

# Young Children's Relationship with Nature: Its Importance to Children's Development & the Earth's Future

By Randy  
White

© 2004 White Hutchinson Leisure & Learning Group

Almost 150 years ago, nineteenth century psychologist Herbert Spencer published his book, *Principals of Psychology*, in which he espoused the “surplus energy theory,” explaining that the main reason for children’s play is to get rid of surplus energy. Although researchers and developmental theorists have rejected his theory, it has had an unfortunate and lasting influence on the design of children’s outdoor play environments (Malone 2003). As a result of Spencer’s theory, playgrounds are seen as areas for physical play during recess, where children ‘burn off steam,’ and not for the other domains of development or for learning. In child care settings, playgrounds typically have manufactured climbing equipment, and other than sometimes-manicured grass, are devoid of nature and vegetation. The playgrounds for multitudes of children are not green, but gray (Moore & Wong 1997), many analogous to a parking lot (Worth 2003).

Early childhood learning facility designers’ and directors’ point-of-view that playgrounds should be designed for surveillance of [children](#), ease of maintenance and to have a break from children, rather than to stimulate the children themselves, has also contributed to the barren design of outdoor childcare environments where there is neither shade, shelter nor opportunities to interact with nature (McKendrick, Bradford & Fielder 2000, Cheskey 2001, Malone 2003). Playground design also reflects a lack of understanding of how quality outdoor play environments can provide children rich educational opportunities, particularly in the area of social skills and environmental learning (Evan 1997). Roger Hart, a noted developmental psychologist, attributes much of the problem to an underestimation of the importance of play to children; that it is considered discretionary rather than essential to child development, and that this misguided concept of play has trickled down into the play areas we create for children, resulting in lackluster environments with little value (Shell 1994).

Human [nature](#) itself has also helped perpetuate this design paradigm, simply because we are creatures of our experience. Our common experiences usually shape the conventional wisdom, or paradigms, by which we operate. When most adults were children, playgrounds were asphalt areas with manufactured, fixed playground equipment such as swings, jungle gyms and slides, used solely for recess. Therefore, most adults see this as the appropriate model for a playground.

## **Children’s History of Contact with Nature**

Modern humans (*homo sapiens*) evolved and have lived in intimate contact with nature, in the savannahs and forests, for almost their entire 120,000±-year history. The cultivation of plants and the domestication of animals allowed our ancestors to dwell in permanent settlements, to expand their population more rapidly,

thus beginning a long, sad divorce from nature (Manning 2004). It wasn't until recent history that most people lived in cities. But even until very recent history, children still grew up with intimate contact with nature. Throughout most of history, when children were free to play, their first choice was often to flee to the nearest wild place—whether it was a big tree or brushy area in the yard or a watercourse or woodland nearby (Pyle 2002). Two hundred years ago, most children spent

1

their days surrounded by fields, farms or in the wild nature at [its](#) edges. By the late twentieth century, many children's environments had become urbanized (Chawla 1994). But even then, as recently as 1970, children had access to nature and the world at large. They spent the bulk of their recreation time outdoors, using the sidewalks, streets, playgrounds, parks, greenways, vacant lots and other spaces "left over" during the urbanization process or the fields, forests, streams and yards of suburbia (Moore 2004, White & Stoecklin 1998). Children had the freedom to play, explore and interact with the natural world with little or no restriction or supervision.

### **Children's Extinction of Experience**

The lives of children today are much different. Children today have few opportunities for outdoor free play and regular contact with the natural world. Their physical boundaries have shrunk due to a number of factors (Francis 1991, Kytta 2004). A 'culture of fear' has parents afraid for their children's safety. A 2004 study found that 82% of mothers with children between the ages of 3 and 12 identified crime and safety concerns as one of the primary reasons they don't allow their children to play outdoors (Clements 2004). Due to 'stranger danger,' many children are no longer free to roam their neighborhoods or even their own yards unless accompanied by adults (Pyle 2002, Herrington & Studtmann 1998, Moore & Wong 1997). Fears of ultraviolet rays, insect-borne diseases and various forms of pollution are also leading adults to keep children indoors (Wilson 2000). Furthermore, children's lives have become structured and scheduled by adults, who hold the mistaken belief that this sport or that lesson will make their young children more successful as adults (Moore & Wong 1997, White & Stoecklin 1998). Brooks (2004) says that a childhood of unsupervised loitering, wandering and exploring has been replaced by a childhood of adult supervised and scheduled improvements.

The culture of childhood that played outside is gone and children's everyday life has shifted to the indoors (Hart 1999, Moore 2004). As a result, children's opportunity for direct and spontaneous contact with nature is a vanishing experience of childhood (Chawla 1994, Kellert 2002, Kuo 2003, Malone 2004, Pyle 2002, Rivkin 1990, Wilson 1996). One researcher has gone so far as to refer to this sudden shift in children's lives and their loss of free play in the outdoors as a 'childhood of imprisonment' (Francis 1991). Childhood and regular unsupervised play in the [outdoor](#) natural world are no longer synonymous (Wilson 2000). Pyle (1993) calls this the 'extinction of experience,' which breeds apathy towards environmental concerns. Kellert (2002) says society today has become "so estranged from its natural origins, it has failed to recognize our species' basic dependence on nature as a condition of growth and development."

Not only have children's play environments dramatically changed in the last few decades, but also the time children have to play has decreased. Between 1981 and 1997, the amount of time children ages 6 to 8 in the U.S. played decreased 25%, by almost four hours per week, from 15 hours a week to 11 hours and 10

minutes. During the same period, the time they spent in school increased by almost 5 hours (Hofferth & Sandberg 2000). A recent study surveyed mothers and found that 70% of mothers in the U.S. played outdoors everyday when they were children, compared with only 31% of their children, and that when the mothers played outdoors, 56% remained outside for three or more hours compared to only 22% of their children (Clements 2004).

### **Mediated Experience**

Today, with children's lives disconnected from the natural world, their experiences are predominately mediated in media, written language and visual images (Chawla 1994). The virtual is replacing the real (Pyle 2002). TV, nature documentaries, National Geographic and

2

other nature TV channels and environmental fundraising appeals are conditioning children to think that nature is exotic, awe-inspiring and in far, far away, places they will never experience (Chipeniuk 1995). Children are losing the understanding that nature exists in their own backyards and neighborhoods, which further disconnects them from knowledge and appreciation of the natural world.

### **Loss of Contact with Nature is Nature's Loss**

Not only does the loss of children's outdoor play and contact with the natural world negatively impact the growth and [development](#) of the whole child and their acquisition of knowledge, it also sets the stage for a continuing loss of the natural environment. The alternative to future generations who value nature is the continued exploitation and destruction of nature. Research is clearly substantiating that an affinity to and love of nature, along with a positive environmental ethic, grow out of children's regular contact with and play in the natural world (Bunting 1985; Chawla 1988; Wilson 1993; Pyle 1993; Chipeniuk 1994; Sobel 1996, 2002 & 2004; Hart 1997; Moore & Wong 1997; Kals et al. 1999; Moore & Cosco 2000; Lianne 2001; Kellert 2002; Bixler et al. 2002; Kals & Ittner 2003; Phenice & Griffore 2003; Schultz et al. 2004).

### **Schoolgrounds Offer Hope**

With children's access to the outdoors and the natural world becoming increasingly limited or nonexistent, child care, kindergarten and schools, where children spend 40 to 50 hours per week, may be mankind's last opportunity to reconnect children with the natural world and create a future generation that values and preserves nature (Herrington & Studtmann 1998, Malone & Tranter 2003). Many authorities believe the window of opportunity for the formation of bonding with and positive attitudes towards the natural environment develops sometime during early and middle childhood and requires regular interaction with nearby nature (Cohen & Horm-Wingerg 1993; Kellert 2002; Phenice & Griffore 2003; Sobel 1990, 1996 & 2004; Wilson 1993). Some authorities believe that if children don't develop a sense of respect and caring for the natural environment during their first few years, they are at risk for never developing such attitudes (Sobel 1996, Wilson 1996).

### **Premature Abstraction Breeds Biophobia**

The problem with much environmental education is that it approaches education from an adult's, rather

than a child's perspective. Children's curiosity with the natural world and unique way of knowing requires discovery and exploratory learning, rather than a didactic approach. One of the main problems with most environmental education is premature abstraction, teaching children too abstractly. One result of trying to teach children at too early of an age about abstract concepts like rainforest destruction, acid rain, ozone holes and whale hunting can be dissociation. When we ask children to deal with problems beyond their cognitive abilities, understanding and control, they can become anxious, tune out and develop a phobia to the issues. In the case of environmental issues, biophobia—a fear of the natural world and ecological problems—a fear of just being outside—can develop. Studying about the loss of rainforests and endangered species may be age appropriate for middle school children, but is developmentally inappropriate for pre-school and elementary school students (Cohen & Horn- Wingerg 1993, Coffey 2001, Kellert 2002, Sobel 1996, Wilson 1997).

John Burroughs cautioned that, "Knowledge without love will not stick. But if love comes first, knowledge is sure to follow." The problem with most environmental education programs for young children is that they try to impart knowledge and responsibility before children have been allowed to develop a loving relationship with the earth (Sobel 1996, Wilson 1997). Children's emotional and affective values of nature develop earlier than their abstract, logical

3

and rational perspectives (Kellert 2002). We need to allow children to develop their biophilia, their love for the Earth, before we ask them to save it. Rather than books and lectures, nature itself is children's best teacher (Coffey 2001). Young children tend to develop emotional attachments to what is familiar and comfortable for them (Wilson 1996). The more personal children's experience with nature, the more environmentally concerned and active children are likely to become (Bunting & Cousins 1985, Harvey 1989).

### **Discovering Children's Ecopsychological Self**

During the preschool years, it is important to help children discover what has been termed as their *ecopsychological self*—the child's natural sense of self in relation to the natural world (Phenice & Griffore 2003). Many authorities believe that due to humans' evolution in the natural world, we possess nature-based genetic coding and instincts, that children are born with a natural sense of relatedness to nature and this innate and developmental tendency towards empathy, biophilia or affiliation with nature needs to be nurtured starting in their earliest years (Barrows 1995, Lewis 1996, Nelson 1993, Sobel 1996, Tilbury 1996, Wilson 1993 & 1997). Children's instinctive feelings of continuity with nature are demonstrated by the attraction fairy tales set in nature and populated by animal characters have to children (Barrows 1995).

The extent to which an individual believes s/he is a part of nature, their connectiveness to nature, has been shown to be correlated with positive environmental attitudes (Shultz, et al. 2004). Research has also demonstrated that children's positive encounters with nature can lead to development of an environmental ethic (Chawla 1998, Nabhan & Trimble 1994, Palmberg & Kuru 2000, Wilson 1997). Young children's sense of self needs to develop in connection with and as a part of nature. Research indicates

that children's understanding of the relationship of humans to nature is both partially complete and under construction during early childhood (Phenice & Griffore 2003).

Children's development with little or no regular contact with the natural world is seen as a process of socialization by which children come to see themselves as separate and not a part of the natural world (Phenice & Griffore 2003, Sobel 1996). If children's developing sense of self becomes disconnected from the natural world, then nature comes to be seen as something to be controlled and dominated rather than loved and preserved. The child develops biophobia that can range from discomfort and fear in natural places to a prejudice against nature and disgust for whatever is not manmade, managed or air-conditioned (Cohen 1993, Bixler, et al. 1994, Orr 1993).

Sobel (1996) believes that developing children's empathy with the natural world should be the main objective for children ages four through seven. Children's experiences during early childhood should nurture the conception of the child as a part of nature. It is during early childhood when children's experiences give form to the values, attitudes, and basic orientation toward the world that they will carry with them throughout their lives (Wilson 1994 & 1996). Regular positive interactions within nature help children develop respect and a caring attitude for the environment. Not only are regular experiences in nature important, but also watching adults, both parents and teachers, modeling enjoyment of, comfort with, and respect for nature (Cohen 1992 & Phenice & Griffore 2003, Wilson 1996).

Sobel (1996) advocates that in addition to regular contact with nature, one of the best ways to foster empathy during early childhood is to cultivate children's relationships with animals. Young children feel a natural kinship with, and are implicitly drawn to animals and especially baby animals (Rosen 2004, Sobel 1996). Animals are an endless source of wonder for children, fostering a caring attitude and sense of responsibility towards living things. Children interact instinctively and naturally with animals, talk to them, and invest in them emotionally (Sobel

4

1996). A little-known fact about children and animals is that studies of the dreams of children younger than age 6 reveal that as many as 80% of their dreams are about animals (Acuff 1997, Patterson 2000). An additional significance of animals' symbolic importance to children is that animals constitute more than 90% of the characters employed in language acquisition and counting in children's preschool books (Kellert 1983).

### **The Naturalization of Playgrounds**

Fortunately, there is a growing movement in North America to transform the paradigm for playground design in preschool and kindergarten settings from barren areas of grass, asphalt, and wood chips with manufactured equipment into naturalized environments for children's play, exploration and discovery. The *Natural Learning Initiative*, headed by Robin Moore at North Carolina State University, Rusty Keeler's *Planet Earth Playscapes* and the *White Hutchinson Leisure & Learning Group's* discovery play gardens are examples of early childhood playground designers' initiatives to help children reclaim the magic that is their birthright—the ability to play and learn outdoors through exploration, discovery and the power of their imaginations in intimate contact with nature (White & Stoecklin 1998). These new naturalized play environments do not depend on manufactured equipment. Rather than being built, they are planted—they

use the landscape and its vegetation and materials as both the play setting and the play materials. Instead of being designed like a well manicured adult environment, naturalized playgrounds are designed from a child's perspective as informal, even wild, and as a place that responds to children's development tasks and their sense of place, time and need to interact with the nature. They are designed to stimulate children's natural curiosity, imagination, wonder and discovery learning as well as nurture children's connectiveness with nature (White & Stoecklin 1998).

Basic components of a naturalized play environments for young children include (White & Stoecklin 1998):

- Water
- Plentiful indigenous vegetation, including trees, bushes, flowers and long grasses that children can explore and interact with
- Animals, creatures in ponds, butterflies, bugs
- Sand, and best if it can be mixed with water
- Diversity of color, textures and materials
- Ways to experience the changing seasons, wind, light, sounds and weather
- Natural places to sit in, on, under, lean against, climb and provide shelter and shade
- Different levels and nooks and crannies, places that offer socialization, privacy and views
- Structures, equipment and materials that can be changed, actually, or in their imaginations, including plentiful loose parts

### **Benefits of Naturalized Playgrounds**

Research on natural playgrounds is demonstrating the broad benefits this paradigm shift in playground design and environmental learning has to children by offering them play and learning in naturalized environments. Children learn by constructing their own knowledge about the world, not by memorizing facts (Piaget 1962). Harvard psychologist Howard Gardner says that scholastic knowledge "seems strictly bound to school settings," while outdoor education fosters "connected knowing," where education is part of, rather than separate from life (Gardner 1991). Fjortoft (2001) found that when children's daily outdoor play environments were heavily naturalized, there was a considerable increase in children's interest

5

in and knowledge of nature. Sobel (2004) reviewed the research on naturalized playgrounds and found that they have a positive impact on children's development of environmental stewardship values, and the greater the diversity of the natural landscapes, the greater children's appreciation of nature and experiences in it. Malone and Tranter (2003) found that the playgrounds most conducive to environmental learning were unstructured, such as forest areas not specifically designed for children's play. The combination of both formal learning and informal, positive experiences in the naturalized environments were found most associated with the development of children's environmentally responsible behaviors (Fisman 2001). In addition to the opportunities for children to develop an environmental ethic through regular contact with nature, natural environments offer children many additional benefits. A growing body of literature shows that the natural environment has positive effects on the well-being of adults, including

better psychological well-being, superior cognitive functioning, fewer physical ailments and speedier recovery from illness. Research provides convincing evidence of the more profound benefits of experiences in nature for children due to their greater plasticity and vulnerability (Wells & Evans 2003).

The findings indicate that:

- Children with symptoms of Attention Deficit Hyperactivity Disorder (ADHD) are better able to concentrate after contact with nature (Faber Taylor et al. 2001).
- Children with views of and contact with nature score higher on tests of concentration and self-discipline. The greener, the better the scores (Faber Taylor et al. 2002, Wells 2000).
- Children who play regularly in natural environments show more advanced motor fitness, including coordination, balance and agility, and they are sick less often (Fjortoft 2001, Grahn et al. 1997).
- When children play in natural environments, their play is more diverse with imaginative and creative play that fosters language and collaborative skills (Faber Taylor et al. 1998, Fjortoft 2000, Moore & Wong 1997).
- Exposure to natural environments improves children's cognitive development by improving their awareness, reasoning and observational skills (Pyle 2002).
- Nature buffers the impact of life stress on children and helps them deal with adversity. The greater the amount of nature exposure, the greater the benefits (Wells 2003).
- Play in a diverse natural environment reduces or eliminates anti-social behavior such as violence, bullying, vandalism and littering, as well reduces absenteeism (Coffey 2001, Malone & Tranter 2003, Moore & Cosco 2000).
- Nature helps children develop powers of observation and creativity and instills a sense of peace and being at one with the world (Crain 2001).
- Early experiences with the natural world have been positively linked with the development of imagination and the sense of wonder (Cobb 1977, Louv 1991). Wonder is an important motivator for life long learning (Wilson 1997).
- Children who play in nature have more positive feelings about each other (Moore 1996).
- A decrease in children's time spent outdoors is contributing to an increase of children's myopia (Nowak 2004).
- Natural environments stimulate social interaction between children (Moore 1986, Bixler, Floyd & Hammutt 2002).
- Outdoor environments are important to children's development of independence and autonomy (Bartlett 1996).

## **Conclusion**

Children and society as a whole can benefit significantly by maximizing the informal play and learning opportunities that naturalized outdoor play environments offer young children. Naturalized outdoor early childhood environments are places where children can reclaim the magic that is their birthright, the ability to grow and learn to their fullest in their unique experiential way through the joy of exploration and discovery in the natural world. But perhaps even more important, naturalized playgrounds offer the hope that children will develop the environmental values to become the future stewards of the Earth who will preserve the diversity and wonder of Nature. Randy White is the CEO of the White Hutchinson Leisure & Learning Group, a Kansas City, Missouri-based firm that specializes in the design of children's indoor and outdoor learning, play and leisure environments. Randy can be reached at <[randy@whitehutchinson.com](mailto:randy@whitehutchinson.com)> or via the company's website:[www.whitehutchinson.com/children](http://www.whitehutchinson.com/children).

## References

- Acuff, Dan (1997). *What Kids Buy and Why*. New York: The Free Press. p. 174
- Bixler, R., Carlisle, D.L., Hammitt, W.E. & Floyd, M.E. (1994). Observed fears and discomforts among urban students on field trips to wildland areas. *The Journal of Environmental Education*, 26(1), 24-33
- Barrows, A (1995). The Ecopsychology of Child Development, in T. Roszak, M.E. Gomes & A.D. Kanner (Eds) *Ecopsychology: restoring the Earth, healing the mind*. New York: Sierra Press
- Bartlett, Sheridan (1996). Access to Outdoor Play and Its Implications for Healthy Attachments. Unpublished article, Putney, VT
- Bixler, Robert D., Floyd, Myron E. & Hammitt, William E. (2002). Environmental Socialization: Quantitative Tests of the Childhood Play Hypothesis, *Environment and Behavior*, 34(6), 795-818
- Brooks, David (2004). *On Paradise Drive: How We Live Now (and Always Have) in the Future Tense*. New York: Simon & Schuster, pp. 142-143
- Bunting, T.E. & L.R. Cousins (1985). Environmental dispositions among school-age children. *Environment and Behavior*, 17(6)
- Chawla, Louise, (1988). Children's Concern for the Natural Environment, *Children's Environments*, (5)3
- Chawla, Louise, (1994). Editors' Note, *Children's Environments*, (11) 3
- Cheskey, Edward, (2001). How Schoolyards Influence Behavior. in *Greening School Grounds: Creating Habitats for Learning*, (eds) Grant, Tim and Littlejohn, Gail., Toronto: Green Teacher and Gabriola Island, BC: New Society Publishers
- Chipeniuk, Raymond C. (1994). Naturalness in Landscape: An Inquiry from a Planning Perspective (PhD dissertation), University of Waterloo, Ontario.
- Chipeniuk, R. (1995). Childhood foraging as a means of acquiring competent human cognition about biodiversity, *Environment and Behavior*, 27, 490-512
- Cobb, E. (1977). *The Ecology of Imagination in Childhood*, New York, Columbia University Press.
- Coffey, Ann (2001). Transforming School Grounds, in *Greening School Grounds: Creating Habitats for Learning*, (eds) Grant, Tim and Littlejohn, Gail., Toronto: Green Teacher and Gabriola Island, BC: New Society Publishers
- Cohen, S. (1992). Promoting Ecological Awareness in Children. *Childhood Education*, 68, 258-260
- Cohen, Stewart & Horm-Wingerg, D. (1993). Children and the environment: Ecological awareness among preschool children. *Environment and Behavior*, 25(1), 103-120
- Crain, William (2001). Now Nature Helps Children Develop. *Montessori Life*, Summer 2001.
- Evan, J. (1997). Rethinking Recess: Signs of Change in Australian Primary Schools. *Education Research and Perspectives*, 24(1): 14-27
- Faber Taylor, A., Wiley, A., Kuo, F.E., & Sullivan, W.C. (1998). Growing up in the inner city: Green spaces as places to grow. *Environment and Behavior*, 30(1), 3-27
- Faber Taylor, A., Kuo, F.E. & Sullivan, W.C. (2001). Coping with ADD: The surprising connection to green play settings.

- Faber Taylor, A., Kuo, F.E. & Sullivan, W.C. (2002). Views of Nature and Self-Discipline: Evidence from Inner City Children, *Journal of Environmental Psychology*, 22, 49-63

- Fishman, Lianne (2001). Child's Play: An empirical study of the relationship between the physical form of schoolyards and children's behavior. MEdSc 2001 Accessed June 1, 2004 from [www.yale.edu/hixon/research/pdf/LFishman\\_Playgrounds.pdf](http://www.yale.edu/hixon/research/pdf/LFishman_Playgrounds.pdf)
- Fjortoft, I. And J. Sageie (2000). The Natural Environment as a Playground for Children: Landscape Description and Analysis of a Natural Landscape. *Landscape and Urban Planning*, 48(1/2) 83-97
- Fjortoft, Ingunn (2001). The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children. *Early Childhood Education Journal*, 29(2): 111-117
- Francis, Mark (interview) au Kathryn Devereaux (1991) "Children of Nature", *U. C. Davis Magazine*, 9(2) University of California, Davis.
- Gardner, H. (1991). The tensions between education and development. *Journal of Moral Development*, 20(2), 113-125
- Grahn, P., Martensson, F., Lindblad, B., Nilsson, P., & Ekman, A., (1997). UTE pa DAGIS, Stad & Land nr. 93/1991 Sveriges lantbruksuniversitet, Alnarp
- Hart, Roger (1997). *Children's Participation: The theory and practice of involving young citizens in community development and environmental care*, Earthscan Publications Limited, UK
- Hart, Roger (1999). au Anne Raver, Tutored by the Great Outdoors at a Southern Pines Playground, *New York Times*, October 7, 1999. New York
- Harvey, M. (1989). The Relationship between Children's Experiences with Vegetation on Schoolgrounds. *Journal of Environmental Education* 21(2): 9-18
- Herrington, Susan, & Studtmann, Ken (1998). Landscape Interventions: New Directions for the design of children's outdoor play environments. *Landscape and Urban Planning*, 42, 191-205
- Hofferth, Sandra L. & Sandberg, John F. (2000). Changes in American Children's Time, 1981-1997, Center for the Ethnography of Everyday Life. Accessed June 1, 2004 from [ceel.psc.isr.umich.edu/pubs/](http://ceel.psc.isr.umich.edu/pubs/)
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity towards nature as a motivational basis to protect nature. *Environment & Behavior*, 31(2), 178-202
- Kals, Elisabeth & Ittner, Heidi (2003). Children's Environmental Identity, Indicators and Behavioral Impacts, in *Identity and the Natural Environment - The Psychological Significance of Nature*, Clayton, Susan and Opatow, Susan (eds), The MIT Press, Cambridge, Massachusetts
- Kellert, Stephen (1983). Affective, evaluative and cognitive perceptions of animals. In I. Altman & J. Wohlwill (eds.), *Behavior and the Natural Environment*. New York: Plenum Press
- Kellert, Stephen R. (2002). Experiencing Nature: Affective, Cognitive, and Evaluative Development, in *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations*. Cambridge, MA: The MIT Press.
- Kuo, Frances (2003). book review of *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations* Children, *Youth and Environments*, 13(1) accessed June 12, 2004 from [cye.colorado.edu:8080/CYElom/BookReviews/BookReview49](http://cye.colorado.edu:8080/CYElom/BookReviews/BookReview49)
- Kytta, Marketta, (2004). The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments, *Journal of Environmental Psychology*, 24(2), 179-198
- Leiberman, Gerald & Hoody, Linda, (1998). *Closing the Achievement Gap: Using the Environment as an Integrated Context for Learning* (San Diego, California: State Education and Environmental Roundtable)
- Lewis, A.L. (1996). *Green Nature/Human Nature*. Urbana and Chicago, IL: University of Illinois Press
- Louv, Richard (1991). *Childhood's Future*, New York, Doubleday.

- Malone, Karen & Tranter, Paul (2003). Children's Environmental Learning and the Use, Design and Management of Schoolgrounds, Children, *Youth and Environments*, 13(2), Accessed June 9, 2004 from [cye.colorado.edu](http://cye.colorado.edu)
- McKendrick, J., Bradford, M., & Fielder, A. (2000). Kid Customer? Commercialization of Playspace and the Commodification of Childhood. *Childhood*, 7: 295-314
- Moore, Robin C. (1986). The Power of Nature Orientations of Girls and Boys Toward Biotic and Abiotic Play Settings on a Reconstructed Schoolyard. *Children's Environments Quarterly*, 3(3)
- Moore, Robin (1996). Compact Nature: The Role of Playing and Learning Gardens on Children's Lives, *Journal of Therapeutic Horticulture*, 8, 72-82
- Moore, R. & Wong, H. (1997). *Natural Learning: Rediscovering Nature's Way of Teaching*. Berkeley, CA MIG Communications.
- Moore, Robin & Cosco, Nilda, (2000). Developing an Earth-Bound Culture Through Design of Childhood Habitats, Natural Learning Initiative. paper presented at Conference on People, Land, and Sustainability: A Global View of Community Gardening, University of Nottingham, UK, September 2000). Accessed June 12, 2004 from [www.naturalearning.org/earthboundpaper.html](http://www.naturalearning.org/earthboundpaper.html)

8

- Moore, R. (2004). Countering children's sedentary lifestyles by design. Natural Learning Initiative. Accessed June 12, 2004 from [www.naturalearning.org](http://www.naturalearning.org)
- National Environmental Education & Training Foundation (2000). *Environment-based Education*, The National Environmental Education & Training Foundation, Washington, DC
- Nowak, R. (2004). Blame lifestyle for myopia, not genes. *NewScientist*, July 10, 2004, 12
- Olds, Anita ( ). *Children Come First Video*, Community Playthings
- Orr, D.W. (1993). Love it or lose it: The coming biophilia revolution. In S.R. Kellert and E. O. Wilson (eds.), *The Biophilia Hypothesis* (pp. 415-440). Washington, DC: Island Press
- Patterson, B. (2000). *Build Me an Ark*. New York: Norton
- Phenice, L. & Griffore, R. (2003). Young Children and the Natural World. *Contemporary Issues in Early Childhood*. 4(2), 167-178
- Piaget, J. (1962). *Play, dreams, and imagination in children*. New York: Norton
- Pyle, Robert (1993). *The thunder trees: Lessons from an urban wildland*. Boston: Houghton Mifflin.
- Pyle, Robert (2002). Eden in a Vacant Lot: Special Places, Species and Kids in Community of Life. In: *Children and Nature: Psychological, Sociocultural and Evolutionary Investigations*. Kahn, P.H. and Kellert, S.R. (eds) Cambridge: MIT Press
- Raver, Anne (1999). Tutored by the Great Outdoors at a Southern Pines Playground, New York Times, October 7, 1999. New York
- Rivkin, Mary S. (1990). The Great Outdoors: Restoring Children's Rights to Play Outside. National Association for the Education of Young Children, Washington, D.C.
- Rosen, M.J. (2004). Stars in a Child's Universe, in *The World's Children and Their Companion Animals*, Jalong, M.R. (ed), Olney, MD: *Association for Childhood Education International*, pp. 6
- Schultz, P. Wesley, Shriver, Chris, Tabanico, Jennifer J. & Khazian, Azar M. (2004) Implicit connections with nature. *Journal of Environmental Psychology*, 24(1), 31-42
- Shell, Ellen Ruppel (1994). Kids Don't Need Equipment, They Need Opportunity, *Smithsonian Magazine*, 25(4), 78-87
- Sobel, D., (1990). A place in the world: Adults' memories of childhood's special places. *Children's Environments Quarterly*, 7(4)
- Sobel, David, (1996). *Beyond Ecophobia: Reclaiming the Heart of Nature Education*, Great Barrington, MA: The Orion Society.
- Sobel, David (2002). *Children's Special Places: Exploring the Role of Forts, Dens, and Bush Houses in Middle Childhood*, Detroit, MI: Wayne State University Press
- Sobel, David (2004) *Place-Based Education, Connecting Classrooms & Communities*, Great Barrington, MA: The Orion Society.

- Tilbury, D. (1994). The critical learning years for environmental education. In R.A. Wilson (Ed.) *Environmental Education at the Early Childhood Level*. Washington, DC: North American Association for Environmental Education, pp. 11-13
- Wells, Nancy M. (2000). At Home with Nature, Effects of "Greenness" on Children's Cognitive Functioning, *Environment and Behavior*, 32(6), 775-795
- Wells, Nancy M. & Evans, Gary W. (2003). Nearby Nature: A Buffer of Life Stress Among Rural Children. *Environment and Behavior*, 35(3), 311-330.
- White, R. & V. Stoecklin (1998). Children's Outdoor Play & Learning Environments: Returning to Nature. Accessed June 11, 2004 from [www.whitehutchinson.com/children/articles/outdoor.shtml](http://www.whitehutchinson.com/children/articles/outdoor.shtml)
- Wilson, Ruth (1993). *Fostering a sense of wonder during the early childhood years*. Columbus, OH: Greyden
- Wilson, Ruth (1994). *Environmental Education at the Early Childhood Level*. Washington, D.C: North American Association for Environmental Education.
- Wilson, Ruth A. (1996). *Starting Early Environmental Education During the Early Childhood Years*(ERIC Digest). Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education (ERIC Identifier ED 402147).
- Wilson, Ruth A. (1997). The Wonders of Nature - Honoring Children's Ways of Knowing, *Early Childhood News*, 6(19).
- Wilson, Ruth A. (2000). *Outdoor Experiences for Young Children* (ERIC Digest). Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools (ERIC Identifier ED448013)
- Worth, Jennifer (2003). Book review of Greening School Grounds: Creating Habitats for Learning, *Children, Youth and Environments*, 13(2). Accessed June 9, 2004 from [cye.colorado.edu](http://cye.colorado.edu)