive era scientist in 1909, a forester, and eager to implement the conservation method within the larger Progressive ideals. 'Enlightened management' entailed using science and technology to achieve the Progressive era ends. One of Leopold's initial forays into enlightened management was addressing the predator problem in the Southwest of the United States. Predators were seen as problematic since they killed 'good' animals (deer and cattle) that humans wanted for their own ends. In recounting an experience some thirty years later of shooting a mother wolf, he reflects on the beginnings of his normative transformation:

> We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain. I was young then and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view.[13]

The 'fierce green fire' draining from the wolf's eyes and the effects on the mountain due to too many deer suggested to Leopold after years of experience and reflection that there were complex forces in the natural world that were not accounted for in his scientific theory. There was a natural equilibrium regulating the mountain hillside with prey and predator; his prior theory incorporates neither the wisdom nor experience to appreciate the complexity of the natural system. Here Leopold began his intellectual journey, he gained an 'ecological conscience' which is based on an understanding of ecological

[12] Brundtland Commission of the United Nations (1987). Available at http://www.un-documents.net/wced-ocf.htm (accessed 2013-03-01).
[13] Leopold, *Sand County Almanac* (Oxford: Oxford University Press, 1949), p. 130.

interdependence, thinking in different scales, and the moral affections of care and love. We need, according to Leopold, to 'think like a mountain,' recognizing the necessity of the various members of the 'community', including humans, and their inter-dependence on one another and the differences in physical and temporal scales. This requires that we stop seeing the land as an economic resource only and start seeing our relationship with the land in moral terms.

Leopold argued that history demonstrated a steady evolutionary expansion of our sphere of moral concern and respect. Ethical concern started with one's tribe, then expanded to one's nation, then to all humanity and the 'extension of ethics' will eventually include animals and the land. Notice that for Leopold, 'land', meant everything on the land, animals, rocks and soil. Also it meant all land, developed and undeveloped wilderness. Ethics has 'evolved' to include more in its domain of 'considerability' or those entities toward which humans have moral responsibilities. For Leopold, the central vice was to see land and natural resources as property only, something to be used any way we see fit without moral ramifications. Using the story of Odysseus' killing nine slave girls, Leopold illustrated how at the time of writing the *Odyssey*, slaves were property only and did not have any moral status. The story exemplifies how our moral sensibilities and what we think is morally relevant can and does change. Hearing that story now we are horrified by Odysseus' callous indifference to the lives of those women, his failure to see them as moral subjects. But the example is meant to challenge us to interrogate our current views about what we consider as property.

The problem, according to Leopold, was: 'We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.'[14] The change required in humans' relationship to land is detailed in Leopold's conception of the land ethic: 'In short, the land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.' The 'land ethic simply enlarges the boundaries of the community to include soils, water, plants, and animals, or collectively, the land.'[15] Concern for what Leopold calls 'land health' – the land's capacity for self-renewal – 'expresses the cooperation of the interdependent parts' and 'it implies a collective self-renewal and collective self-maintenance'.[16] Our attention to land health should be viewed in synchronic as well as diachronic terms.

Leopold was well aware that we are in a relationship with the past and future, our lives are shaped, both enriched and sometimes impoverished by the past's behavior and the future is dependent on our choices. Illustrating our interdependence with the past, Leopold showed that our treatment of land determines our history and, hence will determine whether our civilization is sustainable and in what form it continues. As a cautionary tale about what we are currently doing, he says,

[14] Leopold, *Sand County Almanac*, pp. 203-204.

[15] *Ibid.*, p. 204.

[16] Aldo Leopold, 'Land-use and Democracy', *Audubon Magazine* 44 (1942), pp. 249-265.

> We inherit the earth, but within the limits of the soil and the plant succession we also *rebuild* the earth —without plan, without knowledge of its properties, and without understanding the increasingly coarse and powerful tools which science has placed at our disposal.[17]

We have tremendous power over future generations. We have the power to make their lives go well or poorly, in other words, they are vulnerable to us. Vulnerability is a powerful basis of responsibility, Robert Goodin has argued the 'vulnerability of succeeding generations to our actions and choices seems to be the strongest basis for assigning to present ones strong responsibilities for providing for them.'[18] Leopold acknowledged this basis for responsibility claiming that

> the privilege of possessing the earth entails the responsibility of passing it on, the better for our use, not only to immediate posterity, but to the Unknown Future, the nature of which is not given us to know.[19]

This is a sustainability norm, using but not abusing the land, caring for 'land health' for the sake of the future. By land health 'he meant a vibrant, fertile, self-perpetuating community of life that included people, other life forms, soils, rocks, and water.'[20] Leopold was not arguing that we merely preserve the land, rather that we use it responsibly.

Leopold's land ethic is an ethic of responsibility, focusing on relationships as opposed to a juridical model focused on rights, duties, and abstract principles. He wasn't conceptualizing the land or animals as having rights which we are obligated to respect (although he does speak of a biotic right to exist); rather Leopold was arguing that given our interdependent relationships with other human beings, animals, the land, and the future, being in a community with them generates a web of responsibilities to those entities. The land ethic provides that there is an 'individual responsibility for the health of the land' and by implication the future since land health is creating a resilient on-going and self-perpetuating community of life.[21] 'Our community' has different scales and natures, namely, local and global, physical ones, temporal ones, past, current and future, and social and cultural ones. Like Potter, I see deep affinities between Leopold's ethical approach and feminist ethics.[22] Throughout his writings, Leopold uses narrative, as do feminist ethicists, to discover and illustrate what are moral understandings about our responsibilities and what they should be.[23] He recounts stories about some of the practices where individuals were deflecting their responsibility, such as farmers seeing their land as merely a commodity that they own and individual owners required only to 'practice what conservation is profitable on your own land; the government will do the rest'.[24] Leopold's detailed explanation of his experiences and empirical research forms the

[17] Aldo Leopold, 'The Conservation Ethic' [1933], in *The River of the Mother of God*, edited by Susan Flader and Baird Callicott (Madison: University of Wisconsin Press, 1991), pp. 181-193, at p. 185.
[18] Robert Goodin, *Protecting the Vulnerable* (Chicago: University of Chicago Press, 1985), p. 177.
[19] Leopold, 'The Conservation Ethic', p. 94.
[20] Newton and Freyfogle.
[21] Leopold, *Sand County Almanac*, p. 221.
[22] Van Potter, *Global Bioethics*, p. 86.
[23] Margaret Walker, *Moral Understanding* (London and New York: Routledge, 1998).
[24] Leopold, *Sand County Almanac*, p. 207.

justification for his account of our responsibilities to the land and others. Rather than starting, as many philosophers have done, from ideal theory – abstract universalizable norms such as those of Immanuel Kant or Jeremy Bentham – and 'applying' them to problems, Leopold starts with historical, cultural, and empirical circumstances to develop his normative account. He evaluates and critically reflects on our moral understandings, whether they are intelligible and coherent, about what we can do to the land, to animals, what we must do for whom, who is responsible for do what and who is not responsible. Leopold's answer is that our current moral understandings are not intelligible and coherent (even for our prudential interests in survival) and that we must evolve our moral understandings about our relationship to the land if humans are to survive into the future. Leopold's land ethic requires that we have responsibility for the land's health for the sake of the land, since it is valuable beyond its instrumental value to us, but also to carry out our responsibilities to the future generations who will depend upon that land for their well-being.

The conception of sustainability arising from Leopold's model is a 'strong sustainability' conception of sustainability.[25] Two notions of sustainability are discussed in the literature: so-called weak sustainability and strong sustainability. These notions were first developed by Herman Daly and John Cobb in *For the Common Good,* where they challenged the economic paradigm that economic growth and saving rates are the primary indications of sustainability.[26] What these two notions of sustainability represent are two ways of conceptualizing what we owe the future and thereby provide an evaluative framework for our behavior. Weak sustainability measures the welfare of humans in the future, and strong sustainability measures the 'stuff' left in the world for the future (this includes pluralists who measure both welfare and stuff).

On the welfare account of intergenerational obligations, weak sustainability (WS), we are required to maintain at least as much in terms of levels of individual welfare as we currently have. Regardless of how we understand 'welfare,' namely as happiness or pleasure, preference satisfaction, or some objective list of goods (knowledge, friendship, peace), we need to preserve for future generations at least the same level of welfare which we currently have. WS puts no constraints on where the welfare comes from, so that there can be trades between types of capital and other forms of wealth to achieve the welfare satisfaction. If certain natural resources are used up but the society has more economic resources that can compensate agents and 'make up' any welfare decline, then that depletion of natural resources is justified.

Strong sustainability (SS), requires that we save 'stuff' for the future, for example, intact ecosystems, adequate supplies of natural resources, healthy soil, that is, 'natural capital'. SS puts limits on substituting natural assets with human-built ones. In other words, an increase or equivalence in welfare cannot be purchased with the destruction of other kinds of goods. SS supposes that we can't know for certain what future generations will want or need, but that whatever their interests are having certain natural resources will facilitate their ability to live fulfilling lives. In addition, SS supposes that there is value in more than human welfare so that trading off entities without economic value is wrong. This version of sustainability requires us to decide what stuff is important and valuable to preserve for future generations. We can't know what they want in fact

[25] Bryan Norton, *Sustainability* (Chicago: University of Chicago Press, 2005), p. 307ff.
[26] Herman Daly and John Cobb, *For the Common Good* (Boston: Beacon Press, 1994).

whatever policy about resource use and preservation we end up adopting will affect the identities and preferences of future generations and will be optional for the people that it created.[27]

Leopold's land ethic is a strong conception of sustainability since he does not believe that all things are fungible and that they can be traded for human welfare interest. Leopold would not support a WS model that supposes that human happiness (whatever its source) is the only thing of importance and thereby willing to trade natural 'stuff' for more happiness. For instance, on a WS model if the future is 'happier' than we are (think of humans hooked up to a machine as in the Matrix experiencing 'happiness') even though all the natural places are gone, the current generation has satisfied its intergenerational responsibilities. Leopold argued that 'land health' was a community value and not merely for its instrumental value for the interests of humans. Ensuring the health of the land is protecting natural 'resources' for the future. We are not merely passing on 'natural resources' but our commitment to them as valuable.[28] This could be seen as a kind of paternalism about the 'character of future individuals' not a 'paternalism about the welfare of future individuals'.[29] We want future generations to be people who value what we think is worthy of value and we believe that they will lead better lives with these things we believe are valuable. Just as we think that democratic institutions, great art and literature should be protected for the future because we think they are worth protecting, so too should some aspects of nature be protected. It is because we have connections with the future, in Leopold's term are in a 'community' with the future, that we are responsible to preserve things of value for them. Leopold's land ethic, with its expansion of our understanding of community to include the land and attention to its 'health' provides a foundation for a normative framework for strong sustainability.

Emerging Technologies, Transhumanism, and Sustainability

Successes with emerging technologies have fueled the current transhumanists' optimism about the possibility of pushing evolution forward quickly to transform human beings. Is the transhumanists' future consistent with any version of sustainability? On a weak sustainability account, transhumanism may not violate our responsibilities to the future. WS requires that we ensure that future generations' welfare is at least as good as our welfare. On a happiness (hedonist account) account of welfare, transhumanism could come out pretty well in advancing human welfare. This is particularly true since on the WS account the source of the welfare improvement (or equilibrium) doesn't matter. Neuroenhancers, for example, created by pharmacology, implants, or genetic manipulation, designed to enhance our mood and eradiate negative emotions, should make people happier. If what we are required to ensure is that future generations' subjective states are as good as or better than ours and genetic changes, new drugs or implants can eliminate depression and make people 'happier', then we will have satisfied our obligation to them by creating a world with widespread access to neuroenhancers.

[27] For instance, see Derrick Parfit, *Reasons and Persons* (Oxford: Oxford University Press, 1986), and Mark Sagoff, *The Economy of the Earth* (Cambridge University Press, 1988), p. 64.
[28] See Sagoff and Norton.
[29] Sagoff, p. 64.

This is true even if those future generations are denied many of the natural resources that we currently experience, viz., relatively clean air and abundance of water, wild lands, and biodiversity. In fact, some predictions of the posthuman world, humans will merge with machines, and consequently, these merged humans presumably wouldn't experience any deprivation from the depletion of natural resources since their 'experiences' will be in the virtual world and not as we currently experience the world.[30] If this prediction comes to pass, it would have profound and devastating effect on our relationship to the land according to Leopold since he believed that a direct experience with the land was necessary in order to evolve to the land ethic.[31]But for the WS theorist, the relationship to the land is not necessary for achieving human welfare, consequently Leopold's concerns are not salient.

Turning to Leopold's conception of sustainability and whether transhumanism is consistent with his version of SS, we might start by asking whether the changes brought by transhumanism are fundamentally different from other ways technology has been changing us for centuries. In other words, is there something different about the implications of the transhumanists' technological advancements from those of other technologies? Vaccines and other medical developments are good examples of human advancements that have enhanced our lives, extending the average life span of populations where there is widespread access to them. Agricultural advancements that have led to a steady supply of nutritious food have significantly increased many human characteristics, such as the height of those populations. Nevertheless, such enhancements (extending life spans and increasing height) have changed human lives in degrees, so the question may rest upon when enhancements move from the incremental changes in humans to a fundamental change, possibly making humans into a different species from earlier versions of humans. Many of the developments that led to the changes up to this point were designed as 'therapeutic' correctives of diseases or disabilities in humans as opposed to intentional improvements or enhancements of humans—overcoming man as Nietzsche put it.

Both critics and proponents of human enhancements argue that the enhancements being contemplated are different in kind from the ones of the past. According to historian Michael Bess,

> They will affect the qualities we deem most centrally and deeply human. Personality, emotions, cognitive ability, memory, perception, physical sensation, the boundaries between one person and another—all these will be subject to deliberate manipulation.[32]

Some of the most ardent critics of transhumanism raise the following types of alarm: Francis Fukuyama claims that it is the 'world's most dangerous idea', because it threatens human nature, moving us to a posthuman stage of history.[33] Loss of human nature means loss of our continuity of experience and values, and the kind of political regimes possible.

[30] See, for instance, Kurzweil.

[31] Julianne Lutz Newton, *Aldo Leopold's Odyssey* (Washington: Island Press, 2006), p. 348.

[32] Michael Bess, 'Icarus 2.0: A Historian's Perspective on Human Biological Enhancement', *Technology and Culture* 49:1 (2008), pp. 114-126, at p. 123.

[33] Francis Fukuyama, *Our Posthuman Future: Consequences of the Biotechnology Revolution* (New York: Picador, 2002).

Bill McKibbon contends that human enhancements would undermine the necessary context for human experience. Tampering with fundamental characteristics of humans in order to overcome human limitations (such as aging, limitations of cognition and physical abilities) will, according to McKibbon, remove the conditions that are necessary for meaningful human choice. If limitations could be overcome technologically, human lives would be meaningless. Moreover, McKibbon argues that parents will be 'forced' to engineer their children, eliminating traits and dispositions that can lead to self-reflection, self-doubt, and depression, states that can lead to real emotional growth. With 'widespread use, they will first rob parents of their liberty, and then strip freedom from every generation that follows. In the end, they will destroy forever the very possibility of meaningful choice.'[34] Michael Sandel argues that engineered humans would see their talents as fully their responsibility rather than gifts for which we should be grateful:

> [I]f bioengineering made the myth of the 'self-made man' come true, it would be difficult to view our talents as gifts for which we are indebted rather than achievements for which we are responsible.[35]

The secular problem with eroding our appreciation of the 'giftedness' of our talents and powers is that 'it will transform three key features of our moral landscape—humility, responsibility, and solidity.'[36] Ultimately he argues that proposed enhancements undermine the dignity of man since they diminish our humanity by threatening human freedom and human flourishing.

Dangerous idea or not to humanity, will the transhumanists' endeavors be sustainable according to a Leopoldian view of sustainability? At minimum, sustainability dictates that we refrain from harming the future; already, according to Leopold, our treatment of the land is violating that responsibility to the future. Does the transhumanist project harm future generations or the land in some other distinct fashion? The projected trajectory of human enhancements includes enhancements done by individual agents to themselves or their children. The current enhancement agenda is sheltered under the banner of individual freedom and welfare, often with a libertarian favor. This libertarian approach takes form in a defense of fundamental rights against government interference into one's reproductive and morphological freedom. This characterization distinguishes the current enhancement movement from the earlier ones, such as the eugenics movement, wherein the state was imposing its coercive measures upon often unwilling individuals.[37] Parents' reproductive choices (for example, genetically designing their offspring) are motivated to help, not harm, their offspring.[38]

[34] Bill McKibbon, *Enough: Staying Human in an Engineered Age* (New York: Times Books, 2002), p. 190.

[35] Michael Sandel, *The Case Against Perfection* (Cambridge: Harvard University Press, 2007).

[36] *Ibid*., p. 86.

[37] Allen Buchanan, Norman Daniels and Daniel Wikler, *From Chance to Choice: Genes and Social Justice* (Cambridge: Cambridge University Press, 2000).

[38] It should be noted that there has been considerable debate in the literature about the moral appropriateness of genetic alterations of children for enhancement purposes due among other reasons to the potential risks of those procedures to those children. Let's assume for the sake of this argument that all of those risks to one's progeny will be reduced or eradicated as technology advances.

The transhumanists' libertarian framework is problematic to the Leopoldian conception of sustainability, which requires responsibility to the community (in Leopold's sense) and not merely a narrow self-interested focus that the libertarian condones. For example, the goal of radical life extension for those with resources to afford the technological enhancements could have significant impact on the carrying capacity of the land. Just as over-population of any species can be destructive to the ecosystem, so too could too many individuals who extend their lives far beyond what is the 'norm'.[39] Questions of comparative fairness arise as well, namely whether it is fair that some have access to the technology that extends some people's lives while others do not have that access to those technologies and cannot extend their lives. As a consequence of their use of the emerging technologies, those with extended lives could be seen as using more than their 'fair share' of the global resources. If it were feasible to ensure universal access to human enhancing technologies then the fairness to current individuals would be addressed, but we are left with the question of the fairness of resource use issue for the future. Transhumanists contemplate eradicating disease and death altogether. What the prospect of humans living indefinitely would mean for the planet is unfathomable and certainly troubling for the earth. Presumably, new people are being added to the world every year but if roughly equal numbers are not expiring then overpopulation would very quickly overwhelm the resources of the planet. Transhumanism's reliance on libertarian ethics would discount the negative externalities that their activities generate, for example, the effects on the globe of radical life extension. They also undervalue public goods, healthy soil, clean air and water, and the role of the community or state to secure them. Libertarians reject responsibilities outside of those that they have voluntarily chosen or involve direct harm to others; consequently, that moral framework would reject the notion of responsibility to future generations outside of ones voluntarily assumed or directly attributable to their actions.

We owe the future on Leopold's SS account, natural resources and other features of the environment. The human genome arguably is a 'natural resource', part of the natural capital owed to the future in at least some similar form as we received it. In genetically engineering humans we are dramatically altering the natural resources for future humans and dictating the state of their existence. A number of theorists have worried that human enhancements, or designing future people, objectionably dictates the state of existence for future humans. For example, Hans Jonas, philosopher and theologian, was one of the first in the 1970s to raise ethical questions about new technologies used to change humans. Jonas said:

> Technologically mastered nature now again includes man who (up to now) had, in technology, set himself against it as its master… But whose power is this—and over whom or over what? Obviously the power of those living today over those coming after them, who will be the defenseless other side of prior choices made by the planner of today. The other side of the power of today is the future bondage of the living to the dead.[40]

[39] Granted the notion of 'normal' life span is difficult to discern but lives that went significant beyond what is statistically average would have a greater impact on resource use of the globe.

[40] Hans Jonas, quoted in Jürgen Habermas, *The Future of Human Nature* (Maldon, Mass.: Wiley-Blackwell, 2003), pp. 47, 48.

Jonas argues for a 'right to ignorance' as a 'condition for the possibility of authentic action'. The 'ethical command' Jonas claims is 'to respect the right of each human life to find its own way and be a surprise to itself'.[41] Jonas's objection is that human enhancement, specifically genetic enhancement, would 'constitute a kind of parental tyranny that would undermine the child's dignity and capacity for autonomous choice.'[42] Bostrom's response to Jonas's objection to genetically engineering humans is that our descendants will be much more technologically advanced than we, and if they don't like our expansion of their capacities they can reverse them. He says:

> If, for some inscrutable reason, they decide that they would prefer to be less intelligent, less healthy, and lead shorter lives, they would not lack the means to achieve these objectives and frustrate our designs.[43]

Bostrom misses the point of Jonas's objection to genetic enhancements that dictate the characteristics of their children. Joel Feinberg developed a version of the objection to certain interferences of parents on their children, which Feinberg called the violation of the right to an 'open future'.[44] The idea is that parents must not constrain children (and by extension future generations with human enhancements that can continue well into the future) and should provide them with opportunities so that when they grow up they will have choices about the kind of life they want to live.[45] In other words, children have a right not to have all the details of their life (for example, not to have their height, weight, career path, athletic and intellectual abilities, traits and dispositions) dictated in advance. Whether this right to an open future is violated with any given modification is open to dispute. It is arguable, however, that altering the human genome, for instance, so as to eliminate certain human emotions such as compassion or empathy that expand our understanding of ourselves, other humans, and animals might well cross over the threshold and violate that right. Eliminating those emotions would be problematic for Leopold's account since he thought we needed more than a scientific understanding of the land to evolve to the land ethic. 'No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions.'[46] Once those opportunities to experience those emotions are lost, by genetically precluding them, it is difficult to imagine how they could be retrieved. Because of the long term effects of germ line genetic alternations (modification of germ cell or gametes), modifications to the germ line have come under much more criticism than somatic cell alterations (somatic cell modifications are any cells other than the gametes and thereby are not passed on to progeny). Germ line modifications make changes to future generations and not merely to the individual who is affecting the change. These types of changes might well violate their right to an open future or put the

[41] Hans Jonas, 'Biological Engineering – A Preview', *Philosophical Essays: From Ancient Creed to Technological Man* (Englewood Cliffs, NJ: Prentice-Hall, 1974), pp. 141-167, at p. 163.
[42] Nick Bostrom, 'In Defense of Posthuman Dignity', *Bioethics* 19:3 (2005), pp. 202-214, at p. 211.
[43] *Ibid*.
[44] Joel Feinberg, 'The Child's Right to an Open Future' [1980], in Joel Feinberg, *Freedom and Fulfillment: Philosophical Essays* (Princeton: Princeton University Press, 1994), pp. 76-98.
[45] Jürgen Habermas, *The Future of Human Nature* (Maldon, Mass.: Wiley-Blackwell, 2003), p. 79.
[46] Leopold, *Sand County Almanac*, pp. 209-210.

'future in bondage with the dead' and thereby adopting those changes might violate responsibilities we have to the future.

But we said earlier and argued that we ought to identify resources, whether natural or man-made (democratic institutions and art, for example), worth preserving for the future. In doing so we are hoping to cultivate the character of future persons, making certain ways of living possible for them and other ways of living not possible. And I argued that we should make these decisions on the basis of what we believe is worth preserving, what we believe is valuable. How is this determination different from the engineering of future individuals, why in the one case it is violating the 'right to an open future' and in the other, our picking resources to save, it is not violating the right to an open future? Leaving future generations with a wide variety of natural resources, including human resources such as the genome, expands the range of opportunities that they will be able to experience, thereby opening the possibly life choices. Providing one's children with a range of educational and recreational experiences expands their breath of choices, opens their future options in a way that requiring them to play only tennis five hours a day does not. Making a public commitment to preserve wilderness areas, fisheries, wildlife, works of art, and not necessary NASCAR race tracks, we hope that the future will appreciate the value of those things we committed to preserving because we believe they are of value. They may decide otherwise, but they have the option to appreciate those things. Genetically designing or other altering a person so they can only be particular ways and value particular things is to immorally constrain them by violating their right to an open future.

Beyond the argument that genetic enhancements would objectionably constrain or dictate the lives of future generations, are there other reasons to think that we have a responsibility to the future to preserve some semblance of human genetic heredity, if not against all changes, at least changes that amount to transforming humans into another species? Fiction writers have dealt with versions of this issue, portraying various dystopias with genetic engineering of humans. In addition to Aldous Huxley's well known *Brave New World*,[47] Margaret Atwood in her novel *Oryx and Crake,* imagines a world where genetically engineered 'humans', the 'Children of Crake' are produced to be peaceful, polite, and happy, feel no jealousy, with thick skin that is impervious to the damaging sunlight, and with naturally insect-repellant properties, as well as vegans 'perfectly suited' to their environment.[48] The Crakers were created to solve perceived problems with humans. There seemed to be good reasons for excluding each of the characteristics. For instance, Craker's skin that isn't damaged by sunlight, so people didn't have to worry about prolonged sun exposure. The fact that Crakers turn a certain color when they are fertile and ready to copulate eliminates all the problems of romance and interpersonal sexual relationships! These fictional depictions expose an important truth and one of which Leopold was well aware: that scientific interventions done even with the best intentions and based on the 'best' science can have unintended consequences to society and the planet. Further the hubris of humans implementing scientific innovations without caution for the future can and sometimes does result in disasters. Our predictive abilities, particularly with complexity and when projected far

[47] Aldous Huxley, *Brave New World* (New York: Harper: Perennial Classics, [1932] 1998).
[48] Margaret Atwood, *Oryx and Crake* (New York: Anchor Books, 2004).

into the future, are not really reliable.[49] Even if the individual genetic changes don't have downstream detrimental effects, the cumulative effects of enhancements on future generations might well be detrimental and limit the wellbeing of the future as well as having injurious impacts on the land.

Notice that Bostrom's response to Jonas also presupposes that there will be no unintended consequences of these alternations to humans, that is, they will all be 'good' changes, making us smarter, better looking, and longer lived. Not only is that naïve about the possibility of unintended bad consequences from good changes but also begs the question about whether we always have an accurate insight about what is 'good'. The elimination of what we consider 'bad' traits in favor of 'good' ones is reminiscent of Leopold's early misguided thinking about the varmint problem and the supposed solution of ridding ourselves of 'bad' animals.

On the Leopoldian account of sustainability we have a responsibility to preserve natural 'stuff', which includes arguably includes human genetics and human nature. What is meant by 'human nature' is multifaceted; it is conceived from a number of different perspectives: religious, psychological, 'folk', and biological. If we think of human nature as traits or characteristics or dispositions that all humans share then it may be difficult to define human nature. If rather we define human nature as a cluster of those characteristics and dispositions, supposing that all humans have most of them, but that none are necessary for being human, then we have a plausible account. Recognizing that this is a superficial analysis of human nature but that a full account of the nature of human nature is beyond the scope of this paper, we can nevertheless plausibly argue that preserving human nature is some of the natural 'stuff' worth preserving on the strong sustainability account. Human nature connects us with the past and the future since we assume that humans will react to experiences in roughly the same way that we currently do and that similarity of experiences permits us to understand and empathize with others' lives. What makes enduring literature engaging to us, for example, is the exploration of human emotions and paradigmatic themes products of human nature. The hero's journey, a trope in literature, is based on common human experiences that are based (loosely) on some conception of human nature. Ensuring that the future has that cluster of characteristics and dispositions that comprise human nature is our responsibility and arguably human enhancement threatens it. Some philosophers, for example, most of the transhumanist philosophers and others such as Alan Buchanan have challenged this argument that there is something wrong

> with altering or destroying human nature, because, on a plausible understanding of what human nature is, it contains bad as well as good characteristics and there is no reason to believe that eliminating some of the bad would so imperil the good as to make the elimination of the bad impermissible.[50]

[49] Fritz Allhoff, 'Risk, Precaution, and Emerging Technologies', *Studies in Ethics, Law, and Technologies* 3 (2009); Cynthia Selin, 'Diagnosing Futures: Producing Scenarios to Support Anticipatory Governance of Technology' (2010), Paper presented at the annual meeting of the 4S Annual Meeting - Abstract and Session Submissions, Crystal City, VA. Abstract available at http://www.allacademic.com/meta/p380481_index.html (accessed 2014-12-01).

[50] Allen Buchanan, 'Human Nature and Enhancement', *Bioethics* 23:3 (2009), pp. 141-150, at p. 141.

But given Leopold's experience with so-called 'enlightened management' of the natural environment where we thought we could know what was bad and remove the 'bad' animals (predators) and leave only the 'good' ones, should make us less sanguine about our ability to make those judgments that effect the existence of what ought to be the characteristics of humans.[51]

The future, then, on this Leopoldian account is owed some 'natural resources', including healthy land and other natural 'stuff' since they are required to ensure human well-being. On this account of sustainability, we believe that some things besides human happiness are valuable outside their instrumental value that we want to preserve those things for the future community, a community we conceive ourselves as a part, with shared values. We are responsible to preserve things such as wilderness areas, national parks, and 'land health', treasures of art, democratic institutions, and so on. Some of those natural resources would be human ones, for example, human genetic heredity and human nature. Just as we can marvel and see the value in the majesty of natural places (the Grand Canyon) we can marvel at the complexity and diversity of human beings and want to preserve humanness. Our community includes the past and future; we rely upon past generations for current bequests, including natural and human-made ones (great works of literature, music and art, as well as cultural traditions we believe are worth preserving), and the future relies upon us for the same. We rely upon the future to carry out our current projects that we believe are worthwhile, including preserving values of democracy and responsibility to nature.

Back to the Future: Bioethics and Sustainability

Many theorists have been concerned about modern technology's power to radically change the planet and even perhaps destroy humans; Leopold was among them. Particularly given human hubris and lack of moral consciousness toward our treatment of the land, he was concerned about the potential destructive effects of modern science and technology. His concern for humans' 'cosmic arrogance' that lead them to practice 'power science', attempting to control the world rather than an earlier practice of science which tried to understand the world and learn to live in harmony with the world. Leopold's most important contribution to contemporary ethical discussion has been to expand our thinking about our responsibilities, particularly to the land, focusing on the goal of 'land health' that idea of a 'vibrant, fertile, self-perpetuating community of life.'[52] I have tried to argue that the focus on land health, implemented through exercising our responsibilities entailed by the land ethic, will provide a rich foundation for sustainability. Conceptualizing ourselves as 'fellow-voyagers' with the land community, recognizes our interdependent relationships with all the entities in our community. The land ethic not only changes our thinking about our responsibility to the land community today, but acknowledges our responsibility for the far-reaching impacts of our current actions on the future. Leopold's sustainability charges us with the responsibility to consider the community, physical, cultural, biological, the current and future one of which we are a part.

[51] Leopold, *Sand County Almanac*, pp. 129-133.
[52] Newton and Freyfogle, p. 29.

Leopold's land ethic provides a foundation for sustainability prescribing responsibilities to preserve and protect some of the natural 'stuff' for the future. Transhumanists may be thinking like virtual mountains, not real ones, that is, they are not thinking about their responsibilities to other species, the land, and future with their vision of building 'better' people. Transhumanists suppose that they are doing what evolution has done but just more quickly. Leopold made an astute response to such assertions that 'Man-made changes [in the land-community] are of a different order than evolutionary changes, and have effects more comprehensive than is intended or foreseen.'[53] Leopold, though he was not aware of the technology of the twenty-first century, experienced what human hubris based on our science could do to the planet and our ability to survival on it. Leopold would be dismayed with the transhumanist use of science. He said: 'We of the machine age admire ourselves for our mechanical ingenuity... But are these not in one sense mere parlor tricks compared with our utter ineptitude in keeping land fit to live on?'[54] Leopold saw himself as a scientist; nevertheless, he worried about the direction of science. He said 'Science has no respect for the land as a community or organism, no concept of man as a fellow passenger in the odyssey of evolution.'[55] Leopold's vision of sustainability would have us respect and be responsible for the land's health as a good community member for current members and future members. Potter's original use of the term 'bioethics' meant for the field to consider our technologies' and practices' effects on the future existence on the planet. Returning to the genesis of bioethics we should consider the morality of emerging technologies in light of their effects on sustainability.

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Bibliography

Allhoff, Fritz. 'Risk, Precaution, and Emerging Technologies', *Studies in Ethics, Law, and Technologies* 3:2 (2009), pp. 1-27 (online).

Atwood, Margaret. *Oryx and Crake* New York: Anchor Book, 2004.

Bess, Michael. 'Icarus 2.0: A Historian's Perspective on Human Biological Enhancement', *Technology and Culture* 49:1 (2008), pp. 114-126.

Bostrom, Nick. 'In Defense of Posthuman Dignity', *Bioethics* 19:3 (2005), pp. 202-214.

Buchanan, Allen E., Norman Daniels and Daniel Wikler. *From Chance to Choice: Genes and Social Justice*. Cambridge: Cambridge University Press, 2000.

Buchanan, Allen. 'Human Nature and Enhancement', *Bioethics* 23:3 (2009), pp. 141-150.

Brundtland Commission of the United Nations. Available at http://www.un-documents.net/wced-ocf.htm (accessed 2013-03-01).

Daly, Herman and John Cobb. *For the Common Good*. Boston: Beacon Press, 1994.

[53] Leopold, *Sand County Almanac*, p. 218.

[54] Leopold, 'The Conservation Ethic'.

[55] Aldo Leopold, 'On a Monument to the Pigeon' (1946), quoted in Curt Meine, *Aldo Leopold: His Life and Work* (Madison: University of Wisconsin Press, 2010) p. 483.

Dwyer, James. 'How to Connect Bioethics and Environmental Ethics: Health, Sustainability, and Justice', *Bioethics* 23:9 (2009), pp. 497–502.

Feinberg, Joel. 'The Child's Right to an open Future' [1980], in Joel Feinberg, *Freedom and Fulfillment: Philosophical Essays*. Princeton: Princeton University Press, 1994, pp. 76-97.

Fukuyama, Francis. *Our Posthuman Future: Consequences of the Biotechnology Revolution*. New York: Picador, 2002.

Goodin, Robert. *Protecting the Vulnerable*. Chicago: University of Chicago Press, 1985.

Habermas, Jürgen. *The Future of Human Nature*. Maldon, Mass.: Wiley-Blackwell, 2003.

Hughes, Robert. *Citizen Cyborg*. Boulder: Westview Press, 2004.

Huxley, Aldous. *Brave New World*. Perennial, Reprint edition, 1998.

Jonas, Hans. 'Biological Engineering—A Preview', in *Philosophical Essays: From Ancient Creed to Technological Man*. (Englewood Cliffs, NJ: Prentice-Hall, 1974), pp. 141-167.

Kurzweil, Ray. *The Singularity Is Near: When Humans Transcend Biology*. Penguin: New York, 2006.

Leopold, Aldo. 'Land-use and Democracy', *Audubon Magazine* 44 (1942), pp. 249-265.

Leopold, Aldo. *Sand County Almanac*. Oxford: Oxford University Press, 1949.

Leopold, Aldo. 'The Conservation Ethic' [1933], in *The River of the Mother of God*, edited by Susan Flader and Baird Callicott. Madison: University of Wisconsin Press, 1991, pp. 181-193.

McKibbon, Bill. *Enough: Staying Human in an Engineered Age*. New York: Times Books, 2002.

Meine, Curt. *Aldo Leopold: His Life and Work*. Madison: University of Wisconsin Press, 2010.

More, Max. 'On Becoming PostHuman' (2010). Available at http://eserver.org/courses/spring98/76101R/readings/becoming.html (accessed 2014-12-01).

National Science and Technology Council. 'Nanotechnology: Shaping the World Atom by Atom'. Washington DC, 1999.

Nash, Roderick. *The Rights of Nature*. Madison: University of Wisconsin Press, 1989.

Newton, Julianne Lutz and Eric Freyfogle, 'Sustainability: a Dissent' *Conservation Biology*, 19: (2005), pp.23-32.

Newton, Julianne Lutz. *Aldo Leopold's Odyssey*. Washington: Island Press, 2006.

Nietzsche, Frederick. *Thus Spoke Zarathustra*. London: Penguin Classics, [1883-1891] 1961.

Norton, Bryan. *Sustainability*. Chicago: University of Chicago Press, 2005.

Parfit, Derrick, *Reasons and Persons*. Oxford: Oxford University Press, 1986.

Potter, Van. *Bioethics: Bridge to the Future*. Englewood Cliffs, NJ: Prentice-Hall, 1971.

Potter, Van. *Global Bioethics: Building on the Leopold Legacy*. Lansing: Michigan State University Press, 1988.

Roco, Mihail C. and William S. Bainbridge. *Converging Technologies for Improving Human Performance: Nanotechnology, Biotechnology, Information Technology and Cognitive Science*. Washington DC: National Science Foundation, 2002.

Sagoff, Mark. *The Economy of the Earth*. Cambridge: Cambridge University Press, 1988.

Sandel, Michael. *The Case against Perfection*. Cambridge, Mass.: Harvard University Press, 2007.

Selin, Cynthia. 'Diagnosing Futures: Producing Scenarios to Support Anticipatory Governance of Technology' Paper presented at the annual meeting of the 4S Annual Meeting - Abstract and Session Submissions, Crystal City, VA. Abstract available at http://www.allacademic.com/meta/p380481_index.html (accessed 2014-12-01).

Walker, Margaret. *Moral Understanding*. London and New York: Routledge, 1998.
Whitehouse, Peter. 'The Rebirth of Bioethics: Extending the Original Formulations of Van Rensselaer Potter', *American Journal of Bioethics* 3:4 (2003), pp. 26-31.

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