



# Nature's Services and Contributions: The Relational Value of Childhood Nature Experience and the Importance of Reciprocity

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## OPEN ACCESS

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### Specialty section:

This article was submitted to  
Conservation and Restoration  
Ecology,  
a section of the journal  
Frontiers in Ecology and Evolution

**Received:** 02 December 2020

**Accepted:** 06 April 2021

**Published:** 27 May 2021

### Citation:

Beery TH and Lekies KS (2021)  
Nature's Services and Contributions:  
The Relational Value of Childhood  
Nature Experience  
and the Importance of Reciprocity.  
*Front. Ecol. Evol.* 9:636944.  
doi: 10.3389/fevo.2021.636944

People depend on functioning ecosystems to meet human needs and support well-being across the life span. This article considers the interest in ecosystem service valuation, the growing interest in the benefits of nature experience for children, and ways to bridge these perspectives. We focus on embodied childhood nature experiences: the physical and multisensory experiences that intertwine child and nature. Additionally, we highlight the reciprocal quality of nature and child experience relationship as an example of how this relationship goes beyond the instrumental and demonstrates relational value. Underlying this perspective is the belief that children need to be better represented in the perception and action of ecosystem valuation in environmental policy.

**Keywords:** children, childhood nature experience, ecosystem services, embodiment, nature's contribution to people, reciprocity, relational values

## INTRODUCTION

People depend on functioning ecosystems to meet human needs and support well-being across the life span (World Health Organization, 2020). One aspect of the human role in functioning ecosystems is our responsibility to these systems' health and well-being. This call for increased human responsibility is at the foundation of this perspective article. Our objectives are to explore the ecosystem services idea from the vantage point of children in nature and draw attention to the need for greater recognition of children within the broad ecosystem service discourse. Furthermore, we will make an argument for the reciprocal quality of that relationship.

Two important but distinctly different documents relating to the human relationship with nature were released in 2005. One was the Millennium Ecosystem Assessment (2005), developed by an interdisciplinary and international panel of scientists, which established the importance of the concept of ecosystem services and the link between human well-being and ecosystem functioning; the Millennium Ecosystem Assessment (MA) provided a framework for analyzing social-ecological systems and has had a significant impact in policy and scientific communities. The other was the popular press book, *Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder*, written by journalist Louv (2005). The book highlighted a dangerous trajectory—a loss of childhood nature experience. Louv called for a recognition of the interconnection of all life on earth, including plants, humans, and other animals, focusing on children. Both of these documents have had an enormous impact on their respective disciplines. With the emergence of these documents, there has been a heightened interest in scientific and practitioner communities to examine relationships between individuals and the natural world (Chawla, 2020).

We argue that the critical and overlapping timing of the MA and *Last Child in the Woods* represents a broader societal interest in questions of sustainability. We propose that the timing is symbolic of the overwhelming call for change in the human relationship with nature. Unfortunately, we also argue that the ideas captured in these works have not been integrated adequately despite the interest they have generated. It is time to bring these ideas together; we will attempt to show why childhood nature experience contributes to the broader ecosystem services discourse. We are inspired by the work of Gladkikh et al. (2019), who identified a broad range of ecosystem services that refugees experience during migration. Just as the refugee experience was brought into the ecosystem service discourse, we hope to make childhood nature experience more visible. As part of our argument, we will remind readers of the wealth of early childhood, education for sustainable development, environmental education, environmental psychology, health, and planning literature that provide scientific evidence of the value of embodied childhood nature experiences. Drawing upon the work of Merleau-Ponty (1968), we define embodied experiences as direct contact with nature, with sensory awareness, mind, body, and environment intertwined as children roam, play, explore, and learn (Beery and Jørgensen, 2016; Jørgensen, 2016, 2017; Fasting, 2017; Raymond et al., 2018). We will also highlight the reciprocal quality of the nature and child experience relationship, thus supporting the idea of ecosystem services as two-way relationships. Underlying this effort is a belief that children need better representation in the perception and action of ecosystem valuation in environmental policy.

## BACKGROUND

### Nature's Services and Contributions

Scholars trace the origins of the ecosystem service idea to the 1970s as a part of increased efforts toward global biodiversity conservation (Gómez-Baggethun et al., 2009). An important turning point in the ecosystem services progression was the Millennium Ecosystem Assessment (MA) in 2005, an international work program designed to meet decision makers' needs for scientific information on the links between ecosystem change and human well-being (MA, 2005). MA global initiatives attempt to raise awareness and make ecosystem services explicit in planning and environmental management; for example, The Economics of Ecosystems and Biodiversity (TEEB) was an international effort to assess the costs of the loss of biodiversity and the associated decline in global ecosystem services (TEEB, 2008). On a national scale, some countries have incorporated the ecosystem service concept in environmental planning initiatives (Beery et al., 2016; Mononen et al., 2016; Verburg et al., 2016).

Relatedly, and in response to the application of the Ecosystem Services (ES) in policy, practice, and scientific discourse, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) introduced the concept of Nature's Contributions to People (NCP) in 2017 (Pascual et al., 2017). NCP is complimentary with the ES concept while designed to expand and diversify it. For example, NCP is associated with

other worldviews of human-nature relations and knowledge systems, inclusive of the idea of "nature's gifts" in some indigenous cultures (Pascual et al., 2017, p. 9). This current effort is not meant to focus on a detailed history of ES/NCP, nor upon the specific distinctions/similarities between the two (de Groot et al., 2018); instead, we will use the notation ES-NCP henceforth to reference the broad and diverse nature valuations discourse and progression of ideas. A brief consideration of this spectrum of ideas provides context for greater inclusion of embodied childhood nature experiences.

A part of the ES-NCP spectrum of ideas has been to question the potentially reductionist character of the original economic emphasis, which may misrepresent how nature relates to society (Kusmanoff et al., 2017; Thorén and Stålhammar, 2018). Developments within the NCP concept, however, may be a support mechanism in this regard. As Kadykalo et al. (2019) noted, "NCP could represent a powerful communication tool to facilitate dialogue and understanding between a wide range of stakeholders in order to co-produce knowledge for people and nature relations" (p. 280). Closely related, another concern based on the economic background of the ES-NCP spectrum is its potential to over-emphasize economic benefits to people (Raymond et al., 2018). In response, a diversity of valuation methods has been explored (Kelemen et al., 2016; Yang et al., 2018), and numerous calls have been made to better recognize and understand local, cultural, and psychological processes as important in human-environment relationships (Setten et al., 2012; Raymond et al., 2013; Jackson and Palmer, 2015).

Similarly, Raymond et al. (2018) urged avoidance of imposing a duality between aspects of the ecosystem and the cultural system to avoid distorting understanding of the types of benefits provided by ecosystems. They recognize a growing consensus that ecosystem services are co-produced between humans and nature and assert the importance of co-production of ecosystem services. Raymond et al. (2018, p. 780) called for consideration of the embodied ecosystems idea to broaden our understanding of values and relations and describe them as "dynamic, multi-level relationships" that are possible between elements of the environmental and cultural system. The idea emphasizes a tightly interwoven socio-ecological system.

Another significant development in the ES-NCP progression emphasizes relational values to go beyond the limitations of the common framing of nature's value as either intrinsic or instrumental (Klain et al., 2017). NCP identifies relational values as part of quality of life (Christie et al., 2019), and this conceptual development from ES to NCP has resulted in valuation discourse more inclusive of a spectrum of sources of human well-being, particularly when considering human decision making and values (Chan et al., 2016). Embodied childhood nature experience needs to be seen more explicitly as a part of this spectrum of sources.

### Embodied Childhood Nature Experience

There has been a substantial increase in research-based efforts to understand the relation between children and nature over the past decade, with a subsequent increase in systematic reviews in recent years. This growing body of research, conducted primarily

in North America and Europe, but increasing in other regions worldwide, has demonstrated the benefits of spending time in nature and having access to green and other natural spaces across physical, cognitive, affective, and social domains that comprise overall well-being. Outcomes have focused on such topics as physical activity, prevention of myopia, attention span, restoration, reduction of attention deficit hyperactivity disorder (ADHD), self-regulation, motivation for learning, psychological well-being, and prosocial behavior (see Chawla, 2015; Christian et al., 2015; Collado and Staats, 2016; McCormick, 2017; Xiong et al., 2017; Tillman et al., 2018; Vanaken and Danckaerts, 2018; Kuo et al., 2019; Mygind et al., 2019; Roberts et al., 2019; Grzybowski et al., 2020; Islam et al., 2020; Putra et al., 2020a,b for systematic reviews and the Children and Nature Network for an ongoing compilation of research studies and summaries). **Table 1** provides recent examples of studies that represent different countries, ages of children, and research methodologies.

In addition to the scientific literature, the past 20 years have seen a surge in Western educational and popular culture interest in the idea and practice of children in nature. A notable example of this interest and convergence between popular culture, scientific study, and practitioner engagement can be seen in the Children and Nature Network (2020), an organization that brings together education professionals, parents, researchers, individuals, and organizations to address, explore, and support children in nature. Another more global organization working to support the need for children to play is the International Play Association (1989), which explicitly identified “natural settings” in its Declaration of the Child’s Right to Play. Other organizations exist at the local, regional, national, and international levels to provide resources and support to a wide range of educators and other practitioners.

Our focus is on childhood nature experiences that involve direct and embodied contact with natural elements such as trees, animals, rocks, terrain, insects, water, wind, and snow. As defined earlier in the paper, we emphasize how children’s minds, bodies, and the environment are intertwined as children roam, play, explore, and learn. Children are part of the “web of embodied relations” at a particular point in time in a dynamic, ever-changing system (Chawla, 2007; Raymond et al., 2018, p. 786). Observational and ethnographic studies of young children’s play and interest in the natural environment reveal active bodily movement in and through places, curiosity, bodily and multisensory awareness, a sense of wonder, engagement with small creatures such as invertebrates, insects, and earthworms, and a connection to the landscape (Chawla et al., 2014; Jørgensen, 2016, 2017; Fasting, 2017; Barthel et al., 2018; Malone and Moore, 2019).

In our own work, we have undertaken a series of studies to explore children’s experience of nature through the common practice of collecting items from nature such as rocks, shells, feathers, berries, and leaves. Our interest in this topic developed to better understand a specific kind of children’s nature experience and its impact over the life course. Through this research, which relied on adult memories of childhood collecting in both the United States and Sweden, we found a vivid recollection of items collected, feelings of fascination

and excitement, the use of items in play and for aesthetic value, and associations with specific places where collecting occurred. Embodied movement through forests, seashores, and even backyards close to home allowed for joyful and spontaneous moments, encounters with unique smells, textures, tastes, and sights, and intrigue with nature that remained with individuals to the present time (Lekies and Beery, 2013; Beery and Jørgensen, 2016; Lekies et al., 2017; Beery and Lekies, 2018). Our findings add to a growing body of work that indicates the lasting power of memories associated with outdoor places of play, including woods, trees, fields, gardens, parks, forts and dens, landscapes, and wild spaces (Sobel, 2002; Morgan, 2009; James et al., 2010; Williams and Chawla, 2016).

Environmental education and other outdoor experiences are associated with increased knowledge, awareness, or concern related to natural phenomenon (Ardoin et al., 2018; Profice and Tiriba, 2018; Ardoin and Bowers, 2020). Little research, however, has been identified that explicitly links outdoor play, child-nature exploration, and outdoor learning with the ES-NCP spectrum. Nonetheless, we are encouraged to see ecosystem services increasingly emerge in the literature of environmental education and environmental education appearing in the literature of ES-NCP. For example, recent studies include the study of Hutcheson et al. (2018) on the environmental education as a cultural ecosystem service, the study of Barracosa et al. (2019) on the use of ocean literacy to mainstream the ES concept in both formal and informal education settings, the study of Goodwin et al. (2019) on the exploration of values held by primary school students, and the study of Almers et al. (2020) on the functional meaning that preschool-aged children assign to different material aspects of their schoolyards. We are hopeful that this important research direction will continue.

## DISCUSSION

While conceptually considering the value of children’s nature experience is not novel, what is novel is its potential inclusion in a meaningful way in ES-NCP discourse. We will use this section to show how the benefits of embodied childhood nature experience need explicit inclusion in the broad ES-NCP discourse as part of efforts to capture the diversity of values held by different groups of society. Also, we will present the argument that embodied childhood nature experience must also be considered from the reciprocal quality of the relationship; these nature experiences benefit the well-being and development of children and potentially contribute to an individual’s pro-environmental engagement, attitudes, and behavior, facilitating action on behalf of ecosystems.

### Embodied Childhood Nature Experience Is an Ecosystem Service

As Jacobs et al. (2016) noted, the NCP approach helps recognize developments in how relational values are assessed and their place within broad ES considerations. Thus, the importance of recognition of childhood experience of nature is a crucial relational value. However, it is difficult to find specific examples

**TABLE 1** | Examples of benefits of nature contact and access for children.

Domain	Outcome	Related studies
Physical	Physical activity	Lovasi et al., 2011; Pagels et al., 2014; Ward et al., 2016; Akpınar, 2017
	Prevention of myopia	Rose et al., 2008; French et al., 2013; Wu et al., 2013; He et al., 2015; Shah et al., 2017
	Cortisol reduction	Dettweiler et al., 2017
Cognitive	Attention span, executive functioning, restoration, and reduction of ADHD	Faber Taylor and Kuo, 2009; Dadvand et al., 2015; Amicone et al., 2018; van Dijk-Wesselius et al., 2018; Lee et al., 2019
	Self-regulation	McCree et al., 2018; Faber Taylor and Butts-Wilmsmeyer, 2020
	Intrinsic motivation for learning	Dettweiler et al., 2015
Affective	Psychological well-being and mood	Ward et al., 2016; Weeland et al., 2019; Harvey et al., 2020
	Stress reduction and resilience	Chawla et al., 2014; Dettweiler et al., 2017
Social	Pro-social behavior and reduction in behavior difficulties	Amoly et al., 2014; Richardson et al., 2017; McEachan et al., 2018; Lee et al., 2019; Putra et al., 2020a,b

of explicit benefits for children in the broader ES-NCP discourse despite the importance. We note the mention of “childhood experience” in #17 in the Supporting Identities category of NCP (Díaz et al., 2018) and appreciate how the IPBES (2019) Global Assessment (2019) provides space for a diversity of perspectives recognizing the multiple ways of understanding and categorizing relationships between people and nature. We argue that one critically important way to understand the relationship between people and nature is through the value of the childhood experience of nature by recognizing nature’s contribution to child health, growth, and well-being. We worry that a lack of visibility of the child experience of nature in ES and NCP discourse may negatively impact both children and ecosystem service valuation in environmental policy.

## Children in Nature Is a Two-Way Relationship

The background section provided a brief overview of the ES to NCP conceptual development and a summary of how the embodied experiences afforded by nature are a direct service, i.e., supporting children’s well-being and development. We acknowledge the concern that our examples, just as in the case with particular ES and NCP terminology, often express instrumental and anthropocentric perspectives, focusing upon nature as an instrument to human well-being. Specifically, the concern is that both terms emphasize the relation between nature and people as a one-way provider of benefits (Kenter, 2018). We note, however, that the NCP approach includes reciprocal relationships. Consider this example of pollinators: “. . .some NCP that were defined as practices of care gifted to people, such as fostering pollinator nesting resources in forests, totemic relationships requiring reciprocal obligations between people and pollinators, and traditional governance that depends on ongoing presence of bees and butterflies in the landscape. . .” (Díaz et al., 2018, p. 272). We identify a wealth of reciprocity examples in other ES-NCP considerations (Takeuchi, 2010; Comberti et al., 2015; Bonari et al., 2017; Ulicsni et al., 2019). For example, Comberti et al. (2015) noted that humans contribute to ES-NCP through the maintenance and enhancement of ecosystems. They highlight the biocultural ecosystems of Amazonia and the

Pacific Northwest of North America (Cascadia) and provide a review of research in Amazonia to detail the many services people of that region that contribute to ecosystem health, including rituals, cultural prescriptions, beliefs, or taboos to guide or regulate resource use, soil fertility enhancement, and planting. We embrace the idea of “nature’s gifts” from the ES-NCP discussions (Pascual et al., 2017); we find it easy to think of nature’s gifts regarding the nurturing of children—what children gain, how they grow, how the here and now of everyday lives are made richer by the embodied interaction with non-human life. Singh (2015) used the gift metaphor from a study in India and highlights reciprocity, the idea that the embodied experiences help create an ethic of care.

We underscore that this idea of reciprocity is an important part of connectedness to nature in childhood. Connectedness to nature in childhood has been described as an essential pathway for developing lifelong interest, concern, and potential for sustainable behaviors on behalf of the natural world (Chawla, 2020). Childhood connectedness to nature includes “freely chosen personal elections to interact with nature. This interaction may take many forms, including bodily movement in nature, the investigation of natural phenomena, place exploration, and free play” (Beery et al., 2020, p. 16). Beyond the benefits of embodied nature experience described earlier, Chawla (2020) makes a strong case for the relationship between connectedness to nature and lifespan environmental engagement measures, such as environmental citizenship behavior, conservation, and pro-nature behavior. Similarly, Charles et al. (2018) highlight how children’s opportunities to connect with nature are important for biodiversity conservation. Another more recent example is Giusti (2019), research with children that defined human–nature relationships using reciprocal language such as “systems of meaningful relationships between mind, body, culture, and environment. . .” (p. 19). He reminds us that these relationships can promote or hamper efforts toward sustainable living. Additionally, Sachs et al. (2020) suggested that it is critical for people to have positive experiences with nature in childhood, both for nature engagement and to instill pro-environmental attitudes in adulthood.

Further research is needed to understand the mechanisms by which child nature experience carries over into adulthood

(Rosa and Collado, 2019). Evidence from our work and authors from a growing number of countries, however, suggest that the embodied aspect of child nature experiences has a fundamental role to play (Kals et al., 1999; Wells and Lekies, 2006; Hsu, 2009; Chawla and Derr, 2012; Lekies and Beery, 2013; Beery and Jørgensen, 2016; Lekies et al., 2017; Asah et al., 2018; Beery and Lekies, 2018; Evans et al., 2018; Hosaka et al., 2018; Rosa et al., 2018; Häggström, 2019; Jensen and Olsen, 2019; Rosa and Collado, 2019). Abson et al. (2016) noted that connectedness to nature and the subsequent care and concern for the larger ecosystem that it evokes might be a strong leverage point to transform a socio-ecological system toward a desirable, resilient, and sustainable future. It is interesting to note that the journalist who helped inspire the current connectedness to nature movement, Richard Louv, has released another book that considers the reciprocal quality of our relationships with nature; specifically, Louv (2020) explores the reciprocity of our relationship with animals, reminding readers that the benefits of nature are an exchange of deep relational value.

## CONCLUSION

We have argued that children's embodied nature experiences belong in nature valuation discussions. We emphasize that it is not enough to say that human well-being is one of nature's contributions to people, as children and childhood's

unique character are potentially lost in such a broad grouping. Furthermore, the use of embodied childhood experience of nature provides a way to consider and possibly further strengthen the understanding of valuation as two directional.

People depend on functioning ecosystems to meet human needs and support well-being across the life span. The idea of reciprocity reminds us that the human role as a part of functioning ecosystems is our responsibility to these systems' health and well-being. Reciprocity is an appropriate way to think of the value of embodied childhood experiences of nature, and we propose that this idea needs a stronger presence in the ES-NCP discourse.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## AUTHOR CONTRIBUTIONS

Both authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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**Conflict of Interest:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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