

Beyond Biophilia: On the Human Need for and Right to Nature

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Introduction

Calling for inclusive, agile and coordinated action to usher in an era of sustainable development for all, Secretary-General Ban Ki-moon today presented the United Nations General Assembly with...a new global agenda centred on people and the planet, and “underpinned by human rights”.

– (United Nations, (UN)) December 4, 2014b

In terms of civil liberties, people in North America are generally well off compared to the rest of the world. This security is partially due to how Western governments have established certain individual human rights in law. As highlighted in the recent speech above to the UN by Ban Ki-moon, human rights are starting to be seen as necessary to being able to achieve sustainable development. There is one essential human right, however, that is critically missing from the conversation—the right to nature. ***Human beings have essential needs for nature from the personal to the collective, global scale. Based on these needs and the threat to them, human rights to nature should be established, especially for children.***

The right to life is a fundamental human right from which other basic rights, such as to food and water, stem. If it can be demonstrated that there is an innate and universal need that is critical to human life, and the fulfilment of that need is threatened, this would make a strong basis upon which to build a case for establishing human rights regarding that need (Nickel, 2014). How to make this case for the need for ***nature*** (Defined in Appendix I) is a thorny real world challenge where science, ethics, and policy collide. In his consilience theory to unify the sciences and humanities, E.O. Wilson suggested that such complex multidisciplinary problems would best be tackled with a rigorous approach based on empirical methods (E. O. Wilson, 1998). A ***complex systems science*** (Appendix I) framework is therefore used in this paper, along with existing theories on biophilia and

nature deficit disorder, as part of the basis to demonstrate how humans need nature—from nature next door, to nature **wild** and **free**¹—at both the individual and global scales.

On the Personal Human Need for Nature

Biophilia and Nature Deficit Disorder

There was a child went forth every day;
And the first object he look'd upon, that object he became;
And that object became part of him for the day, or a certain part of the day,
Or for many years, or stretching cycles of years.
The early lilacs became part of this child,
And the grass and the white and red morning-glories,
And white and red clover, and the song of the phoebe bird...

- *Walt Whitman (1965)*

The scholarship on the relationship between humans and nature is broad, including many disciplines such as biogeochemistry, system science, climatology, ecology, psychology, medicine and philosophy. There are two authors, however, who have helped catalyze and inspire the specific study of the human need for nature, E.O. Wilson and Richard Louv.

One of the main concepts underlying the human need for nature is **biophilia**, meaning a love of living things (*bio-*, life; *philia-*, love). The concept was originally proposed by Erich Fromm as a psychological orientation of someone attracted to what is alive (Fromm, 1964). The concept was then extended in the biophilia hypothesis by E.O. Wilson and others, presented as an inherent, evolutionary human instinctive psychological response to nature and need to affiliate with living systems (P. H. Kahn, 1997; Kellert & Wilson, 1993; E. O. Wilson, 1984).

One way to establish a need for something is to demonstrate the adverse effects of its deprivation. Taking the biophilia hypothesis one step further, Louv's concept of **nature deficit disorder** presented in his book, *Last Child in the Woods*, claims that when humans are deprived of nature, they suffer a variety of adverse effects (Louv, 2005). Louv drew on research

¹ The words 'wild' and 'free' are used to serve as familiar proxies for the technical terminology used in systems science. Definitions for these and other terms key to understanding the arguments in this paper are provided in **Appendix I**, and so it is suggested that these definitions be read prior to reading the sections below.

in the field to demonstrate how modern children have less access to nature than they did a generation ago due to: increasing urbanization; “stranger danger” leading to parents not sending children outside to play as in previous generations; the loss of accessible natural environments; and the growth in time spent indoors on various media (Louv, 2005). Louv also cited studies showing that, as access to nature has declined, certain issues have been rising for children such as ADD/ADHD, childhood obesity, and depression, and presents these as potential effects of nature deprivation (Louv, 2005).

The coupled concepts of biophilia and nature deficit disorder are put forward as the basis of the argument for a personal need for nature that starts in childhood and can later develop into strong psychological, emotional and even spiritual attachments with nature that provide health outcomes as well as deep meaning and purpose in life (Gullone, 2000; Kamitsis & Francis, 2013; Kellert, 1997). There have, however, been a few criticisms of the theories put forward by Louv and Wilson. These arguments are presented in the following section, followed by the defence, with evidence, of the personal need for nature.

Arguments Against

In Plato’s dialogue *Phaedrus*, Socrates’ interlocutor asks him why he never goes beyond the city walls. Socrates replies, “I am a lover of learning, and trees and open country won’t teach me anything.”

- Cited by Whitley Kaufman (2013)

Some arguments with weight have been leveled by Whitley Kauffman, Professor of Philosophy and Global Studies at the University of Massachusetts Lowell, around Wilson’s claims on biophilia and “his project to biologize ethics”, as well as Wilson’s appeal to people’s evolved and therefore innate love of nature to ultimately support his “conservation ethic” (Kaufman, 2013). Kaufman claims that, contrary to “Wilson’s protestations”, there is “very little evidence from either biology or the human sciences that a biophilia drive exists except in the vaguest sense, or that it would have had any survival value in our evolutionary history.”

Wilson's evidence for biophilia in the popularity of "zoos, camping trips and visits to national parks" do not sway Kaufman, who points out that people actually spend more time indoors and notes the decline of natural activities compared to time spent on electronic media. Kaufman also states that many people prefer the urban and technological life, highlighted by the quote by Socrates cited above, as shown by the existence of many technophiles and videophiles (Kaufman, 2013).

There is some strong evidence to support Kaufman's argument. A 2007 study found a steady decline between 1987 to 2003 in US national park visits (a metric Wilson himself had previously used to argue for biophilia), indicating a potential decline in biophilia (Zardiac & Pergams, 2007). The same study found data indicating a significant rising trend in videophilia (specifically for home movies, theatre, video games, and Internet use) along the same timeline. A more recent study found that the average American 8- to 10-year olds spent nearly eight hours a day engaged with different screen media, while older children and teenagers spent upwards of eleven hours a day, notably more time than a full-time job (Rideout, 2010). Overall research finds that young people now spend more time with media technology than they do in school (Council on Communications Media, 2013).

In addition to the above arguments against biophilia, Elizabeth Dickinson has taken issue with a few aspects regarding Louv's central claim of nature deficit disorder (Dickinson, 2013). Dickinson's strongest argument against Louv is for his medical approach to nature deficit as a *disorder*, and claims that "obesity, ADD/ADHD, depression, and behavioural difficulties are still problems, but they are not caused by a nature deficit". Dickinson's overall aim is not to discredit Louv's central purpose to reconnect children with nature, however, as she states Louv has "successfully launched an important conversation and critique of human-nature disconnectedness". Dickinson's intent is, rather, as an eco-psychologist, to deepen and "extend this discussion" by addressing: "important cultural factors" that underlie things like fall-recovery

narratives, and the need to approach nature with more than scientific approaches such as naming and classifying (which eco-psychology views as limited to a cognitive approach, enforcing mind-body dualism and the psychological distance between observer and subject), and instead use more “emotional expressiveness, connectedness and co-presence” to foster a deeper and more integrative approach for the formative stages of human-nature relationships in children. (Dickinson, 2013)

While not a direct argument against biophilia or nature deficit disorder, there have recently been developments in the field of cybernetics through advances in artificial intelligence (AI), that is worthy of note in the debate regarding the need for nature. There has been a rise in the concept of “apocalyptic AI” and the related concept of the ‘Singularity’ as the time when humans will transcend nature in uploading their intelligence to merge with AI in robot or other machine form (Geraci, 2010a, 2010b). Ray Kurzweil perhaps best presents the arguments for why humans will one day finally overcome (or escape) nature in his book, *The Singularity is Near: When Humans Transcend Biology* (Kurzweil, 2005):

A thousand-bit quantum computer would vastly outperform any conceivable DNA computer...The Singularity denotes an event that will take place in the material world, the inevitable next step in the evolutionary process that started with biological evolution and has extended through human-directed technological evolution...Evolution moves towards greater complexity, greater elegance, greater knowledge, greater intelligence, greater beauty, greater creativity, and greater levels of subtle attributes such as love. In every monotheistic tradition God is likewise described as all of these qualities, only without limitation: infinite knowledge, infinite intelligence, infinite beauty, infinite creativity, infinite love, and so on...So evolution moves inexorably towards this conception of God, although never quite reaching this ideal. We can regard, therefore, the freeing of our thinking from the severe limitations of its biological form to be an essentially spiritual undertaking.

- Ray Kurzweil (2005)

While it may be initially tempting to dismiss the above statement as biologically naïve, science fiction, or evidence of a new techno-religious cult, it is important to note that Kurzweil speaks with a certain amount of authority on this topic. Kurzweil has multiple inventions to his name such as a scanner that allowed the blind to read, he works for one of the largest tech

companies in the world, Google, as their Director of Engineering, and he has correctly predicted several trends already such as the rise of the Internet. Kurzweil's claims of the Singularity come, not just with a promise of liberation from biological traits (including death), which nature has placed upon humanity, but also with some alarming threats to life itself. To communicate the nature of this threat, the physicist, Stephen Hawking, recently told the BBC that humans, "who are limited by slow biological evolution, couldn't compete and would be superseded" by AI and that the development of full AI "could spell the end of the human race." (Cellan-Jones, 2014) Similarly, inventor and CEO of Tesla Motors, Elon Musk, recently echoed this warning, saying that AI is the "biggest existential threat there is" and that with AI "we are summoning the demon." (Finamore & Dutta, 2014) These warnings partially stem from the warning sounded by Nick Bostrom in his recent book *Superintelligence, Paths, Dangers and Strategies*, where he argues how humans have outcompeted the rest of nature due to our superior intellects, and that AI, due to soon surpass humans in intellectual capacity, therefore has similar potential to outsmart us and shape the future in ways we cannot currently predict and that could pose significant existential risks to humanity. (Bostrom, 2014)

In Defense

Evidence Supporting Biophilia

In the arguments presented above, Kaufman's first claim against biophilia is that there is "very little" evidence of biophilia as "a drive" or as having "any survival value in our evolutionary history" is actually unfounded. The literature indicates that Kaufman is wrong on this count. A growing body of evidence lends credence to biophilia in: 1) its evolutionary roots, 2) the range of forms it can take, 3) intrinsic preference to interacting with nature compared to other activities, and 4) its positive benefits on health and wellness.

Biophilia involves human responses to nature with a posited genetic basis that has been shaped by evolution. Unlike Kaufman's claim that no mechanism biophilia to evolve exists, E.O.

Wilson and Charles Lumsden have actually proposed a model of biocultural evolution consisting of “gene-culture coevolution, which traces a spiral trajectory through time; a certain genotype makes a behavioural response more likely, the response enhances survival and reproductive fitness, the genotype consequently spreads through the population, and the behavioural response grows more frequent.” (E. O. Wilson, 1996)

If this evolutionary mechanism proposed by Wilson and Lumsden were true, then one would expect to find evidence for biophilia in our closest ancestors, the great apes. This evidence is starting to come together. Studies on primates have observed adverse effects on emotional indicators of primate happiness and wellbeing when separated from nature, and positive indicators upon their reunion with natural habitats (Verbeek & de Waal, 2002). Primates have also been observed to have innate responses to nature that range from fear and aversion of snakes to positive responses bordering on awe or even religious spirituality to environmental components such as waterfalls (Goodall, 1986; Harrod, 2014; Verbeek & de Waal, 2002).

Biophilia is also proposed to extend along a spectrum of responses to nature that range from attraction to aversion from the scale of individual organisms to the landscape scale (Kellert, 1997; Kellert & Wilson, 1993). The Savannah hypothesis, which states that humans prefer savannah-like landscapes, is part of a growing body of research that indicates humans prefer natural vistas, and have aversive responses to many urban scenes (such as looking at a brick wall outside one’s window or an urban alley compared to a scene of the ocean or a forest) rather than many urban ones (Adevi & Grahn, 2011; Bender, Tobias, & Bender, 2012; Howell, Dopko, Passmore, & Buro, 2011). While many humans have aversions to snakes and many insects, they have equally strong affinities for many animals. Evidence of mutual attraction, affiliation and bonding between humans and different species supports the affinity for other life implicit in biophilia (Rose, 2011). The bonding between people and animals has a long history of scholarship (Myers & Saunders, 2002), including research of benefits of animal assisted therapy and companion animals to wellbeing (Bekoff, 2014; Katcher, 2002), as well as common stories

of people who consider their pets considered as part of the family. This bonding goes both ways as stories attest to dogs who perform the ultimate sacrifice to protect their human companions, and even birds such as owls can form remarkably strong bonds with humans (O'Brien, 2009).

Evidence for biophilia that is intrinsic would be most obvious in young children who have had less time to be swayed by culturally or experientially learned counter-influences in their preferences. The evidence appears to back up this position with research supporting universal similarities in biophilia related views in children (P. H. J. Kahn, 2002), research indicating that young children have stronger affinities with nature than older children (R. Kaplan & Kaplan, 2002), as well as other studies on the multiple aspects of the affinities of young children with nature (Hart, 1979; Jack, 2010; P. H. Kahn, 1997; Nabhan, 1994; Smith-sebasto, 2011).

Evidence for the positive effects of humans connecting to nature has also grown such as in the restorative properties and other positive benefits of re-connecting with nature (S. Kaplan, 1995; Louv, 2011, 2012). Research on the evolved psychological and cultural value of experiences in nature of prehistoric humans (including positive and traumatic ones), including spiritual dimensions, has also been advanced that supports the principles of biophilia (Taylor, 2010; Terhaar, 2009; Van Wieren & Kellert, 2013). The evidence of the presence of animistic spirituality and related deep human connectedness to nature in indigenous cultures across the globe also speaks strongly for the prehistoric evolution of biophilia (Basso, 1996; Costa & Fausto, 2010; Greenberg, 2013; Griffiths, 2006; Haberman, 2010; James, 2002; Joseph, 2009; Jr., 2003; Kent, 2010; Pryor, 2011; Sponsel, 2007; Van Horn, 2011; J. A. P. Wilson, 2009; Zent, 2009). Moving from prehistory to history, traces of biophilia speak to us through myth, cultural and religious narrative and psychological symbolism. For instance, historian and mythologist, Mircea Eliade, has established the ancestral connections to the natural world evident in nature symbolism (such as the pervasive presence of the world tree) in ancestral myth and shamanism (Eliade, 1989). Carl Jung has defended the evolved, psychological and spiritual links with nature and laments the separation of modern humans and nature in his book *The Earth has a Soul*

(Jung & Sabini, 2002). He also counters the earlier quote by Socrates in stating, "Sometimes a tree tells you more than can be read in books."

Regarding Kaufman's criticism that biophilia seems to be giving way to technophilia, the existing of other types of behaviour, or affinities by people such as Ray Kurzweil does not mean that biophilia itself does not exist as a real, evolved, biocultural characteristic of humanity. There is always genetic variability within populations, so just because some people have predilections for salt does not mean that others prefer sugar, or that based on overall diet or food availability that tastes for salt or sugar may shift over time. The question regarding biophilia and technophilia would then be what has changed that has caused humans, particularly children, in the West to move away from their associations with nature?

The more recent work of Richard Louv addresses this question, as part of the impetus for his work to reconnect children and families with nature is from his observations of the increased rates of loss of nature, increased urbanization, culminating in 2008 when for the first time in history more than half the world's population was reportedly living in cities or towns, and the concurrent loss of youth to indoor, screen mediated activities (Louv, 2011). Louv does not deny that there are benefits to the Internet, but he states that without a force to balance technology, "it creates the hole in the boat—draining our ability to pay attention, to think clearly, to be productive and creative. The best antidote to negative electronic information immersion will be an increase in the amount of *natural* information we receive. *The more high-tech we become, the more nature we need.*" (Louv, 2011; emphasis in original) In addition, technology and nature are not mutually exclusive, and in fact, the study of cybernetics (Appendix I) shows how natural and technological system are actually connected by the same fundamental components of managing information and control systems. The love of technology can also be used to complement and help protect humans and nature, rather than feed into fears of annihilation produced by the thinking that sees a schism between human, technological and

natural systems. (It would also help if the people programming AI were not also subject to that mental schism of man vs. machine vs. nature.)

Evidence in Support of Nature Deficit Disorder

Regarding the claims by Dickinson that nature deficit is not causal to “obesity, ADD/ADHD, depression, and behavioural difficulties” (Dickinson, 2013), what evidence is there to defend nature deficit disorder? While it was not Louv’s personal intent, but his editor’s, to frame the need for nature in medical terminology, it turns out to have been a good decision as studies have found that there *does* appear to be a solid case for the need for nature based on a wide array of indicators from medical, physiological regarding almost all the senses, to psychological and general health and wellness indicators.

It should be noted here that while this study and the work of Louv focuses on North America, there has been considerable work in parallel around the globe on similar fronts. For instance, in Australia, Glenn Albrecht also developed a theory on the adverse psychological effects of the loss of nature on people, which he called ***solastagia*** (Albrecht, 2006, 2008; Seamus, 2009). Albrecht built up the concept originally based on a phenomena he observed of people starting to call him up to express their sense of horror, loss and depression—akin to the grieving response at losing a loved one—at the widespread changes to the environment they were perceiving as a result of some of the large industrial mining and other projects going on in the countryside from about 2000-2006 that were profoundly altering the landscape.

So, what is the evidence for nature deficit disorder? Is solastagia a real physiological phenomenon? Frances Kuo, from the University of Illinois Landscape of Human Health Laboratory, is one of the key researchers in the field who has studied the health links to nature for decades. In a 2009 interview Kuo stated that when people would ask her, as a scientist, ‘Do we know that people need nature?’, she would respond, “As a scientist I can’t tell you. I’m not ready to say that.” (Lab Spaces, 2009). Within a few short years, however, the weight of the evidence has come in, and in a recent review paper, Kuo outlined a ‘pyramid’ of evidence,

based upon multiple scientific indicators in support that: 1) “not only does nature exposure increase positive indicators of health such as perceived health or well-being, but it also protects against negative health outcomes such as disease and mortality”, and 2) that Louv’s nature-deficit disorder captures the concept well that “deprivation of contact with nature leaves us vulnerable to a wide range of negative health outcomes.” (Kuo, 2013) Kuo goes on to outline, quoting multiple research sources, where the evidence for the benefits of nature as well as adverse effects of its deprivation have been found in terms of the evidence, dose and treatment.

In terms of the evidence for the need for nature, Kuo cites numerous research in the following areas: 1) psychological and subjective (including biophilia and life satisfaction), 2) healthy functioning including cognitive, affective and social (such as indicators of behaviour and impulse control, like individuals living in green buildings being found to be systematically less aggressive; some studies also being replicated on children with ADHD), 3) important precursors to health such as stress reduction, physical activity, social ties and support, healing and immune functioning, and 4) objective measures of health such as reduced childhood obesity, healthier blood glucose levels, lower rates of disease and mortality in adults and increased longevity. To back up these claims, Kuo provides a lengthy table of data illustrating outcomes for “rigorously controlled studies”. (Kuo, 2013)

Regarding dose, Kuo states that some questions remain on this front but that the existing evidence indicates that every form of nature helps (with less support for indoor plants) at every dose, that the frequency and total time of exposure are both important factors, and that the more accessible and nearby the nature (linked to the commonly used term in the field of ‘nearby nature’) the better the effects of greenness. Studies also indicate that the greener the nature the better; although small doses of nature can be beneficial, and greener views were progressively better. Longer-term exposure to wilderness itself appears to be particularly beneficial. For instance, a weekend retreat to a forested area “was sufficient to enhance immune functioning for an entire month.” Further, Kuo likens nature to ‘Vitamin G’, that acts like

a metaphorical water-soluble vitamin that can't easily be stored, so needs to be replenished by our bodies on a regular basis. (Kuo, 2013).

In summary, Kuo's summarization of years of evidence shows that the weight of evidence has shifted to be able to clearly claim that the current science shows that Dickinson is likely wrong in her arguments against Louv's nature deficit disorder and the human need for nature.

On the Global and Systemic Human Need for Nature

Independence is a political, not a scientific term.

- Lynn Margulis and Dorian Sagan (1995, p. 26)

All members of an ecological community are interconnected in a vast and intricate network of relationships, the web of life. They derive their essential properties and, in fact, *their very existence* from their relationships to other things. Interdependence—the mutual dependence of all life processes on one another—is the nature of all ecological relationships. The behaviour of every living member of the ecosystem depends on the behaviour of many others. The success of the whole community depends on the success of its individual members, while the success of each member depends on the success of the community as a whole.

- Fritjof Capra (1996, p. 298; *Emphasis added*)

Another argument against the need for nature based on biophilia and nature deficit disorder posited by Wilson and Louv is that it is incomplete; this perspective on the human need for nature is limited to the personal system, the individual scale. There is another human need for nature at the emergent global scale at which humans across the globe collectively need nature to continue functioning—wild (self-willed) and free (from our interference)—particularly in its provisioning and regulating capacities as a life support system.

The notion that the externalization of nature from things like economic decision-making is a mistake is relatively new, and partially due to how scientific discoveries have shifted human perceptions on nature dramatically over the last fifty years. For instance, it used to be an accepted theory up until around the 1960s in the geosciences that the drivers of Earth's planetary systems, like ocean circulation or the climate, could only be comprised of physical processes emanating from large and cosmic sources like the sun, volcanism, or the precession

of the poles, (Lovelock, 1987). From this viewpoint humans were seen as being affected by grand planetary systems like climate—certainly not the other way around. Gradually though, various data were collected that led to a paradigm shift to the view that the collective human activities over time can indeed lead to profound cumulative effects on planetary systems (Lovelock, 1987; Schlesinger, 1997). After the publication of the Gaia hypothesis by James Lovelock and Lynn Margulis, coupled with advances in **cybernetics** and **complex systems science** (Appendix I), the field of Earth system science took off, incorporating the new perspective how human systems interact with planetary ones (Dennett, 1998; Hallowell, 2009; Onori & Visconti, 2012). The mounting evidence on the extent of anthropogenic climate change has helped to confirm for scientists (regardless of political denial) that humans significantly influence atmospheric chemistry and related global temperature (IPCC, 2013; Schneider, 2009).

In addition to knowledge on anthropogenic climate change, another realization has occurred that, in spite of conservation efforts, the Earth has been losing natural systems at increasing rates, posing significant threats to biodiversity and related ecosystem functioning and stability. This led to scientists trying a new approach of **ecosystem services** to communicate to decision makers on the limits of growth and need to protect externalized, but diminishing, natural capital (Costanza et al., 1997; Daily, 1997; MEA, 2005). As a result, economists have begun to correct the old, wrong assumption that nature is infinitely vast and renewable—which was partly why nature was treated as an externality—and factor nature back into the equation for key metrics such as gross domestic product (Dasgupta, 2010).

While the use of ecosystem services and related economic instruments is a positive step, much more is needed to protect the integrity and functioning of natural systems that are beginning to be critically threatened. The Red List Index shows that “overall, species are declining in population and distribution and, hence, moving faster towards extinction” (United Nations, 2014a). In addition, the world failed at meeting the global biodiversity protection goals set for 2010 and targets set for 2020 will not be met either (Tittensor et al., 2014).

Climate and biodiversity are not the only planetary systems, normally regulated and maintained by living systems, which are threatened by human actions. The current geological era has been dubbed the Anthropocene due to how humans are now the major driver of several of Earth's natural planetary systems (Steffen, Crutzen, & McNeil, 2007). In addition to climate and biodiversity, other natural systems with **planetary boundaries** that humans are affecting have been identified, including: ocean acidification, stratospheric ozone depletion, atmospheric aerosol loading, biogeochemical interference with phosphorus and nitrogen cycles, global freshwater cycle, land use change (i.e., to cropland), and chemical pollution affecting air quality (Rockstrom et al., 2009). Transgressing one or more planetary boundaries (tipping points) for these systems “may be deleterious or *even catastrophic* due to the risk of crossing thresholds that will trigger non-linear, abrupt environmental change within continental- to planetary-scale systems.” (Rockstrom et al., 2009; emphasis added)

This threat to the planetary systems that act as critical life support systems for life on Earth is not one that a rational and reasonable civilization would want to take. The potentially “cataclysmic” threat to these planetary systems also poses a distinct existential threat to humans. Humans need natural systems at the global scale to continue functioning in their critical life support capabilities. Therefore, the time has come to also correct the externalization of nature from the consideration of human rights.

Discussion

From Needs to Rights

As stated at the beginning of this essay, the case for making a new human right can be established through demonstrating how a given factor is a basic human need, and how that factor is threatened and needs to have a legal instrument made to help protect it. In the case of nature, the two main arguments put forward in this paper make the case for the right to nature: 1) that that nature is an inalienable and universal individual human need based the evidence for

biophilia and nature deficit disorder, but this need, particularly in children, has been threatened by the increase in modern, urban lifestyles, and 2) that nature at the global scale consists of several complex, emergent planetary systems that are a critical need for all humanity globally due to these systems serving as regulatory life support systems; however the work on biodiversity, climate change and other planetary boundaries finds these systems are threatened, posing potential serious and even existential threats to not only humans, but life on Earth.

Currently, nature is not explicitly stated in the United Nation's *Declaration on Universal Human Rights*, nor is it listed in the *Bill of Rights* within the *United States Constitution* ("U.S. Const. (amend. I to X.),") or in the *Canadian Human Rights Act* ("*Canadian Human Rights Act*," 1986). One development has been made for the establishment of human rights with the International Union for the Conservation of Nature motion M132 on the *Child's right to connect with nature* (IUCN, 2012). This is a step in the right direction, but not enforceable; the human rights to nature need legal 'teeth'.

The case for establishing a collective human right to a biosphere with intact regulatory capacity is novel, and may constitute a new class of rights. It is suggested that, due to the critical need for of high danger that failure of critical planetary systems could pose existential risks to all people, that any legal mechanisms made to safeguard human rights to these systems working be made supreme. In this way, if there is a conflict with other laws, such as economic trade laws, the laws regarding human rights to a safe planetary system would prevail, because without life there is no economy.

The case to establish the human right to nature has never been more urgent. When it becomes clear how a threat to natural systems at different scales are also a universal threat to life, liberty and the pursuit of happiness, then perhaps humans will finally give at least an indirect voice to Gaia in the courts of the Earth.

Next Steps

In the last several years, the message on the need for nature has started to mobilize in a response of establishing various non-profit organizations and initiatives to re-connect with nature. For instance, in the US the No Child Inside Initiative and Outdoor Classrooms Initiative have been approved in Washington and New Mexico, respectively. At the national level, Bill-1306, the introduced *No Child Left Inside Act of 2013*, focuses on providing support to train teachers, bring back environmental education, and get kids outside (Reed, 2013). One of the barriers kids face to accessing nature is, ironically, safety. A British poll of 3,000 parents and children found that although 81% of kids said they would rather go and play outside, half of the parents said they would not let their child leave home or garden, and 37% said they would let their child only go to the end of the street (BBC News, 2014).

Safety poses a real double bind to parents. No parent wants to take the risk of sending his or her young child out unsupervised any more, because even if the chance of abduction is low, the potential danger to the child if it happens is extreme and not supervising children is now seen as neglect. For single parents who do not have time to accompany children all the time, there are real barriers in urban environments to telling children to just go outside and play. Even this author has found that venturing on nature trails with little children in tow often leads to spending time on a deserted path, which leads to a distinct sense of vulnerability in case a wild animal or stalker came along. This is not an experience that a mother would want to repeat as there are real risks in nature. Organizing group hikes are a good solution, but part of the benefits of nature is from spontaneous, unstructured free play and alone time in nature. Spending downtime in natural environments in solitary play is one of the best ways to stimulate focus, independent thinking, and the kind of creative and imaginative play that arises after stretches of boredom (Balseviciene, Sinkariova, & Andrusaityte, 2014; Corraliza, Collado, & Bethelmy, 2012; Flouri, Midouhas, & Joshi, 2014; Louv, 2005). However, there are distinct

barriers for urban parents (especially single working parents) to be able to spend time alone in nature with a child, or a child to be able to spend alone time in natural environments. Providing accessible, natural spaces where children can go and freely and independently play outside may be the biggest challenge towns and cities face to reconnecting kids with nature. Providing the right to nature to children would be a first step in setting this as a priority. In addition, various non-profit and parent mobilizations in the US, such as the Children and Nature Network help to provide strategies, accompanied by other movements to stop overprotecting kids because of misplaced safety goals (Rosin, 2014), so kids can finally get back outside. Perhaps this is an area where the technophiles could help in providing ways to passively and remotely use video technology to monitor children in established 'natural play zones' set apart for kids within cities, so they can get a break from their parents outside, and their parents can have a break inside, knowing that the 'village' is out there looking after their kids.

In Canada, while there have been movements at the local and NGO level such as that launched by the Hatley Park Declaration for children and nature (Child & Nature Alliance of Canada, 2009), the movement has not yet made its way to policy. Several small community projects exist across the country at the grassroots level, similar to the parent and educator movements in the US. One interesting project on Cortes Island, off the coast of British Columbia, has taken a novel approach to fundraise and purchase a stand of forest that will be held in trust to serve the "educational, recreational, cultural and spiritual" needs and values of the forest for current and future children (CCFT, 2014). Similarly, converting some portions of green belts as spaces for 'wild play' for young children, and perhaps setting up monitoring of these places for safety, may help to make nature more accessible to local children.

While the above urban examples are a good start, they are not enough to address the universal and systemic issues of how the global threat to nature outlined in this paper also pose existential threats to human life and liberty. Vandana Shiva, notes, "Strategies that affirm the rights of the poor to their land and livelihoods are also strategies that reduce our dependence on

oil. They help mitigate climate change and help us adapt to climate chaos. Addressing issues of poverty, equity, and justice on a small and finite planet simultaneously address peak oil and climate catastrophe.” (Shiva, 2008, p. 6) The individual land rights of poor farmers are integrally interconnected to global-scale collective issues like climate change and land use change. While this issue is not as big in North America as it is in some developing nations, supporting the growth of small and more holistic farming practices can serve multiple goals of increasing carbon sequestration to prevent climate change, using organic methods to conserve soil and prevent pollution, and bring more families back from urban to natural environments. Rights to sustainably farm rural land for small farmers should be extended to broader public rights to access to rural and natural lands as a whole, particularly for the poor and children, who are marginalized in their ability to access nature in modern society and afford expensive nature vacations. It would be ideal if a person could hike from an inner city along green belts and eventually end up, uninterrupted in wilderness. This kind of city design, with real green corridors that connect nature along its whole continuum, and the right to access nature in this way, is possible. Nordic countries have some interesting precedents, such as the *Allemansrätten* laws, written in the constitution of Sweden (Smorgasborg Tourism, n.d.), that protect recreational and public access and use of natural land for traditional uses such as hiking, horseback riding, skiing, camping and gathering wild berries. These laws are protected similar to the common law right to navigation in Canada and the United States, which may provide grounds upon which to build a case for ‘freedom to roam’ rights such as *Allemansrätten* in North America.

Conclusion

As indicated in the above sections, human beings inherently consist of, connect to, and stem from nature. In other words, we are **biological**, **ecological** and **evolved** entities. Humans are also in-and-of themselves discreet systems from which nature has been externalized, in spite of our real connectivity to and interdependence with wider natural systems, so we not only

need to re-wild nature, but our own natures (Bekoff, 2014; MacKinnon, 2013), including those human cybernetic control systems we call human minds and human rights laws. If human beings were fish, one could say that, caught up in the business of swimming, we have forgotten our own existential need for the sea. Without the sea, without nature, the whole enterprise would not even be possible. To protect humans, the natural systems they need must be protected, from local to global scales. One way to do this in the face of opposition to give rights to nature itself, is establish the need for nature as a human right, along with other fundamental, universal and inalienable rights. Of course, it would be simpler to grant the rights to natural systems themselves, as autonomous, self-organizing, self-deterministic, cybernetic systems (concepts humans tend to think only apply to them), but that appears to still be too big of a leap in thinking for most decision makers. The long standing denial of the need to act on climate change is evidence in the mind gap on understanding Earth's systems and the critical need to protect them (Oreskes, 2014). Part of the need to connect children back with nature is the principle that you cannot love what you do not know, and you do not care about protecting what you do not know or even understand.

The evidence is compelling that, from the individual to collective human scales, there is a strong basis to set human rights to nature. Politicians understand human rights thinking, and hopefully that is something that can provide a solid structure to protect nature, and our personal/collective need for it, through direct human rights to that nature. Human rights are also some of the strongest means people have to counter forces such as hegemony. Therefore, anchored upon other established basic human rights, the need for and right to nature should be added to the legal instruments to protect human basic and existential needs. Where the right to nature affects individuals and their relation to the landscape, this right should be established at the local to national level as appropriate. Where the collective human need for nature at the global scale is concerned, the right should be established as international law that is at least as legally binding as trade law (i.e., given 'teeth'). Only in this way can humanity be assured that

the supposedly responsible governments with which the people have a social contract for preservation and protection will finally be doing their job to stop the externalization of the nature we all need, not only in theory, but in practice.

As Ban Ki-moon indicated in the opening of this essay, the time is now to recognize the important role of human rights in sustainable development. Imagine if we could add the human right to nature to the lexicon. Imagine nature—from nature next door to nature wild and free—being legally protected at all scales of functioning because of its inherent complex linkages with human rights. Imagine a new generation of children growing up integrally connected to nature through regular exposure and an experiential curriculum that fosters immersion in nature using blended scientific, eco-psychological and indigenous methods that engage all senses of the body physiology, heart, and mind. When one begins to imagine what *that* world would look like, it starts to feel we might actually be able to leave future generations a world not only as good as our own, but maybe one that is even greener, more filled with wonder, wider freedom to roam in safety, and a little wilder too.

Appendix I: Key Definitions

Complexity

The term 'complex' is used in this paper for short to represent the understanding of how biological systems act as complex adaptive systems in systems science (Goodwin & Sole, 2001). Complex systems consist of a large number of sub-systems that interact with each other in a way that demonstrates several characteristics such as non-linearity, feedback systems, tipping points, strong independent variables, interdependence of sub-systems, chaos theory, sensitivity to initial conditions, self-organized criticality and other emergent properties at different levels of organization, and evolving adaptability based on different conditions (Arecchi, 2007; Capra, 1996; Liu et al., 2007; Lovelock, 1987; Parrott, 2010; Pickett, Cadenasso, & Grove, 2005). Complex systems present philosophical and mathematical challenges to model and predict due to factors such as multiple interacting sub-systems that each follow their own rules, non-linearity, feedback mechanisms with unknown parameters, and unpredictability due to uncertainty such as if certain components or the whole is also display chaotic processes (such as those found in some weather systems).

Cybernetics

Socrates: in a ship, if a man having the power to do what he likes, has no intelligence or skill in navigation [ἀρετης κυβερνητικης, *aretēs kybernētikēs*], do you see what will happen to him and to his fellow-sailors?

- *Alcibiades I (Plato, 350 B.C./1990)*

The word 'cybernetics' comes from Plato's above use of the word *kybernetikes*, stemming from the Ancient Greek word, *kyber-*, meaning to steer, pilot or govern. For this reason, Norber Wiener used the term to denote the command and information systems within both life and machines (Wiener, 1948). In this context cybernetics incorporates the complex regulatory functions—including action, processing, and feedback mechanisms—that life

performs at different levels of organization, from the structures and processes that regulate cellular metabolism, to those operating in the human mind, to those operating on the planetary scale to potentially regulate climatic processes (Lovelock, 1987; Wiener, 1948). Like systems theory itself, which can be applied at multiple scales, cybernetics is a flexible term that can be applied to different systems, from its common use in robotics and computing to the locus of information and control in an individual cell, to a hive of bees, to the human mind. Characteristics of cybernetic systems, such as self-organization and self-direction, are also found inherently in some of the terminology below, lending credence to the view of some systems scientists that cybernetics is a key component to all systems, including those of life at all its scales (Bitbol & Luisi, 2004; Lovelock, 1987; Margulis & Sagan, 1995; Maturana, 1975; Varela, Maturana, & Uribe, 1974; Villalobos, 2013; Wiener, 1948).

Free

The word 'free' is used in this paper in its context of meaning *free from*, as in the ability of a self-determining system (such as a human being or the biosphere) to autonomously act and not be impaired in this endeavour by an outside force. Nature that is 'free' therefore means natural systems that are free to continue functioning as they have for millennia, free from human interference and possible impairment. This freedom is particularly geared to the regulatory functioning of nature from local ecological scales (such as in the purification of water) and at the global scale (such as in the maintaining of atmospheric chemical mass balances of key constituents such as oxygen (required for all animal (including human) metabolic functioning through respiratory pathways) and carbon dioxide and methane which are key to moderating the greenhouse effect and global warming. In addition, allowing expanses of organisms within nature to continue evolving also provides genetic variability within wild populations which also provides the critical emergent function of generating ongoing potential for adaptability within nature to changing conditions. While it may be argued, for instance, that cultivated (and as

Vandana Shiva would say, captivated) agricultural monocrops may provide some systemic regulatory role such as photosynthesis, these types of species assemblages, while living and functioning as biota, do not harbour the resilience of wild populations and the recent genetic tampering with nature, is not a substitute for the diversity that has taken millions of years to come about, but, like castles in the sand be kicked down and destroyed forever by unthinking bullies only thinking of their own limited and temporary agendas and not the big picture.

Nature

The Latin root word of the word 'nature' itself, stems from *natura*, which meant *birth*, and was tied to the earlier Greek word *physis*, which referred to the intrinsic tendency of plants and animals to develop of their own accord (Naddaf, 2005). Interestingly, this definition is very synergistic with the meaning of self-determinism behind the words 'wild' and 'cybernetics'. It appears as though many researchers into antiquity have been struck by the capacity of life at many scaled to be intrinsically self-driven.

An important aspect of nature is that it is not just one thing, but also anything that is living along a ***continuum of nature*** from that which is captivated, contained, and controlled by humans, such as within an urban context, to that which has little direct contact and interference from humans, such as nature that is more remote. Therefore, a natural system may consist of a single house plant, or agricultural species used in farming, to an empty wooded lot at the end of an urban block, to areas of greenbelt and residential parks, to remote wilderness areas of the Canadian boreal forest or the Siberian tundra that are unroaded and unmanaged.²

At its widest systems interpretation, nature is the emergent planetary system consisting of the entire ***biosphere*** that comprises all the biotic systems of the Earth. As originally postulated by the Russian scientist Vladimir Vernadsky (Vernadsky, 1926/1998) and expanded

² The concept of a pristine wilderness is not used in this report, as the notion of an uninhabited wilderness in America was a colonialist invention. North American lands were already populated by the First Nations people prior to European contact.

by James Lovelock in the Gaia hypothesis—which helped lay the foundations of modern Earth systems science—the biosphere forms a complex and interconnected system with the atmosphere, hydrosphere (i.e., oceanic and freshwater systems), and geosphere (i.e., geological soil and rock systems). The biosphere is also a “totality constituting a feedback or **cybernetic** system” that tends to maintain relatively stable conditions (homeostasis) of certain key parameters over time (Lovelock, 1987).

In order to understand how biota may contribute to any emergent cybernetic or homeostatic tendencies of the biosphere at a planetary level is helpful to consider living systems as constituting their **metabolic chemical processes** that have inputs and outputs. As such plants take in carbon dioxide and put out oxygen while animals who respire do the opposite. In addition to feedback mechanisms, physical processes such thermodynamics and chemical mass balance may also be acting on the system to help keep the overall system in check.

Wild

...in Wildness is the preservation of the world.

- *Henry David Thoreau (1862/2001)*

Wildness is not just the “preservation of the world, it *is* the world.

- *Gary Snyder (Snyder, 1990)*

While the common use of the word ‘wild’ typically denotes crazy and out of control, the opposite meaning is closer to the word’s origins. ‘Wild’ stems from Teutonic and Norse roots of the related word, ‘will’ (Nash, 1982); and from this root, like a *will’d* horse that is spirited and cannot be easily tamed, ‘wild’ can be interpreted as meaning ‘self-willed’ (Griffiths, 2006; Turner, 2013). In systems terms, self-willed nature also means that natural systems, from single celled life to complex multicellular organisms like us, are also characterized by those other emergent qualities at higher levels that define life: self-organizing, self-replicating and self-determining.

Wildness has another meaning as well, that “inheres in any geographical or emotional context that remains unpolluted by absolute safety and certainty” (Turner, 2013). This aspect of wild is also applicable to a systems view of the definition of wild as a self-maintaining, cybernetic system that also contains an element of risk. This is key to the concept of the need for rights to nature, especially for children.

Self-determination is a trait that people typically attribute to humans; however, it is also integral to natural systems. Hence the call for a right to nature that is wild, as in a form of nature that retains its original wild sovereignty and self-determinism on the land. All living beings, “from bacterial speck to congressional committee member”, have evolved from a common ancestor in which a working mechanism involving the above three processes somehow evolved to become the first living cell (Margulis & Sagan, 1995). Since then, over the billions of years of trial and error on this planet, natural systems have evolved effective means of self-regulation and self-steering their own behaviour. Some have called this complex, emergent, property of living systems ‘autopoiesis’ from the Greek for self and creation/production (Hallowell, 2009; Margulis & Sagan, 1995; Varela et al., 1974). Others have called this self-steering property ‘cybernetics’ (Lovelock, 1987; Wiener, 1948). There are some differences in the meaning of ‘cybernetics’ and ‘autopoiesis’. For instance, ‘cybernetics’ could be understood as the sub-system of information and control within the larger organization of an autopoietic system (Maturana, 1975). However, for simplification purposes, only the term ‘cybernetics’ will be used in this report since it is currently in more common usage.

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