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Article

From Environmental Connectedness to Sustainable Futures: Topophilia and Human Affiliation with Nature

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Abstract: Human affiliation with nonhuman nature is an important dimension of environmental concern and support for pro-environmental attitudes. A significant theory of human connectedness with nature, the Biophilia Hypothesis, suggests that there exists a genetically based inclination for human affiliation with the biological world. Both support and challenge to the Biophilia Hypothesis are abundant in the literature of environmental psychology. One response that both challenges and builds upon the Biophilia Hypothesis is the Topophilia Hypothesis. The Topophilia Hypothesis has extended the ideas of biophilia to incorporate a broader conception of nonhuman nature and a co-evolutionary theory of genetic response and cultural learning. While the Topophilia Hypothesis is a new idea, it is built upon long-standing scholarship from humanistic geography and theories in human evolution. The Topophilia Hypothesis expands previous theory and provides a multidisciplinary consideration of how biological selection and cultural learning may have interacted during human evolution to promote adaptive mechanisms for human affiliation with nonhuman nature via specific place attachment. Support for this possible co-evolutionary foundation for place-based human affiliation with nonhuman nature is explored from multiple vantage points. We raise the question of whether this affiliation may have implications for multifunctional landscape management. Ultimately, we propose that nurturing potential topophilic tendencies may be a useful method to promote sustainable efforts at the local level with implications for the global.

Keywords: affiliation; biophilia; human evolution; multifunctional landscape management; place; sustainability; topophilia

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It is a century now since Darwin gave us the first glimpse of the origin of species. We know now what was unknown to all the preceding caravan of generations: that men are only fellow-voyagers with other creatures in the odyssey of evolution. This new knowledge should have given us, by this time, a sense of kinship with fellow-creatures; a wish to live and let live; a sense of wonder over the magnitude and duration of the biotic enterprise [1] (p. 109).

1. Introduction

The world is facing the combined planetary threats of ecosystems function decline, biodiversity loss, climate change, ocean acidification, *etc.* [2,3]. The list of problems is long, complex, and deeply troubling. Human impact is implicated in almost all ecosystem change and these systems cannot be understood without accounting for the dominant influence of humans [2,4,5]. The global nature of the environmental crisis has led to considerable international efforts to mitigate further deterioration and to promote development towards sustainability [6–9]. However, despite the efforts, progress has been limited. Although many countries have signed the protocols from these summit meetings, and also incorporated the ratified targets into national policies, few goals have been realized. Not a single one of the 2010 Biodiversity targets were achieved globally, and most indicators were negative [8]. As remarked in the recent United Nations report "Resilient People, Resilient Planet": "The Brundtland report was right then, and it remains right today. The problem is that, 25 years later, sustainable development remains a generally agreed concept, rather than a day-to-day, on-the-ground, practical reality" [9] (p. 4).

Despite an awareness of human behavioral implications with these enormous challenges, popular and scientific discourses still manage to largely separate the natural and the cultural; we still tend to take humanity out of nature in mindset and behavior. Such separation is an oversimplification as it is inadequate to study ecosystems without recognition of human influence upon biophysical and biogeochemical processes [10,11]. It can be argued that our ability to separate ourselves conceptually from the rest of nature may be largely to blame for the large-scale environmental degradation in the world around us. The dichotomized framing of nature and culture creates 'either/or' thinking and limits the way in which we conceptualize problems, and may ultimately limit our ability to engage human action on behalf of environmental solutions.

The environmental connectedness theoretical perspective, represented by a long list of scholarly, empirical, and practical' connectedness to nature' efforts, represents one way to reconsider people and nature that opposes a dichotomized framing of nature-culture and considers a more relational perspective. Recently, however, Beery and Wolf-Watz [12] raised the concern that the "environment" in the environmental connectedness perspective is often portrayed as a geographically undefined agent, *i.e.*, "nature", with the inherent power to change human attitudes and behavior. They argue that nature be reconsidered in the specific places of human experience, places that may facilitate and frame interpersonal relationships, social formation, and behavior. Elmqvist notes that "Place values emerge from attachment to physical places as these come to be rendered meaningful by those who live or lived

there" [13]. Elmqvist emphasizes that identity and social processes that are attached to specific physical places and culturally valued species often shape the strength of attachment to community. A breadth of work exists in environmental psychology, environmental sociology, and cultural geography exploring this very bonding, or attachment, between place and person/group that Elmqvist refers to [14–17].

In the spirit of this focus upon a deeper consideration of the role of place in the human relationship with nonhuman nature, it is proposed in this paper that an innate propensity for place affiliation be considered from multiple perspectives. Note: it is hoped that the use of the term "nonhuman nature" will not further promote a dichotomized viewpoint, but rather will support an understanding in the idea of nature as inclusive of the human. Further, use of the phrase "nonhuman nature" in this paper is meant to reference living entities at multiple scales from individual species to ecosystems, as well as the non-living physical entities such as geological formations and water. A co-evolved innate and learned propensity to affiliate with nonhuman nature is an important yet seldom studied dimension of environmental connectedness scholarship. In this paper we review theories about environmental connectedness and discuss evolutionary theory corroborating human affiliation with nonhuman nature, placing a special focus upon the Topophilia Hypothesis [18]. The Topophilia Hypothesis both critiques and builds upon the widely noted Biophilia Hypothesis [19] and allows for a multidisciplinary consideration of how biological selection and cultural learning may have interacted during human evolution to support human affiliation with nonhuman nature via specific place attachment. Finally, we consider how these ideas may be applied in the context of sustainable management of multifunctional landscapes.

2. Human Disconnection from Nature

In less than two generations, people in most countries in the industrialized world have become more disconnected from an everyday experience of nonhuman nature as a result of urbanization, habitat loss, and efficiency improvements leading to a drastically reduced workforce in agriculture, forestry, fisheries, and other natural resource–based vocations. For example, in just one decade, 2002–2012, the US Bureau of Labor Statistics shows a 3.4% reduction in the farming, fishing, and forestry workforce sector, and the US Census Bureau shows a steady rise in the rate of urbanization in the US with the 2010 estimate of above 80% [20]. Globally, the world's urban population in developed regions has increased from 55% in 1950 to 78% in 2011, and is expected to increase to 86% by 2050 [21]. Put simply, a majority of the world's population works and lives in an urban environment [22]. One outcome of this urban migration is that many young people today do not have the regular access to nonhuman nature and the experience of biodiversity that their parents, and moreso their grandparents, had [23]. This concern has been referred to as an extinction of experience [23–25], and has been described as "...a decline in specific qualities of attention, ways of learning and thinking about the natural world" [25] (p. 81). In the present-day information society, the paradox is that many people have a more critical knowledge about environmental issues and problems in other parts of the world, such as coral reefs and tropical rainforests, than they have specific and detailed awareness of the nonhuman nature around them in their daily lives [25,26].

The concern for many is that experiential disconnection from regular access to nonhuman nature may have a long-term detrimental effect on human understanding, attitudes, and action, and subsequently exacerbate the destruction of nonhuman nature. This concern for human disconnection from nature can

be found throughout recorded history, articulated eloquently and at length in 1750 by the Swiss-French philosopher Jean-Jacques Rosseau in his "Discours sur les sciences et les arts" [27]. Since the middle of the 20th century, this type of critique has grown substantially. Aldo Leopold is often held up as a key voice in the emergence of the contemporary awareness of concern for disconnection from nonhuman nature. Passages from *A Sand County Almanac* such as: "The problem, then, is how to bring about a striving for harmony with land among a people many of whom have forgotten there is any such thing as land..." [1] (p. viii), drew attention to "disconnection" even before the dawn of the modern environmental movement. Leopold did not use the term nature as he probed ideas of connectedness (as evidenced by the preceding quote), but rather, land. Many consider Leopold's Land Ethic a classic in connectedness philosophy. He urged his readers to consider people as a part of a much broader community:

> *The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land... In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such...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* [1] (pp. 203–204).

From the time of Leopold's writings up to the present, the concern about disconnection from nature has intensified and has led to both mainstream public awareness [26] as well as a detailed focus within the fields of environmental psychology, human geography, environmental education, and conservation biology. As a result of these concerns, the basic idea of human affiliation with nonhuman nature and for nature's potential to support individual transformation towards higher levels of environmental concern and pro-environmental behavior has found application in ideas that can be broadly grouped as the environmental connectedness perspective [12]. These ideas of environmental connectedness describe an affective, cognitive, and/or physical human relationship with nonhuman nature by using terms and defined constructs such as affinity, biophilia, commitment, ecological self, identity, inclusion, interdependence, relatedness, and sensitivity [19,28–39]. Within this broad grouping the emphasis is on the experience of, and direct encounter with, generalized or non-specific "nature" and the possible emotional and/or cognitive relationship between the individual and nature that develops from these experiences.

3. Evolutionary Approaches to Environmental Connectedness

Evolutionary explanations for human behavior are often presented as a foundational element upon which the environmental connectedness perspective is built, as in the nature relatedness research of Zelinski and Nisbet: "...the idea that because humans lived (and evolved) in natural settings until very recently in evolutionary terms, we have an innate need to affiliate with other forms of life" [40] (p. 4). According to this view, the ability to establish cognitive and affective affiliations with components of the environment has been favored by natural selection and has evolved into genetically based adaptations. The presence of such ancient adaptations in current human populations represents one of the tenets of evolutionary psychology, predicting that observations of present behavioral patterns can therefore provide insight into the evolutionary development of specific behaviors [41]. Hartig *et al.* [42] describe this genetic process as originating from human exploration of ancient environments right up to contemporary human behavior, emphasizing a process of continuous genetic adaptation to the environment, integrating the

results of environmentally advantageous genetic changes. This process is a result of a higher survival rate of certain individuals better adapted to particular environmental conditions. Ultimately, this higher survival rate confers fitness via greater reproductive success, leading to a larger genetic representation in future generations.

An interesting example of this proposed evolutionary process can be seen in the work of Coss and Moore [43,44] and Coss *et al.* [45] who explored childhood mouthing behavior and infant attraction to reflective surfaces. They explored possible evolutionary explanations for this behavior and concluded that one possible explanation lies in early hominoid efforts to detect sources of water and prevent dehydration. Their research is based, in part, on the observation of infant and toddler licking in a manner similar to contemporary human drinking from pooled sources in outdoor settings. The researchers posit that the mouthing behavior may be "...the precocious ability to recognize the glossy and sparkling features of water long before this information is useful later in development" [45] (p. 197). Adevi and Grahn [46] noted this finding and related it to human landscape preference, as in support for evolutionary explanations to the human preference to life near water, in their study of cultural determinants and innate reflexes in our evolutionary background. Other attempts to describe contemporary natural environment-oriented behavior in an evolutionary framework can be found in a number of theories including: Biocultural Diversity Theory, Habitat Theory, Prospect-Refuge Theory, and most importantly for understanding the Topophilia Hypothesis, biophilia.

3.1. Biocultural Diversity Theory

Biocultural Diversity Theory recognizes that the diversity of life comprises both biological and cultural diversity [47–49] and stresses that biocultural diversity is not simply accounting for the variety but also an awareness of interaction: "The links among these diversities have developed over time through mutual adaptation between humans and the environment at the local level, possibly of a coevolutionary nature" [47] (p. 269). Closely related is the idea of traditional ecological knowledge (TEK). Those who study TEK argue that it provides a window for viewing how nature "shapes, penetrates or even permeates human cultural expression and vice-versa" [47] (p. 104).

3.2. Habitat Theory

Habitat Theory presents a possible relationship between the original habitat of human adaptation and contemporary human behavioral responses [50–53]. Habitat theory is based on an 'out of Africa' hypothesis (*vs.* a multiregional hypothesis for *Homo sapiens* [54]), noting that the earliest habitats of human development were African savannas, regions characterized by vast grasslands with scattered trees and groves. Balling and Falk [51] link human biological evolution to the specifics of this environment and use examples of contemporary behavior to build support for this theory; for example, they raise the possibility that contemporary parks and backyards may be an expression of innate preference for this habitat of human origins.

3.3. Prospect-Refuge Theory

Prospect-Refuge Theory is based on the work of Appleton [55], who provided an analysis that divides the visual landscape into prospects, refuges, and hazards. The theory is based on proposed ancestral needs

to move towards a goal while remaining out of sight of potential predators [42]. The ancestral use of prospect for information-gathering and refuges for safe avoidance of hazard is hypothesized to result in the contemporary affiliation for both open views and protected vantage points [42].

3.4. Biophilia

The key evolutionary theory referenced within the environmental connectedness perspective is the Biophilia Hypothesis. Wilson introduced the idea into the scholarly and public discourse and eventually described biophilia as "the innately emotional affiliation of human beings to other living organisms" [56] (p. 31). The Biophilia Hypothesis has been widely used as a theory underlying research on restorative environments, landscape preference, biodiversity conservation, sustainable urbanism, and environmental education [39,57–59]. Kellert [60] described a clear link to human biology: "...humans possess an inherent biological affinity for the nonhuman world that is instrumental to their health, productivity, and well-being" [60] (p. 375). This biological affiliation is theorized to be an inherited genetic tendency to respond to the natural world in certain ways that confer fitness in an animal's effort to survive and thrive [60]. The idea that the human species has evolved a close cognitive and affective relationship with the natural world seems obvious at a first glance. Like all other animals, *Homo sapiens* evolved in environments devoid of the built elements characteristic of contemporary cultures, and was strictly dependent on free-ranging populations of animals and plants as food sources. This environment of evolutionary adaptedness [41] or adaptively relevant environment [61] represents the conditions under which our human ancestors lived until the neolithic revolution some 10,000 years ago. Although prolific genetic changes have occurred in the human genome since then [62], most human physical and behavioral adaptations that evolved while our species was still Pleistocene hunter-gatherers have likely remained. It is interesting to note that the extent to which these adaptations exert an influence on our lives today is currently a contested topic in evolutionary psychology and in popular culture as well, e.g., paleo diets and paleo exercise regimes [63,64].

The Biophilia Hypothesis proposes the existence of an ancestral adaptation, which drives us to appreciate natural environmental conditions and the living world, that evolved because such emotional drive would ultimately be beneficial for survival and reproductive success [19]. There exists empirical support for such adaptation, for example, a review by Ulrich [59] found strong support for biophilia from a broad range of studies in landscape preference and stress restoration. Kahn [65] also provided a list of biophilia studies that have been conducted to explore a potential genetic predisposition to certain landscapes while also considering his own studies of children in Houston, Texas, and in the Brazilian Amazon. Kahn [66] concluded that the results from an economically impoverished urban setting in Houston provide evidence of nature affiliation that can only speak to pervasive and deeply abiding biophilic characteristics. In addition, Kahn's [65] Amazon study demonstrated environmental sensitivities in a majority of his youth participants. Based on this work, Kahn concludes that biocentric reasoning resulting in human expressions of affinity for nonhuman life supports the Biophilia Hypothesis and helps link the concept of affinity with other affective measures. One other aspect of support for biophilia comes via a consideration of biophobic responses (defensive or aversive responses to natural phenomena, such as snakes or spiders). Such negative reactions may also be able to provide support for

the idea of innate propensities to respond to nonhuman nature in ways that support the survival and health of an individual [59].

Concerns and critiques of biophilia provide further useful considerations for evolutionary theory as it relates to the contemporary human relationship with nature. Hinds and Sparks note that some advocates of biophilia contend that the proposed biophilic genetic bond may be weak, thus requiring "the addition of learning, culture and experience of nature to optimize biophilic tendencies" [67] (p. 110). Another concern is a definitional critique of biophilia as being too narrow, *i.e.*, exclusion of physical and non-living elements of the natural environment [18]. Conversely, biophilia has been criticized as being overly broad, based on an overestimation of the evolutionary origins of human affective relations with life-like elements and processes [68,69]. Finally, there are concerns about a neglect of research that has not supported the theory and/or has presented uncompelling results [70–72]. Amidst the challenges to biophilia, however, there remains widespread interest in evolutionary origins of human affiliation with nature. This interest has led to the development of the Topophilia Hypothesis.

4. Topophilia

Tuan [73] was one of the first scholars to promote the humanistic geography concept of topophilia. He developed the idea as a study of environmental perceptions, attitudes, and values. Tuan used the term to describe human coupling of sentiment with place, and argued that it could be defined broadly "to include all of human being's affective ties with the material environment" [73] (p. 93). Tuan identified a unique property of this idea when he referred to it as "diffuse as a concept, vivid and concrete as personal experience" [73] (p. 93). Tuan characterized a sense of place as a universal affective bond satisfying fundamental human needs. While not proposing an evolutionary theory *per se*, it is interesting to note that Tuan considered evolutionary explanations for place affiliations within his work:

> *The sheltered sea- or lakeshore may be one of mankind's earliest homes, dating back in Africa to Lower and Middle Paleolithic times. If the forest environment is necessary to the evolution of the perceptual and locomotive organs of man's primate ancestors, the seashore habitat may have contributed to man's hairlessness, a trait that distinguishes him from apes and monkeys. Theories concerning the causes of evolutionary traits in the remote past are at best uncertain. Human agility in water is, however, a fact. The talent is not widely shared among the primates...Could it be that our earliest home was a sort of Eden located near a lake or sea? Consider Carl Sauer's sketch of the advantages of the seashore: No other setting is as attractive for the beginning of humanity. The sea, in particular the tidal shore, presented the best opportunity to eat, settle, increase, and learn. It afforded diversity and abundance of provisions, continuous and inexhaustible. It invited the development of manual skills. It gave the congenial ecologic niche in which animal ethology could become human culture* [73] (p. 115).

The Topophilia Hypothesis (or simply topophilia) as described by Sampson [18] has recently emerged from the noted foundation in the works of Tuan, as well as from a needed expansion of the Biophilia Hypothesis. Topophilia provides definitional clarity for the idea of human affiliation with the nonhuman world and more explicitly allows for a hybridized explanation that includes both cultural learning and innate genetically based origins [18]. Topophilia is described as "an innate bias to bond with local place,

including both living and nonliving components" and that such bonding is "…adaptive, fostering the acquisition of detailed, habitat-specific knowledge" [18] (p. 26). Note that this definition does not necessarily mean that humans have an inherited tendency to appreciate living components of the environment, but rather an inherited propensity to form affective bonds with places, either living or non-living. The following quote from Kaplan *et al*. [74], while written more generally regarding evolution and human behavior, fits well as a descriptive overview of topophilia:

> *It is very likely that a species-typical life course evolved in response to the demands of a hunting and gathering lifestyle that was broad and flexible enough to allow successful exploitation of the world's environments but specialized toward the acquisition of learned skills and knowledge...* [74] (p. 182).

Further understanding of topophilia may be best achieved via a return to the consideration of biophilia and comparison of these two related ideas. A basic difference between biophilia and topophilia lies in an attempt to eliminate some of the definitional fuzziness resulting from Wilson's presentation of biophilia. In describing the latter, Kellert [75] would argue that a psychosocial dependency on the experience of biodiversity comes from human evolution in a biological world. The Topophilia Hypothesis would acknowledge this biological world, but would broaden it to include its physical, nonliving elements while also limiting it to the idea of distinguishable places. It is often the case that when biophilia is described, the idea of interest and positive feelings about living elements of the environment is expanded to include non-living components, as in this example from in the context of landscape preference: "Thus, attention and positive feelings are given to vegetation and natural features such as stones and water" [46] (p. 21). Sampson [18] has noted the lack of recognition of affiliation with the non-living environmental elements as one of the criticisms of the Biophilia Hypothesis.

The idea that humans have an inherent propensity to affiliate with components of the natural world relies on the extent to which such a predisposition represents an adaptive trait evolved by natural selection. What would the characteristics of such a trait be? In what way would a topophilic trait contribute to the reproductive success or fitness of an individual carrying such a trait? Sampson [18] described the adaptive trait as an inclination to form bonds with the local environment. Just as mother-infant bonding can be seen as an adaptive trait based on the value of an extended childhood in human development (improved nutrition, protection, increased learning of key behaviors, *etc*.) [76], such place bonding may have conferred survival advantages onto the individual by creating better knowledge and utilization of local environmental resources. Lived experience in a particular time and place (cultural learning) could thus be an important part in the expression of the adaptive place-bonding trait:

> *These affective place bonds would have been closely linked with culture-based learning, such that the full expression of the former required nurturance through (1) abundant sensory experience in natural (nonhuman) settings and (2) active construction of place-based knowledge mediated through symbols (such as language and story).* [18] (p. 32)

According to the Topophilia Hypothesis, human connectedness with nature is better characterized as a developmental behavioral system based upon gene adaptation and environment interaction. This interaction involves a genetically based drive for exploring the local environment combined with an imprinting of the experienced conditions. Such interaction also makes evolutionary sense when the

environmental conditions that an individual is born into are unpredictable. An innate drive to explore and learn about the local environmental conditions, both biotic and non-biotic, would improve the chances of the individual to survive and reproduce. However, this drive and the resulting imprinting may be most pronounced during childhood, as part of the developmental process that prepares the individual for adult life. Some evidence for such imprinting during early life comes from studies on landscape preferences. For instance, Adevi and Grahn [46] set out to explore key questions of cultural determinants and innate reflexes in the context of landscape preference. Congruent with topophilic ideas, they found strong general support for an influence of the childhood landscape on adult preferences. They also found that landscape qualities that are expected to have been important for survival during human evolution, such as water and safe sites, were connected with stronger preferences to the childhood landscape. Other landscape preference studies may provide additional support to the possibility of landscape preference being based on a combination of genetic propensity and landscape familiarity [77–79]. For example, Beery and Ernst [79] note that residents of a geographic region characterized by an abundance of freshwater lakes overwhelmingly chose a water landscape as a preferred natural setting type. Analysis of these results suggests that human preference for landscapes (a phenotypic trait) is influenced by both genetic information for a particular trait (genotype) and by the experience of environmental factors during childhood (cultural learning). In this respect, the Topophilia Hypothesis is similar to the ideas of Biocultural Diversity Theory, presented briefly earlier, especially the notion of a coevolutionary aspect between the broadly defined diversity of life (plants, animals, habitats, and ecosystems) along with human culture and language. Additionally, the inclusion of environmental factors or cultural learning in topophilia may provide a degree of useful consistency with multidimensional theories of place attachment inclusive of person, psychological process, and place dimensions [16,35,80].

4.1. Topophilia in Action

The concept of topophilia may describe an underlying evolutionary basis for human-environment identity and provide a rationale at a deep human level for how place attachment may be a powerful tool in creating environmental concern and interest in local sustainability efforts. For example, Sampson [18] makes a connection between topophilia and sustainability via his emphasis on place-based or local transformation, a transformation both forward- and backward-looking: backward toward a greater level of traditional ecological knowledge inclusion, and forward with new technology and creative initiatives. He states:

> *Most foods in sustainable societies will be raised locally and change on a seasonal basis. In stark contrast to our present dependence on foreign fossils fuels, energy will be derived from predominantly local, renewable sources, including geothermal, solar, wind, rain, and tides. And since every place has its own unique characteristics—for example, topography, climate, vegetation, water supply, and culture—sustainability will, by necessity, be closely tied to local needs. Thus, any successes in achieving sustainability at higher levels (state, nation, biosphere) will be realized only through the iterative accumulation of sustainable societies in local places* [18] (p. 45).

What might this uniquely local transition to greater sustainability actually look like? A transformation founded upon human affiliation with place that is both structural and behavioral, both social and individual? One possible source for examples of local transformations supported by place affiliation can be found in the practice of multi-functional landscape management. Efforts from protected areas on three continents (Australia, North America, and Europe) provide specific examples of place-based affiliation, both the application and the development of affiliation in the management process. Each of these cases provides an example of place-based management that appears to be strongly supported by the relationship to the places that the participants who engaged in the management process bring with them via their residency, professional efforts, and/or cultural attachment, *i.e.*, social and socio-demographic predictors of place attachment [15].

- *Traditional ecological knowledge harnessed*: The Warddeken Indigenous Protected Area is an expanse of stone and gorge country on the Western Arnhem Land Plateau in the Northern Territory of Australia. The area is noted for dozens of endemic plants, numerous threatened animal species, and a unique ecological community of the sandstone heathlands [81]. In addition, the cultural heritage of the area is apparent in the occupation and extensive rock art sites found there [81]. Despite depopulation, indigenous residents have maintained a relationship with this place via ongoing residency and the region is noted to have a 50,000-year history of indigenous management [82]. The Karrkad Kanjdji Trust [82] notes that 3000 people live within the protected area and that the land is currently managed by indigenous residents in agreement with International Union for Conservation of Nature (ICUN) standards [82]). The trust notes that "The landscape is managed by the people who know it best..." [82]. For example, in Warddeken, indigenous rangers work on a variety of management programs, such as weed control, feral animal control, and fire management [81]. In addition, these rangers play an important role in educating the public. The rangers are charged with "Passing on traditional ecological knowledge to younger generations..." [81].
- *Fostering communication*: The core area of the The United Nations Educational, Scientific and Cultural Organization (UNESCO) designated Riding Mountain Biosphere Reserve is Riding Mountain National Park in Southwest Manitoba. The Riding Mountain Organization [83] notes that a bio-diverse mix of boreal forest, aspen parkland, eastern hardwood forest, and rough fescue prairie plant communities characterize the core area of the reserve; the area around the reserve is managed intensively for agriculture. According to the United Nations [84], approximately 28,000 people live within the biosphere reserve including indigenous people who have been a continuous part of the landscape for thousands of years. The Riding Mountain Regional Liaison Committee works to foster communication and cooperation between the core area of the reserve and adjacent agricultural transition zones [85]. Edge and McAllister [86] note that the membership of this liaison group is drawn from municipalities adjacent to the biosphere reserve core areas. Similarly, another group, the Biosphere Reserve Management Committee, whose membership is also drawn from the communities adjacent to the biosphere core area, has a role emphasizing public information and education guided by broad perspectives on ecosystems and sustainability in the context of an agricultural economy [85].

- *Valuing local experience*: The Kristianstad Vattenrike Biosphere Reserve in southern Sweden is comprised of the lower Helge River watershed and coastal regions of Hanö Bay of the Baltic Sea, and is noted for extensive and ecologically sensitive wetlands (a designated Ramsar site), highly productive agricultural land, and one of the largest reserves of groundwater in Northern Europe [87]. Approximately 75,000 residents live within the designated Vattenrike boundaries. Extensive measures have also been taken by the Kristianstad Vattenrike to both preserve the high biodiversity values of the biosphere reserve and to simultaneously promote public engagement with these values and this place. For example, the Goose Management Group, acting within the Kristianstad Vattenrike Biosphere Reserve, brings local stakeholders together with stakeholders at regional, national, and international levels to consider and problem-solve the challenges and opportunities of the dynamic geese populations in the biosphere area and throughout the southern region of Sweden known as Scania [88]. The very people with regular and on-going experience with geese in the places they live, work, and spend time play a key role in the process of advising management by stakeholders as well as authorities.
- *Local land ownership in conservation strategy*: The Waterton Biosphere Reserve is located in the southwestern corner of Alberta, Canada, and is a part of an expansive regional ecosystem spanning the US and Canadian borders in Montana, Alberta, and British Columbia. The biosphere reserve is made up of the Waterton Lakes National Park and ranch lands north and east of the park [89]. There is a rich ecological diversity, from prairie to alpine systems, with foothills, parkland, montane, subalpine, and alpine ecological communities noted in the core area of Waterton National Park [89]. Much of the land to the north and east of the park, the biosphere reserve's zone of cooperation, is private land used primarily for ranching, oil, and gas exploration/development, as well as recreation [90]. It is within this zone of cooperation that the Waterton Park Front Project (WPFP) of the Nature Conservancy of Canada has undertaken a unique effort in sustainable landscape management. The WPFP has secured conservation easements or direct purchases of private land, an area 113 sq. km in size. The effort is a part of the recognition that sustainable landscapes do not end at the area border, which is in line with the UNESCO Biosphere Reserve system of core, buffer, and cooperation zonation [91]. Furthermore, this effort recognizes that the bonds connecting private landowners to landscapes are a powerful force for the conservation of biodiversity. Concerns about road-building, development, subdivision, and loss of family identity [90] motivated private landowners to engage in the WPFP. The place relationships the ranching community had built over time, with families noted to have lived in the area for two or more generations [90], became a key mechanism in the sustainable land management strategy.

The concept of "place-based governance" can be applied in each of the above examples and is defined by Edge and McAllister as an approach "that seeks to utilise local or regional place-based identities to motivate and engage civil society, government and other organisations in decision-making processes...that promotes a local sense of place and community development" [87] (p. 279). We maintain that the basic idea of topophilia, that human affinity for nonhuman nature is rooted in an innate propensity to bond with local place and nurtured via cultural learning, is a potentially useful idea

requiring thoughtful scrutiny. As noted previously, topophilia suggests that affective place bonds would have been closely linked with culture-based learning, thus, we contend that human affiliation for place may be used to support our efforts to guide society toward a more sustainable course. This is also a reminder that people who have lived for generations in highly urbanized settings may need reinvigorated access to nonhuman nature to engage topophilic propensities.

4.2. Future Research

This paper has not provided empirical findings to support topophilia and such efforts are clearly needed. Continued research into landscape preference, such as the noted attempts to tease out both innate and cultural determinants of preference, is promising [46,77]. In addition, the literature of place attachment and outdoor recreation (and, closely related, the sense of place and place identity) is another promising arena for further investigation of topophilia and pro-environmental behavioral outcomes [92–94]. These research examples show that a topophilic disposition may be a part of sustainable behaviors and that further effort investigating place attachments and behavior may provide additional insight. Finally, study into possible topophobic responses to challenging environmental conditions and natural disasters may be able to shed light on how biological selection and cultural learning have interacted during human evolution to support not only human affiliation, but also aversion to nonhuman nature via place perceptions and relations.

5. Conclusions

This paper provides a review of the Topophilia Hypothesis in the context of the need for a better understanding of the human relationship with nonhuman nature. The ideas underlying topophilia are not new, but a reconsideration of Tuan's work from the perspectives of humanistic geography, research into environmental connectedness, and theories of human evolution, most notably, biophilia, is useful. It has been shown that a broadening of biophilia to include the affiliation with non-living aspects of the more-than-human world, along with the consideration of the co-evolution of innate behavior and cultural learning, is compelling. Further, it has been argued that topophilia makes room for cultural learning, a hybridized explanation that includes both cultural experience and innate behavior, in our understanding of human affiliation with the nonhuman world.

One important application of the Topophilia Hypothesis is to help us consider how cultural learning and its interaction with innate behaviors may strengthen our affiliation with nonhuman nature. In addition, it has been proposed that a heightened understanding of human affiliation with nonhuman nature may be able to play an active and positive role in engaging people in care and concern for the places they hold dear. We believe that the specific examples from multifunctional landscape management above may illustrate how we can apply an understanding of the Topophilia Hypothesis to help us promote a deeper human relationship with the nonhuman world. Simply stated, there is a foundation for using place-based identities as part of efforts to manage landscapes sustainably.

The contention that increasing the opportunity for affiliation with nature via regular experiences of actual places should be an important method in the efforts to develop a more sustainable landscape policy and management is the key outcome of this paper. Intense concerns about the disconnection from nature [26], the previously noted extinction of experience [24], and extensive scientific attention on place

attachment [16] remind us that the consideration of regular experience with nonhuman nature is highly relevant in our ever-urbanizing world. The ideas in this paper have attempted to broaden the theoretical context for re-engaging people with nonhuman nature. The need for such re-engagement is critical to help break down dichotomized understandings of 'nature and culture' and to help us apply more relational understanding on behalf of sustainable futures.

Author Contributions

Thomas Beery and Ingemar Jönsson conceived the review. All authors contributed original text parts to the first draft. Thomas Beery wrote a majority of the manuscript. Johan Elmberg and Ingemar Jönsson contributed to the article development. All of the authors contributed to preparing and approving the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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