



Managing Vegetation for Children

Natural Resource Report NPS/HTLN/NRR—2013/635



ON THE COVER

Homeschool student navigates a trail through a field of Tallgrass prairie at Wilson's Creek National Battlefield
Photograph by: Mike DeBacker of the Heartland I&M Network

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Abstract

This paper takes an in depth look at the positive benefits children receive from natural areas and develops strategies for vegetation management to capitalize on this information. A literature review was first conducted to elucidate the benefits that nature provides to child development. This review found the natural environment to have positive effects falling into four categories: behavior, health, self-conception and environmental sensitivity. The primary vector for these positive outcomes was free-play outdoors and the authors identified three recurring environmental factors – refuge, diversity, and accessibility– as promoters of free-play. In conclusion, the author developed applications for vegetation management projects. This research is a simple and cost effective way to engage children

Introduction

The National Park Service (NPS) report “A call to action: Preparing for a second century of stewardship and engagement” aims, in part, to develop a new generation of informed, healthy and environmentally sensitive citizens¹. The more recent report “Revisiting Leopold: Resource stewardship in the national parks” reinforces this emphasis and calls parks to provide transformative experiences that educate and inspire as a key goal of resource management (p.13). The renewed emphasis by the NPS has been in response to worldwide demographic and technological changes that are pushing people into crowded cities and away from natural spaces. These changes can be traced to increased problems among children that include reduced time spent playing outdoors, emotional issues, and loss of environmental knowledge and sensitivity. While the solutions to meeting these challenges involve numerous efforts, we see an opportunity for the NPS to plan for free-play as an important secondary benefit when managing cultural and natural landscapes.

Free-play allows children the time to roam around, collect things, make up stories, climb, crawl, throw, and construct—activities children do without prompting. The importance of this as a transformative experience that inspires and educates children can be found throughout the literature on environmental education. Richard Louv’s influential book “Last Child in the Woods” (2008) can be seen as a manifesto for free-play. Louv contends that lack of contact with green spaces during childhood is a root cause of many problems seen in children and society as a whole. He dubbed this condition “Nature Deficit Disorder” and prescribed free-play as a panacea. In fact, many of the theorists, and advocates of getting children outdoors are pushing for similar solutions (Sobel, 1993; Nabhan and Trimble, 1994; Thomashow, 1996; Moore, 1997). Moreover, free-play is empirically connected to many of the desired outcomes of NPS initiatives, and free-play has already been introduced in some NPS programs. BioBlitz and the introduction of free observation time during field trips are some examples. Empirical studies supporting positive outcomes resulting from free-play can loosely be grouped into three areas including: 1) behavior, 2) health, and 3) environmental sensitivity.

Behavior

Some of the most promising research links free-play in green spaces to improved management of childhood behavioral disorders such as ADD/ADHD. This research has drawn extensively on attention restoration theory (ART) (Kaplan, 1995). ART contends that sustained focus is a directed and cognitively expensive task that is susceptible to fatigue. However, ART distinguishes between voluntary (i.e., directed) attention and involuntary attention. Where voluntary attention is easily fatigued, involuntary attention requires no effort and allows the mind to restore the focus lost during bouts of directed attention. ART further contends that certain environments offer greater opportunities for involuntary attention and attention restoration. The Landscape and Human Health Laboratory at the University of Illinois Urbana-Champaign has

¹ Actions 2, 6, 7, 15, 16, 17 all deal with reaching youth in new ways

produced research that indicates that natural areas like National Parks provide an ideal place to restore the attention of humans and particularly children suffering from ADD/ADHD. This includes a 2001 study that found among 219 self-reported activities from parents, unstructured play in green settings were significantly overrepresented among activities rated as “best” at reducing attention deficit symptoms. Among these same respondents, indoor activities were disproportionately rated as “worst” for attention deficit symptoms. Furthermore, it found that the “greener” the play setting during the previous week, the less severe the subject’s symptoms (Faber Taylor, Kuo, and Sullivan, 2001). This study was expanded in 2004 to include a national sample as well as being supported by several further papers that have looked at how more specific situations such as viewing nature or taking a walk in a park may have beneficial effects on attention (Faber Taylor, Kuo, and Sullivan; 2002; 2009; Kuo and Faber Taylor, 2004). These studies, along with outside studies looking at play environments for pre-schoolers and the effects outdoor schools can have in child behavior, indicate a very strong causal relationship between play-time in green spaces and improved behavior in children with ADD/ADHD (Mårtensson, 2009; Roe and Aspinall, 2011).

Health

The physical health benefits of play in natural areas during development are numerous. According to the Center for Disease Control and Prevention, over one third of American children and adolescents were overweight or obese. 20% of children ages 6-11, and 18% of adolescents were obese. These numbers are up from 1980 rates of 7% and 5% in each age group respectively (2008). Childhood obesity is related to a host of other very serious problems such as cardiovascular disease, osteoarthritis, diabetes, nonalcoholic fatty liver disease, hypertension, obstructive sleep apnea and asthma later in life. Outdoor play led to increased activity levels in children and adolescents which helps combat obesity and related issues (Klesges, Eck, Hanson, Haddock, and Klesges, 1990; Sallis et al, 1993; Cleland et al, 2008; McCurdy, Winterbottom, Mehta and Roberts, 2010). These studies tracked children’s movements over a set amount of time using a variety of methods including direct observation in households and collecting accelerometer data (Klesges et al, 1990; Sallis et al, 1993; Cleland, 2008; Nicaise, Kahan and Sallis 2011). A recent review of the literature similarly found a strong connection between outdoor play and activity levels (McCurdy et al, 2010).

Outdoor free-play may also lead to an increase in motor skills (Fjortoft, 2001). Working in Norway, Fjortoft grouped kindergarten children according to the style of play available to them. The two primary areas included were a traditional playground experience and a free-play experience in a forested area. Using a standardized motor fitness test, the children were then tested pre/post experiment. In the nine-month window between testing, the children who attended a kindergarten with a primary play activity of free-play in a forest setting scored significantly higher than their traditional playground counterparts. While more studies are needed to confirm this relationship, the study lends additional support to the benefit of play in natural settings.

It should be acknowledged here that many of these health benefits, as well as many others discussed in this article, require significant time and frequency in the outdoors. For many iconic natural parks, where visits per person are low, these benefits are not applicable. However, urban parks, recreation parks, and parks that are located in areas easily accessible to a community are

very capable of providing the benefits discussed. It is to this group of parks that this research is most applicable and the recommendations found later are particularly relevant.

Environmental Sensitivity

In an article titled “The Biological Basis for Human Values of Nature” Stephen Kellert describes nine values of nature that he asserts are found throughout human society (1993). These perspectives included: utilitarian, naturalistic, ecologicistic-scientific, aesthetic, symbolic, humanistic, moralistic, dominionistic, and negativistic. Kellert included in this examination a potential function and evolutionary advantage that each value may impart as well as a list of research giving their universality among humans some empirical support. Kellert goes on to argue that many of these values provide the basis of a strong and enduring conservation ethic. A more general term that encompasses some of these values and whose development has been directly linked to time spent in nature during childhood is environmental sensitivity.

Louise Chawla defines environmental sensitivity as, “a predisposition to take an interest in learning about the environment, feeling concern for it and acting to conserve it, on the basis of formative experiences” (1998). Mitchell Thomashow in his book *Ecological Identity* (1996) develops this very thoroughly and advocates not only for contact with nature, but also emphasizes the necessity of this contact to come during childhood. He says that childhood “is a time of great creativity, involving the first explorations of independence...this is a time that children establish their connections to the earth, forming an earth matrix, a terrain symbiosis, which is crucial to their personal identity” (p.21). Thomashow goes on to explicitly lay out guidelines for developing what he refers to as “ecological identity”. He says that exercising (1), the practice of the wild, (2) natural history excursions and (3) the path of citizenship are important. In a convergence of ideas, Gary Nabhan, and Steven Trimble came up with an almost identical theory (1994). They posited that the three key strategies of developing environmental sensitivity are (1) intimate involvement with plants and animals (2) direct exposure to a variety of wild animals carrying out their routine behaviors and natural habitats and (2) teaching by community elders about their knowledge of the local biota (p. 97).

These theories are bolstered by an abundance of empirical support. As mentioned before, Chawla developed her definition of environmental sensitivity after a review of significant life experiences (1998). She analyzed over 20 qualitative research studies that involved surveys, interviews and environmental sensitivity questionnaires. The results were clear about the influence of experience during childhood and adolescence and allowed Chawla to conclude powerfully, that “contact with natural areas has emerged as one of the most significant influences in all the studies reviewed” (p17). Since that time, Chawla has continued her work on significant life experiences and strengthened the conclusions made earlier (1999; 2001; 2006; 2007). Other studies have further lent weight to the conclusion that environmental sensitivity is linked to outdoor experiences in childhood (Palmer, 1998; Wells and Lekies, 2006; Arnold, Cohen and Warner 2009).

Strategies

For land managers, the research presented offers an incentive to promote free-play when possible while managing natural and cultural landscapes. We believe that this can be done in such a way that avoids or minimizes conflict with other priority uses. Because little infrastructure is required, the challenges for the NPS come in the form of planning, interpreting, and promoting free-play opportunities that are safe and utilize elements that are most closely related to the documented benefits. This offers significant opportunities for collaboration between Interpretation, Education, Maintenance and Natural Resources. In some cases, existing activities in these departments may already have unrecognized value-added benefits for free-play that could form the basis of a larger collaborative project. For example, a project reducing basal density in forests to their historical precedents may increase the free-play potential of an area by making it more accessible for play.

We have developed a simple series of questions to guide the decision making process. After assessing site safety, managers may determine whether or not the area is suitable for management adjustments to maximize free-play by answering the following ²:

1. Is this area suitable for free-play?
2. If yes: Are there ongoing park uses for the area?
3. If yes: Do these uses prevent management adjustments or other actions?

In order to answer the first question there are three elements to consider when planning and designing free-play opportunities in cultural and natural landscapes: (1) refuge, (2) diversity, and (3) accessibility. Certainly this is only a starting point but we believe it is, however, practical. Each principle is based in some part on the research and observations of education professionals.

“Refuge” is a recurring theme in the literature on child play behavior. Kirkby (1989) argued that young children seek refuge areas as places to play because of a larger developmental bias. She showed through her study of play behavior that children spent the largest portion of their playtime play in enclosed spaces. The children in her study spent 47% of their outdoor playtime in refuges that composed only 10% of the total area of the playground (p. 9) Kirkby and other theorists have pointed to environmental preferences for refuges, savannahs, and other landscapes as evidence that they are powerfully rooted in our genetic heritage (Wilson and Kellert, 1994; Kaplan and Kaplan 1995; Kahn 1997). Kirkby goes on to give more guidance on specifics of an enclosure preferred by children. Her guidelines include having a ceiling effect (canopy) sub-spaces or a high degree of complexity, visual connections to the surrounding environment, privacy, and small-scale spaces (p. 11). In fact this emphasis on small places as a part of refuge is echoed in the work of many others (Moore, 1986; Nabhan and Trimble, 1994; Sobel 2008).

² See Appendix A for a complete worksheet containing these questions

Diversity along several metrics also factors in as an environmental preference for children (Kahn, 1997). Increasing the level of diversity is synonymous in this application with increasing the possible experiences for a child in a set domain. This means having rocks of different sizes, trees to climb, crawling spaces, water, dirt, topographical diversity, and animals. Much of this is inherent in nature and outdoor environments: however, where possible it should be enhanced. This allows children the most opportunities for being creative, active and experiencing new sensations. Researchers looking into the attention restoration properties of nature used an environmental evaluative tool called OPEC, which stands for “outdoor play environment categories” (Mårtensson et al, 2009). The OPEC tool scored environments along the variables of total outdoor area that is accessible to children, the proportion of the area containing shrubbery, trees or hilly terrain, and the degree of integration between vegetation, open areas and play structure along with several sub-categories. These scores were then used to create an average score. The correlation between attention restoration in children and OPEC score can be seen as further evidence of the necessity for diversity.

Accessibility is a multi-dimensional characteristic affecting free-play in children. On one level, making sure there are plenty of entrance points to begin engaging with the space is all that is needed. Kahn (1997) notes that the diversity and complexity of the landscape and complexity should not come at the expense of a child’s perceived ability to enter a landscape, maintain orientation, and eventually find a way out. Accessibility is also important in designing individual spaces within the whole. Kirkby included this in her design principles saying “multiple point access to enclosed spaces accommodates individual style, allows ‘escape’ opportunities, and lends itself to a greater variety of use” (p. 11). She even noted the differences in the size of the entry point saying that children seemed “attracted to spaces that were scaled to them” (p. 11).

Together, these principles can be applied to specific landscapes:

Prairies

- The openness of a field provides accessibility while a tree, man-made structure or geological formation could offer a set point to make for easy orientation
- Trees along one edge could offer refuge as well as grasses that are several feet high
- Diversity in a field is offered by hills, the ruins of structures, and natural biodiversity that can be capitalized on by free-play education activities

Forests

- Accessibility can be more of an issue but managers could choose an area with limited undergrowth, a good landmark such as an easily viewed trail, hill, neighboring field, or even a bench where an adult could be located. Shrub thickets with limited accessibility to the interior offer refuge as well as a gully or fallen log

- Forested areas provide diverse experiences. A tree low enough to swing from the branches, streams flowing through an area or simply a fallen tree are all highly diverse play structures for children

Water Ecosystems

- A road or trail crossing through a slow moving and shallow stream could offer high accessibility
- Refuge can be offered all along the banks if necessary but the high diversity of a stream bed could make up for any lack of other attributes
- Fish, insects, rocks, and plants could all be found here to offer a diverse play experience

In addition to these traditional ecosystems, managers could identify underutilized areas that may be proper as a free-play zone. This could include highly disturbed areas such as a reclaimed road or agricultural fields.

Questions two –are there ongoing park uses for the area?– and three –do these uses prevent management adjustments or certain other actions?– are important follow up questions because they clarify whether further action to the identified area is appropriate. Managing a protected area for children has from the beginning of this article been considered a secondary goal of vegetation management and as such should not supplant existing goals. These questions insure this secondary nature by confirming that any actions are in areas that are already under management and do not contradict existing goals. We do not want for example sensitive natural areas opened up to free-play. Appendix A contains the full worksheet that includes free-play criteria and further explanations. As long as an area is suitable for free-play (Question 1) and has management plans already in place (Question 2) that do not prevent further modification and management changes (Question 3), then it may be considered as a viable site for the introduction of management for free-play.

There are many simple modifications that can be incorporated into existing management plans with little effort. For example, in an open field the manipulation of the mowing could have major impacts on the ability of the area to offer refuge and accessibility. Mowing in connecting networks of paths can make an area more welcoming while these same paths could offer refuge if carefully designed. Conversely, allowing vegetation to grow higher could offer significantly more opportunities for refuge during free-play. Forested areas require slightly more involvement from managers. Mowing is still an easy option though as any mowed trails can be widened or narrowed depending on the intended purpose. Narrow networks of trails offer refuge and intrigue for the creative young mind while widening trails could provide the opportunity for diverse play activities.

Finally, while free-play in its purest form is a spontaneous act by children, in order for the maximum number of children to reap the benefits that free-play in the national parks can offer, some prompting and encouragement which connects with more traditional educational curricula must occur. For example, a volunteer entomologist located at a central landmark and equipped

with a handful of butterfly nets could offer kids the opportunity to collect insects on their own while the volunteer aids in identification. Ornithologists could do the same with binoculars. Historians and geographers could facilitate mapping of areas of interest.

Conclusion

Designing cultural and natural landscapes to encourage free-play in national parks offers a simple way for managers to respond to the goals set out in “The Call to Action”. The planning approach and design principles outlined provide important criteria for best implementing these designs for real world applications. As many of the applications derived from these recommendations will be novel, managers should monitor the effectiveness of the projects. Surveys and other measures could be helpful in the continual modification of projects for children. In this way, management of the vegetation in these landscapes may lead to a number of positive physiological, psychological, and developmental outcomes for children.

Literature Cited

- Arnold, H. E., F. G. Cohen, and A. Warner. 2009. Youth and environmental action: Perspectives of young environmental leaders on their formative influences. *Journal of Environmental Education* 40(3): 27-36.
- Chawla, L. 1998. Significant life experiences revisited: A review of research. *Journal of Environmental Education* 29(3): 11.
- . 1999. Life paths into effective environmental action. *Journal of Environmental Education* 31(1): 15.
- . 2001. Significant life experiences revisited once again: Response to vol. 5(4) 'five critical commentaries on significant life experience research in environmental education'. *Environmental Education Research* 7(4): 451-461. doi:10.1080/13504620120081313.
- . 2006. Research methods to investigate significant life experiences: Review and recommendations. *Environmental Education Research* 12(3): 359-374. doi:10.1080/13504620600942840.
- . 2007. Childhood experiences associated with care for the natural world: A theoretical framework for empirical results. *Children, Youth & Environments* 17(4):144-170.
- Center for Disease Control and Prevention (CDC). 2012. Childhood obesity facts. Atlanta, Georgia, USA. Available from cdc.gov/healthyyouth/obesity/facts.htm.
- Cleland, V., D. Crawford, L. A. Baur, C. Hume, A. Timperio, and J. Salmon. 2008. A prospective examination of children's time spent outdoors, objectively measured physical activity and overweight. *International Journal of Obesity* 32(11): 1685-1693. doi:10.1038/ijo.2008.171.
- Faber Taylor, A. and F. E. Kuo. 2009. Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders* 12: 402-409.
- Faber Taylor, A., F. E. Kuo, and W. C. Sullivan. 2001. Coping with ADD: The surprising connection to green play settings. *Environment and Behavior* 33(1): 54-77.
- . 2002. Views of nature and self-discipline: Evidence from inner city children. *Environmental Psychology* 22: 49-63.
- Fjørtoft, I. 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.
- Kahn, P. H., Jr. 1997. Developmental psychology and the biophilia hypothesis: Children's affiliation with nature. *Developmental Review* 17(1): 1-61.

- Kaplan, S. 1995. The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology* 15: 169-182.
- Kaplan, R., S. Kaplan. 1995. *The experience of nature: A psychological perspective*. Ulrichs Bookstore, Ann Arbor, Michigan, USA.
- Kellert, S. 1993. The biological basis for human values of nature. Pages 42-71 *in* Kellert, S., and E.O. Wilson editors. *The Biophilia hypothesis*. Island Press, Washington, D.C., USA.
- Kirkby, M. 1989. Nature as refuge in children's environments. *Children's Environment Quarterly* 6(1): 7-12.
- Klesges, R. C., L.H. Eck, C.L. Hanson, C.K. Haddock, and L.M. Klesges. 1990. Effects of obesity, social interactions, and physical environment on physical activity in preschoolers. *Health Psychology* 9(4): 435-449.
- Kuo, F.E., and A. Faber Taylor. 2004. A potential natural treatment for Attention-Deficit/Hyperactivity Disorder: Evidence from a national study. *American Journal of Public Health* 94(9): 1580-1586.
- Louv, R. 2008. *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books, Chapel Hill, North Carolina, USA.
- Mårtensson, F., C. Boldemann, M. Söderström, M. Blennow, J. Englund, and P. Grahn. 2009. Outdoor environmental assessment of attention promoting settings for preschool children. *Health & Place* 15(4): 1149-1157. doi:10.1016/j.healthplace.2009.07.002.
- McCurdy, L. E., K.E. Winterbottom, S.S. Mehta, and J.R. Roberts. 2010. Using nature and outdoor activity to improve children's health. *Current Problems in Pediatric and Adolescent Health Care* 40(5): 102-117. doi:10.1016/j.cppeds.2010.02.003.
- Moore, R.C. 1986. The power of nature orientations of girls and boys toward biotic and abiotic play setting on a reconstructed schoolyard. *Children's Environments Quarterly* 3 (3): 52-69.
- Moore, R.C. 1997. The need for nature: A childhood right. *Social Justice* 24(3): 203.
- National Park Service (NPS). 2011. *A call to action: Preparing for a second century of stewardship and engagement*. Washington, D.C. USA. Available from <http://www.nps.gov/CallToAction>.
- National Park Service (NPS). 2012. *Revisiting Leopold: Resource stewardship in the National Parks*. Washington, D.C. USA. Available from http://www.nps.gov/calltoaction/PDF/LeopoldReport_2012.pdf.
- Nabhan, G.P., and S. Trimble. 1994. *The geography of childhood: Why children need wild places*. Beacon Press, Boston, Massachusetts, USA.

- Nicaise, V., D. Kahan, and J. Sallis. 2011. Correlates of moderate-to-vigorous physical activity among preschoolers during unstructured outdoor play periods. *Preventive Medicine* 53: 309-315.
- Palmer, J. 1998. An overview of significant influences and formative experiences on the development of adults' environmental awareness in nine countries. *Environmental Education Research* 4(4): 445.
- Roe, J., and P. Aspinall. 2011. The restorative outcomes of forest school and conventional school in young people with good and poor behaviour. *Urban Forestry & Urban Greening* 10(3): 205-212. doi:10.1016/j.ufug.2011.03.003.
- Sallis, J.F., P.R. Nader, S.L. Broyles, C.C. Berry, J.P. Elder, T.L. McKenzie, and J.A. Nelson. 1993. Correlates of physical activity at home in Mexican-American and Anglo-American preschool children. *Health Psychology* (12)5: 390-398.
- Sobel, D. 1993. *Children's special places: Exploring the role of forts, dens, and bush houses in middle childhood*. Zephyr Press, Tucson, Arizona, USA.
- Thomashow, M. 1996. *Ecological identity: Becoming a reflective environmentalist*. MIT Press, Cambridge, Massachusetts, USA.
- Wells, N.M. and K.S. Lekies. 2006. Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments* 16(1): 1-24.

Appendix A

Evaluating Free-play potential

1. Is the area in question suitable for free-play?

There are no set rules for determining the potential for free-play but the following criteria are based on research and should be weighted accordingly. Discretion should, however, be used in the final judgment.

I. Accessibility

- Accessible via trail or road
 - Trail hikes must be considered light enough for children to complete easily
- Legibility- one can reasonably hope to enter an area and find one's way out (Kaplan and Kaplan, 1995)
 - clear entry points and exits
 - distinct landmarks for easy navigation
 - coherence- the scene make sense overall

II. Diversity

- Integration between vegetation and open spaces (Mårtensson, 2009)
- Topographical diversity and physical challenges
 - uneven grounds
 - objects for climbing
 - low spaces for crawling
- Elements for manipulation. Including but not limited to:
 - edible plants,
 - collectable items
- Mystery- the attribute that one could acquire more information by venturing deeper into the area and changing one's vantage point (Kaplan and Kaplan, 1995)
 - Area is marked by any of but not limited to the following attributes:
 - winding narrow trail

- meandering streams
- drastic changes in lighting that draw viewers in
- partially obstructed views
- enclosures and refuge

III. Refuge criteria

- Presence of at least one proper enclosure (refuge spaces) with some of the following attributes (Kirkby, 1989)
 - Ceiling effect (canopy, roof, etc.) is present in some enclosures
 - Sub-spaces or a high degree of complexity
 - Visual connections to surrounding environment
 - Multiple access points and “escape” opportunities
- 2 or more refuge spaces
- Varied scale of enclosures (Kirkby, 1989)
 - small-scale spaces (two to four children)
 - large , loosely joined enclosures allowing more movement and group activity

2. If the area is suitable for free-play: Are there ongoing park uses or plans for the area in question?

3. If yes: Do these uses prevent any adjustments to vegetation management or other changes?

As long as an area is suitable for free-play (1) and has management plans already in place (2) that do not prevent further modification and management changes (3), then it may be considered as a viable site for the introduction of management for free-play.

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