



National Guidelines

Nature Play & Learning Places

Creating and managing places where children engage with nature

ROBIN C. MOORE



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ROBIN C. MOORE
with **ALLEN COOPER**

Foreword by **Howard Frumkin**



NC STATE Design

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ABOUT

Founded in 2000, the **Natural Learning Initiative** (NLI) is a research, design assistance, and professional development unit at the College of Design, NC State University, Raleigh, NC. The long-term mission of NLI is “Creating environments for healthy human development and a healthy biosphere for generations to come.” The mission is implemented by engaging children and families with the natural world in the places of daily life (home, school, neighborhood), through participatory environmental design, action research, education, and dissemination of information. A key aim is to create, translate, and apply evidence to changing policies that affect children’s everyday experience in the built environment. To this end, NLI works with systems in child development, schools, parks and recreation, urban planning, public health, and nonformal education (nature centers, botanical gardens, zoos, and museums). NLI works with government, nongovernment, and private sectors in communities across North Carolina, and at national and international levels, including with prominent landscape architecture firms.

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Founded in 1936, the **National Wildlife Federation** (NWF) is America’s largest conservation organization with 49 affiliated organizations and more than four million members. NWF’s mission is to inspire Americans to protect wildlife for our children’s future. Our award-winning Ranger Rick magazine has brought the wonders of nature to generations of American children, and our Schoolyard Habitats program, begun in 1996, has engaged more than 4,000 schools across the country in the creation and use of outdoor classrooms to help children understand and appreciate the natural world. In 2008, NWF was designated as the U.S. host for the international Eco-Schools program and to date NWF has registered 3,000 K-12 schools in its Eco-Schools USA program which focuses on greening the school grounds, buildings, curriculum and student experience.

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Executive Summary

Nature Play & Learning Places: Creating and managing places where children engage with nature, offers a set of guidelines for those who create, manage or promote development of nature spaces in the everyday environments of children, youth, and families, especially in urban/suburban communities. The goal is to attract kids and families outdoors to interact directly with nature.

Children must spend more time outdoors—for their good health and the health of our planet. If children don't move enough, their bodies will not develop in a healthy manner. If children don't grow up engaged with nature, chances are they will never understand human dependency on the natural world.

Nature play is defined as a learning process, engaging children in working together, to develop physical skills, to exercise their imaginations, to stimulate poetic expression, to begin to understand the workings of the world around them.

The guidelines focus on design and management of physical settings that facilitate direct, hands-on engagement with nature in the everyday lives of children and families. As defined by the national steering committee, a nature play and learning place is:

A designated, managed area in an existing or modified outdoor environment where children of all ages and abilities play and learn by engaging with and manipulating diverse natural elements, materials, organisms, and habitats, through sensory, fine motor and gross motor experiences.

Nature Play & Learning Places is a tool for those working in the field including advocates, policy

makers, system managers, site managers, educators, program specialists, design professionals, urban planners, and developers. Seven chapters cover the following:

1. Why nature play and learning summarizes why nature play and learning is important for health and human development at the global, population, and individual levels and describes the historical precedents of community-based, children's outdoor facilities dedicated to free play and learning. The chapter provides guidance for creating and managing nature play and learning spaces in many contexts with community participation as a key element. Professionals who plan, design, and manage community environments are encouraged to include space for nature play and learning.

2. Nature play, learning, and education demonstrates how playing with and learning through nature can be a vehicle for environmental literacy and a means to advancing educational missions focused on conservation, health, stewardship, and multidisciplinary learning across science, humanities, and the arts. Stages of child development from birth to 18 are summarized and discussed in relation to design and management responses, including volunteer youth helping to manage and run programs.

3. Locating nature play and learning places discusses the idea of nature play and learning as an

integral part of urban green infrastructure, at residential neighborhood level and beyond, including city, county, and regional parks; school grounds; child development centers; non-formal education institutions, including nature centers, museums, zoos, and botanical gardens; and state and federal lands.

4. Designing nature play and learning places is the core chapter and introduces affordance, activity setting, and territorial range as useful concepts, along with creation of a design and management program as a key implementation tool. Descriptions of activity settings include entrances, pathways, plants (trees, shrubs, native perennials, permanent edible landscape, vegetable gardens), natural surfacing, loose parts, natural construction, permanent play structures, multipurpose lawns, meadows, landforms/topography, animals, aquatic settings, sand/dirt settings, gathering places, program bases/outdoor storage, signage, and boundaries.

5. Managing nature play and learning places defines effective management as a tradeoff between the needs of children to engage in exuberant play and protection of natural resources from excessive wear and tear. Projects are defined as either renovation or new construction or a mix of both, often combined with ecosystem restoration. Management should be driven by ecosystem thinking to focus attention on the quality of water, soil, and plants. Depending on context (for example, public park versus botanical garden) nature play and learning places can be designed as open or controlled access offering varied ranges of play and learning programming. Governmental or non-governmental organizations or a mix of both may manage spaces. Development may occur in phases over time as resources become available.

6. Risk management offers a risk management protocol for nature play and learning places that

accomplishes the dual goals of providing a stimulating nature play environment while ensuring that children are not exposed to unreasonable risk of harm. Concepts of hazard, risk, injury, and standard of care are defined and discussed. A risk management assessment protocol for nature play and learning spaces is presented as an eight-step process emphasizing engagement of risk managers and insurers, implementation of an inspection routine, elimination of hazards that may cause serious injury, documenting and evaluating all incidents, maintaining records of inspections and incident reports, and regular staff evaluations and systematic records of responses.

7. Implementing nature play and learning places emphasizes community-based approaches to achieving sustainability. Tools include community surveys and stakeholder workshops as the main source of project content along with participation of children in the design process. Institutions that may sponsor nature play and learning spaces are described, including parks agencies, childcare and school systems, nonformal educational institutions, and state and federal agencies. The importance of community diversity and engagement is emphasized.

Case studies gathered from across the nation, illustrate the feasibility of implementing nature play and learning spaces economically through community processes across a range of contexts.

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“Most children have a bug period. I never outgrew mine.”
—E.O. Wilson

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- Step 3* Conduct a risk assessment and eliminate hazards presenting unreasonable risk of harm.
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- Step 5* Develop an inspection routine.
- Step 6* Document and evaluate all incidents.
- Step 7* Maintain records of inspections and incident reports coupled with regular staff evaluations and recorded responses.
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Foreword

Decoding the human genome was impressive. The internet has been transformative. Big data are amazing. But a child playing in the woods? That simple, time-honored image is at once magical, and powerful, and inspiring.

We face enormous challenges—in our communities, as a nation, across the globe. While many health outcomes are improving, many are trending in the wrong direction. Asthma and allergies, anxiety and depression, autism-spectrum disorders, obesity and diabetes...these and other conditions bedevil us, and for the first time in history, today's children may not live as long as their parents.¹ At the same time, the planet itself is ailing. The impact of human activity on earth systems has been so profound, that the modern era is known as the “anthropocene”²—an era marked by frightening rates of species extinctions,³ galloping climate change, disruptions of natural nitrogen cycles, and other dangerous and unsustainable trends.⁴

How do we halt and reverse these trends? Part of the answer lies in connecting with the natural world. This deceptively simple prescription offers far-reaching benefits. Nature contact promotes human health and well-being in many ways; the evidence of these benefits is now too compelling to ignore.⁵ Nature contact promotes better stewardship of the environment;⁶ how can we care for what we do not know and cherish? And better stewardship of the environment, from the individual choices

we make each day to the policies our governments promulgate, will in turn result in a healthier planet—a fundamental requirement for healthy people, now and in coming generations.

So while this may seem to be a book about play spaces for children, it is much more. At the risk of bloviating, I would call it a book about saving the world. It offers essential guidance for designing places we need.

We need to provide our children with natural settings in which to play, learn, and thrive. We need to help them form emotional bonds with the abounding beauty of flowers and trees, rivers and streams, critters and clouds. We need them to be fascinated by these things, to grow into close and careful observers of the world around them, to feel not only appreciative but protective, and to be prepared to live their lives accordingly. This is a public health strategy, an environmental strategy, and educational strategy...and a path to the future we want.

Howard Frumkin, M.D., Dr.P.H.

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01

Why nature play and learning

“For a child to understand something he must construct it for himself, he must reinvent it ... if future individuals are to be formed who are capable of creativity and not simply repetition.”
—Jean Piaget

Children’s time outdoors and contact with nature are in sharp decline. Negative consequences include children’s reduced physical health, lack of knowledge about nature, and related misconceptions about human dependence on the natural world. The World Health Organization now recognizes the interdependence of human health and ecosystem health.¹ The positive, innate bond between human well-being and nature is supported by environmental health science.² Childhood engagement with nature is the key to cementing this relationship for generations to come.³ Learning in and through nature is an educational imperative⁴ that urgently calls for new ways to safely attract children into local, natural settings to re-integrate the experience of nature into childhood. Such action will help to set the stage for a new generation of healthy, active children growing up both loving nature and understanding human dependence on healthy ecosystems. Childhood engagement with nature is more likely to produce

conservation-minded citizens willing to care for the planet, to protect our natural resources and to recognize them as our most precious economic asset. To achieve this end, playing and learning in nature go hand-in-hand,⁵ beginning in the first year of life and extending through the several stages of childhood and youth.⁶ As Frances Kuo has emphasized,⁷ two strategies can be pursued: bringing nature to where children are and bringing children to where nature is.

A growing body of research demonstrates the negative health consequences of children’s increasing sedentary, indoor lifestyle. The most obvious result is the rapid rise in childhood obesity rates and related diseases, partly because children are not moving enough.⁸ Dire consequences for health costs and negative economic impacts are projected.⁹ If these health trends continue unchecked, children today may be the first generation with a shorter life expectancy than their parents.¹⁰ On the other



hand, research supports the many health benefits of contact with nature,¹¹ including reducing stress,¹² decreasing symptoms of ADHD,¹³ and protecting against myopia.¹⁴ Simply walking in a park¹⁵ or engaging with nature hands-on can have a positive effect.¹⁶ Exposure to native plants can boost the immune system.¹⁷ In summary, time in nature offers broad, measurable health benefits for children and, indeed, for people of all ages.

Decline in child well-being and lack of understanding about nature are not inevitable! Getting kids outdoors engaged with nature is a key health promotion initiative for people and planet that can make a major impact across the United States if the “outdoor professions” act together. *Nature Play & Learning Places* is a tool to help. By stimulating

full-body engagement, nature play extends a child’s gross motor activity repertoire, encourages exploration and therefore more walking and running, which increases physical activity and vigorous movement.

Nature Play & Learning Places is a cultural call to reframe childhood and nature, to create new types of places where children can enjoy nature play. Viewed as a genetically driven process of learning about self and surroundings across the millennia of human history, such experiences can be considered a childhood right.¹⁸ Natural settings for children’s play that previous generations took for granted must now be deliberately created.

1.1 Nature play and learning occurs when natural objects can be moved around and experimented with “to see what happens.” Movable rocks in flowing water is a classic activity setting that offers the sensory delight of bare feet in water. Notice the cooperation of boys and girl working together as they carry out their “plan.” Off-camera parents are enthusiastically watching from a distance. Imagine the parallel learning to this play. *Cincinnati Nature Center* (Case Study 6).



1.2 Nature play and learning places can be created anywhere, as here in the heart of Manhattan. Success requires the creative skills of professional landscape designers who understand that activity settings need to be comfortable and engaging to accompanying adults as well as children; here, all are immersed in a constructed landscape, where children can run ahead and explore around the next corner. *Teardrop Park* (Case Study 3).

1.3 Activity settings such as multipurpose lawns, where children can run and roll, add value to nature play and learning places. Undulations increase play opportunities, including rolling. Notice how the “loose part” colored streamers prompt activity. Can we hunt for similar colors in the natural surroundings? *Bright Horizons Family Solutions Child Development Center*.

Nature Play & Learning Places provides a tool for anyone promoting, designing and managing outdoor spaces for children and families, including the rapidly growing group of professionals who believe that motivating kids to get outdoors to play and learn is crucial for their health and for the health of the planet.

In 2005, Richard Louv's *Last Child in the Woods*¹⁹ initiated a children and nature movement and called for new ways to integrate nature into childhood to help us move from an ego-centric to an eco-centric society. *Nature Play & Learning Places* is a response. Daily opportunities for nature play and learning can help children become agents of change by applying their collective experience and understanding as a vital force for cultural realignment.



DEFINITION

The project steering committee defined a nature play and learning place as:

A designated, managed location in an existing or modified outdoor environment where children of all ages and abilities play and learn by engaging with and manipulating diverse natural elements, materials, organisms, and habitats, through sensory, fine and gross motor experiences.

Genuine nature play and learning spaces contain mainly natural materials such as plants (trees, shrubs, vines, ground covers), stones, water, dirt piles, fallen trees, hollowed-out logs, and a multitude of other natural elements designed to encourage hands-on manipulation and discovery. Natural materials provide inspiration, allowing children to shape their environment and at the same time exercise fine motor skills. Local play traditions and cultural meanings can be expressed in natural forms: tropical leaves, dirt, adobe, water, sand, snow and ice according to region.

Each season presents new, stimulating opportunities as children learn the affordances of local ecology. Sticks, grass, twigs, stones, seeds (pine cones,

acorns, maple ‘helicopters,’ honey locust and catalpa pods) amplify play opportunities, motivate cooperation through socio-dramatic play, encourage social interaction in unscripted nature games, and offer raw materials for natural building. Play in and with nature helps children learn about their inherited world. Nature play is good for children and good for planet Earth.

Nature play spaces are living systems. They add value with each passing season. They demonstrate nature’s regenerative power and the ability to recover from damage, including the impact of children’s own activities. They help children understand, appreciate, and value the ecosystem services offered by nature.

1.4 Earth play, sometimes interpreted as genetically embedded “recapitulation” of human manual interaction with the surface of the planet. Notice here the child is using a “helping stone” as early *homo sapiens* did

1.5 Green play will happen wherever opportunities arise; here, beside the sidewalk, bright yellow flowers attract sibling attention. *Wrightsville Beach, NC.*

1.6 Water play has the strongest universal attraction to children and can be designed and managed according to age group and context. Here, a group of teens have walked the Riverside Park trail to their favorite spot to fish and enjoy the green infrastructure. *Spruce Pine, NC.*

1.7 Exuberant nature play spontaneously erupts when children realize adults approve—and even join in the action. Notice here kids are taking the lead with enthusiastic adult behind. *Nature Play Corps* (see insert, pp. 46-51).



CHILDHOOD, FREEDOM, AND CONTROL

“Healing the broken bond between our young and nature is in our self interest, not only because aesthetics or justice demands it, but also because our mental, physical, and spiritual health depends on it.” —Richard Louv

Engagement with nature raises long-standing issues about the meaning of childhood: freedom and control; integration of play, learning, and education; and hands-on nature experiences that can help children flourish in body, mind, and spirit. As discussed by progressive education philosophers such as Froebel, Montessori, Dewey and Rousseau, engagement with nature is considered essential to education. For them, the ethos of nature play is freedom of expression and creativity in spaces that allow children to work together using close-at-hand materials to create new things and to shape new meanings to places already inhabited.

An abundance of natural materials can release children’s imaginations to co-create, invent drama, build stories, and negotiate with other players as bodies and minds interact in the self-directed,

collective processes of active play. For children whose exuberant, creative learning styles are not well adapted to indoor classrooms, access to rich outdoor, hands-on natural settings may allow them to excel through self-expression and group leadership.²⁰

By working together with adults to create nature play and learning spaces, children will gain a sense of ownership and respect. Particularly in institutions such as childcare centers and schools that may be subject to strict regulation, adults have a responsibility to promote the value of nature play and learning, to provide children with opportunities for exercising freedom and control, and to help them acquire a sense of environmental stewardship and responsibility.



1.8 Summer camp, that great American tradition, includes many attributes of safe risk-taking in natural settings. What are the lessons learned that could be implemented in close-to-home places to keep the spirit of adventure alive year-round?

PRECEDENT

Historic but very different developments on both sides of the Atlantic provide a frame of reference for the current push for the creation of places for nature play and learning.

Summer camps in the United States were first introduced in the 1880s as part of a back-to-nature trend developing since the middle of the 19th century.²¹ Established youth organizations such as Boy Scouts of America, Girl Scouts of the USA, Camp Fire, 4-H, Jewish Community Centers Association, the YMCA, and religiously affiliated groups offer camping experiences as an integral aspect of their organizational mission. Recent surveys conducted by the American Camp Association, indicate that approximately 7,000 resident (overnight) and 5,000 day camps currently operate in the U.S. Of the 12,000 total, approximately 9,500 are run by nonprofit groups, including youth agencies and religious organizations, and 2,500 are privately owned independent for-profit operations. Since 2002, the number of ACA-accredited resident camps increased by 21% and day camps by 69%. Annually, more than 11 million children and adults

attend camps in the U.S., which employ more than 1,500,000 staff, 20% from other countries. More than 80 percent of ACA-accredited camps offer co-ed programs.²² This American nature-based tradition represents great potential for continuing to activate and promote spaces for nature play and learning.

On the other side of the Atlantic, philosophies of childhood based on freedom and creativity inspired practical models of children's nature play and learning spaces beginning in northern Europe and Scandinavia after the Second World War. Professionals developing these models, which spread worldwide, including to the U.S., believed the unique attributes of nature engagement could support healthy, holistic child development beginning early in life.

1.9 *Berkeley Adventure Playground* (Berkeley, CA) is the real thing, with an excellent safety record defying conventional wisdom for more than 30 years. Facilitated by professional playworkers, freedom, risk, and adventure are primary themes.

1.10 The pioneering *4-H Children's Garden* at Michigan State University was the first in the country to recognize children and families as a legitimate group of public garden visitors motivated to learn through play in settings specifically designed for them. *Peter Rabbit* (illustrated here) demonstrate how children's literature and cultural themes can be meaningfully embedded in the landscape.

1.11 The *Hamill Family Play Zoo* (Brookfield Zoo, IL) was the first in the country to create playful outdoor settings to help children develop an emotional attachment to nature. Here, Play Partners apply playwork principles to facilitate the "Animal Homes Adventure Play" setting.

Adventure playgrounds started in the 1940s in Copenhagen, created by Danish landscape architect C Th. Sørensen, focused on earth, water, fire, gardens, a free-form landscape, and farm-yard animals (sheep, pigs, geese, ducks, chickens, rabbits, and donkeys).²³ The main idea was an enclosed space with opening hours where children could build their own community, facilitated by skilled playworkers²⁴ responsible for supplying scrap materials and tools, and administering risk management protocols. Some form of "hut" or "clubhouse" is essential to serve as a place for kids to meet, to play indoor games in bad weather, as an administrative office, and as community meeting facilities.²⁵ The model was imported to London at the end of WWII by landscape architect Marjory Allen. On the U.S. side of the Atlantic, an adventure playground has been continuously in operation in Berkeley, California, for more than 30 years.²⁶

The most recent precedents are both U.S. innovations: children's gardens and play zoos, which have steadily grown, beginning in the 1990s.

Children's gardens have been around for centuries and first began in the U.S. as school gardens in Boston in the 1890s. The first children's garden in

a botanical garden in the world was inaugurated at the New York Botanical Garden in 1914. A new era of children's gardens in the U.S. is attributed to Jane Taylor, founder and first curator of the extraordinarily successful 4-H Children's Garden, which opened in 1993 at Michigan State University.²⁷ The new model, "making plants the central feature and relevant to children's everyday lives, was designed with physiological and developmental appropriateness for very young children into early adolescence,"²⁸ inspired a children's garden movement in the U.S., which has spread to other countries. Children's gardens have been developed in botanical and other types of public gardens in the United States. Many outstanding children's gardens have been created to entice appreciation of the natural world and teach about plants, vegetables, and flowers, but they are sometimes not conducive for hands-on, free nature play.

Play zoos, again a recent development, which grew out of the longer history of children's/petting zoos, are focused on nature (animals and plants), particularly in the local region where the zoo is located. The original model, the Hamill Family Play Zoo, which opened in 2001 at the Brookfield Zoo near Chicago, is based on developing an emotional





1.12



1.13

relationship between children and nature facilitated by a team of trained Play Partners (based on the playwork approach).²⁹ The model has since spread to many zoos in the U.S, most recently to the North Carolina Zoo (see kidZone, Case Study 8).

Urban/city farms or children's farms

took hold in the Netherlands, Germany, and the U.K. beginning in the 1970s. They vary greatly in size and facilities. Some are stocked with farmyard animals, horses and ponies for riding. Some focus on gardening. Older children are usually responsible for feeding and day-to-day care of animals. An onsite café is typical, serving visitors simple meals from farm produce.³⁰ "The Farm" or Crossroads Community, developed in San Francisco during the same period by artist Bonnie Sherk and Jack Wickert, was a remarkable achievement that included community and medicinal gardens, an animal theater, a winter "hibernation festival," and many community engagement events—all captured on a 40-minute video essay.³¹

Playworkers and other creative professionals manage adventure playgrounds and urban farms. Their

primary role is to facilitate play and creative activity rather than direct it. Playworkers subscribe to a philosophy of children's self-determination, consider play as crucial to healthy development, recognize the fundamental link between playing and learning, see nature as a space for free, creative expression, and recognize community engagement as a key to success.³²

Forest kindergartens, nature-based preschools, and forest schools

are more recent models in the formal education sector with nature engagement as a core mission. Founded in Denmark in the late 1950s, with Germany following in the late 1960s, variations on the model have spread to the U.K., Japan, Canada, and the United States.³³ Examples vary from those with minimal buildings, where children spend all day outdoors in all types of weather, to those where children are housed in normal school facilities but take frequent, day-long trips to a nearby forest. Judging from online activity (articles, videos, blog posts, etc.), there is a rising interest and modest growth of programs on the ground in the U.S. (See pp. 61-65).

1.12 *Windmill City Farm*, central Bristol (pop. 430,000), UK, founded 1976, offers educational, recreational and therapeutic experiences including farmyard animals, community gardens, picnic area, café serving home-made food, an adventure playground, nature-based courses, community meeting spaces, and nursery school for children 9 months to 5 years. Garden and farm-reared produce is sold in the farm shop.

1.13 Children enjoy playing and learning outdoors, year round, at *Chippewa Nature Preschool*, founded 2007 at the *Chippewa Nature Center*, Midland, MI.



1.14



1.15



1.16

AUDIENCE

1.14 Policy makers and advocates may be convinced of the impact of nature play and learning on the wellbeing of children if they see it demonstrated. Here, a superintendent of schools expresses enthusiastic endorsement after watching a play program in the local “bamboo forest” and its joyful impact on elementary school kids.

1.15 Site managers serve a critical role and source of reliable information about potential relations between users and environments. Here, a National Wildlife Refuge manager explains to a group of summer interns the agency mission and key species habitats—how they could inspire play programming to support educational goals.

1.16 Educators (formal and nonformal) and play professionals appreciate nature as a vehicle for play and learning but may lack management guidance to make the best use of the site. Here, a museum educator is able to playfully explore the diverse, museum landscape, designed for play and learning.

Nature Play & Learning Places is for professionals responsible for outdoor spaces used by families and children, including homeowner associations, public housing authorities, and neighborhood associations; urban park systems; school and childcare center outdoor play and learning environments; regional authorities administering county and state open space resources; federal agencies managing public lands and monuments; and nonformal education institutions, including museums, zoos, arboreta, and botanical gardens.

For policy makers and advocates (community leaders, parks board members, school board members, boards of trustees, elected officials), *Nature Play & Learning Places* introduces the nature play and learning paradigm and offers up-to-date information based on experience of the Natural Learning Initiative (NLI), North Carolina State University, and dozens of national nature play and learning space collaborators.

For system managers, particularly of park systems and schools (where the children are), *Nature Play & Learning Places* provides a set of principles and guidelines for design and management of natural environments to support nature play, learning, recreation, and education.

For site managers, *Nature Play & Learning Places* offers detailed information to guide project implementation and site management.

For program developers, *Nature Play & Learning Places* was created to inspire thinking about how the natural environment could be used as an active partner in creating dynamic play, learning, educational, and recreational programs.

For educators, *Nature Play & Learning Places* offers guidance for those working in schools and early child development centers; in parks; in arboreta, nature centers, and public gardens, including children’s gardens; in zoos and museums, including children’s museums; in county, state, and federal public lands; in summer camps and vacation resorts.



For design professionals, including urban designers, landscape architects, architects, and transportation planners/engineers, *Nature Play & Learning Places* addresses integration of nature play and learning into the urban public realm (those spaces freely accessible to citizens, including streets, urban plazas and parks, greenways and trails, former industrial sites, and all manner of “left over” urban space).

1.17 Design professionals are highly skilled at assembling teams to solve design problems but may lack full understanding of nature play and learning space programmatic *content*, matched against budget and site constraints. Site layout or *form* is also important, including circulation, entry sequence, location of areas by age, location of settings by play and learning function, position of social spaces, and topographical form. The schematic design above illustrates both content and form in relation to three designed-from-the-ground-up areas: Infant/Toddler, Preschool, School-age, and (left) a lightly-on-the-land looping system of pathways and “Play Pockets” to convert the existing woods into a nature play area. *Fillmore Discovery Park* (Case Study 7).



1.18 Urban designers, city planners, and transportation professionals also think about environmental content and form but at a much larger scale. Here (map 1.18a), the example is Vancouver, Canada, recognized for its citywide pedestrian, bicycle, and public transit systems and innovative, green infrastructure policy, all of which provide access to a multitude of nature play and learning opportunities, including rough, playable, urban open space (photograph 1.18b).

For urban planners and developers involved in the transformation of post-industrial cities, Nature Play & Learning provides a tool to help justify nature play and learning spaces within new green infrastructure developments, including restored ecosystems in former industrial zones. The U.S. has the largest population of any nation in the industrialized western world and one of the highest levels of urbanization.³⁴ The current generation entering the workforce appears more interested in urban living than previous generations, along with empty nesters and retirees moving back to the city. However, to keep the urban option attractive when the younger cohort starts having families will require more focused, proactive, long-term policy targeting housing and schools, to support development of an intergenerational urban community.

SCOPE

By recognizing and learning from existing models and their historic roots, key intentions are:

1. To provide practical guidance for creating and managing nature play and learning spaces in all applicable contexts.
2. To recognize the crucial importance of community participation for sustainability and cultural change.
3. To emphasize the role of design as an intentional, goal directed intervention in the physical world to improve its ecological and social/cultural value.
4. To aid institutions that serve children and families by demonstrating how nature play spaces support child development and learning, including children with special needs.
5. To support nature-based institutions by demonstrating to local policy makers how direct experience of nature advances educational missions focused on science, conservation, health, and stewardship. Included here are nature centers, natural science museums, botanical gardens, arboreta, nature preserves, wildlife refuges, and zoos.
6. To encourage professions that plan, design, and manage community environments (residential neighborhoods—including public housing, parks and open space, multiuse urban developments, downtown areas, and the urban public realm at large) to consider possibilities for nature play and learning. ■

Nature play, learning, and education

“Education is the point at which we decide whether or not we love the world enough to assume responsibility for it.”

—Hannah Arendt

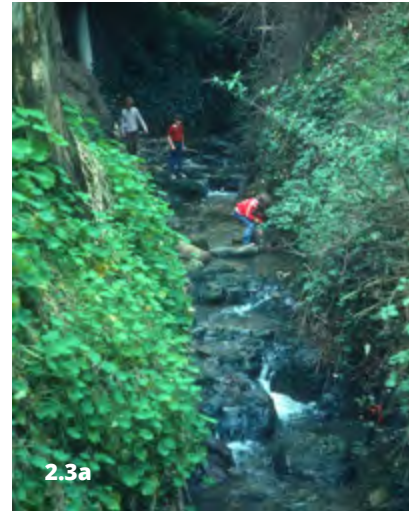
2.1 Middle childhood (8-12 years) embraces the halcyon years when children are fully competent to engage with nature from every perspective—from the aesthetic to the scientific, the literate to the dramatic, the intimate to the grandiose. Here, two boys observe a box turtle in a forest preserve. *Alligator River National Wildlife Refuge, NC.*



Because nature play spaces may be developed within educational institutions, play, learning, and education are considered here as a continuum of learning *through* nature. Rooted in hands-on, spontaneous play and exploration, sensory learning happens when children dam a stream, turn over rocks to find life underneath, observe sunlight dancing through swaying leaves, follow scurrying ants salvaging eggs from a disturbed ant hill, stroke the mossy surface of shady ground, bend pliable stems to roof a den, gather sticks to make a fire, smell the air following a rainstorm, watch a lizard dart across a rock, and the myriad other ways of engaging with nature. Hands-on nature play experiences such as these are retained in vivid memories, often for the rest of life.³⁵ They lay the groundwork for formal learning and provide motivation to study living systems.³⁶



2.2



2.3a



2.3b

Science and the arts offer dozens of historical examples of the link between the unique power of direct experience of nature in childhood and a passion for nature in adulthood. E.O. Wilson in his autobiography, *Naturalist*, describes how, as a 9-year-old he “pulled away the bark of a rotting tree stump” in Rock Creek Park, Washington, DC, and discovered “a seething mass of citronella ants” that “left a vivid and lasting impression on me.” Wilson later became a Harvard entomologist and world expert on ants. In *Thunder Tree*,³⁷ naturalist Robert Pyle connects his messing around in a Denver drainage ditch to his scientific passion for butterflies.

Environmental psychologists Rachel and Stephen Kaplan developed “Attention Restoration Theory” to explain the beneficial effect of human encounters with nature. For them, the “soft fascination” of experiencing nature engages effortless “involuntary attention” that produces a sense of relaxation and promotes recovery from mental fatigue.³⁸ Afterward, individuals can concentrate better. What if every school had a “time out” nature play and learning space, where children could recover from pressure-cooker classroom stress and return with improved concentration for the next activity?

2.2 Opportunities for children to daydream in nature have greatly diminished over the last two generations, possibly to the point where the idea may seem archaic. Hope lies in new types of institutions offering unbounded opportunities for nature engagement. Here, a forest kindergarten child sits on a sandbank, quietly singing to herself, immersed in nature, entranced by the gentle sound of running water and the delicious sensation washing her feet. *Munich City Forest, Germany.*

2.3 Where can kids find places in the city to mess around in nature away from adult eyes? Here, a group of friends, below street level, explore the infinite play potential of an urban stream and at the same time appreciate the erosive power of water. *Berkeley, CA.*



2.4 The “Six Cs” (described to the right) provide criteria for evaluating the motivational quality of nature play and learning activity settings. Here, the damp, rocky, gravelly ground surface, with water vaguely running through, is enough to motivate all six. *Curiosity* is prompted by stones to turn over; *choice* is afforded by sizes/shapes of stones, gravel, and sand; *content* is the discovered organisms harbored underneath; *collaboration* is self-evident in the playful exploration group; the large rocks are surely a *challenge* to turn over; *context* is what the kids take away from the experience in new friendships, reinforced or new skills learned, observations made, new projects planned at home or school.

2.5 To create a complex 3-D, nature play and learning landscape requires design ingenuity. Here, huge boulders have been used to create a complex, 3-D landscape, challenging young bodies to maneuver, reminiscent of a Sierra Nevada mountain stream (small, recirculating stream is off camera). *Santa Barbara Museum* (Case Study 3).

LEARNING THROUGH NATURE

Nature also offers educators a context for an interdisciplinary approach to multiple subject areas, including learning about nature. Educational programs conducted in nature tend to provide a greater range of options better matched to children’s varied learning styles and personalities than do programs limited to indoor classroom activity.³⁹ The learning-through-nature approach to education or learning naturally supports the 6Cs of intrinsic motivation. The number and names of intrinsic motivation C’s varies in the literature. Here we choose six that apply:⁴⁰ Curiosity, Choice, Content, Collaboration, Challenge, and Context.

Curiosity is the intrinsic force of a child’s playful interaction with the physical world. Choice is freely donated by nature’s diversity and change through time, which provides infinite, equal opportunity—an antidote to boredom. Content is the thing itself, worms under logs, giant leaves, sweet-smelling flowers, the way water ripples over rocks, the varied textures of soil, ad infinitum. Collaboration is the way nature brings children together to explore an idea, to execute a project, to make friends through constantly changing shared experience. Challenge exercises agency and self-efficacy, as the child alone and children together take risks, continuously test the limits of their understanding of how things are and thus learn how the world works. Context refers to the transfer of skill and understanding between situations and surroundings, from nature play and learning space to classroom, to home, to other friends in other places.

Nature play is intensely physical, obligating the body to move through space: up, down, in, and around, which positively affects hands-on, active learning.⁴¹ Intrinsic motivation, the essence of free play, drives engagement, whereby children acquire deeply grounded environmental values attached to experience and a core of knowledge.

Frequent visits to a richly endowed nature play space for adventures with friends helps a child to know the place, to understand what goes on there, how it works, and how its many attributes behave through the day and through the seasons. As Robert Pyle so eloquently asserts, hands-on childhood experience helps us understand the natural world as an interactive system.⁴²

SUPPORTING ENVIRONMENTAL LITERACY

According to the North American Association for Environmental Education (NAAEE), “Environmental education (EE) teaches children and adults how to learn about and investigate their environment, and to make intelligent, informed decisions about how they can take care of it.” Further, “EE is taught in traditional classrooms, in communities, and in settings like nature centers, museums, parks, and zoos.”

Environmental literacy, a key outcome of effective EE, came into common usage following the publication of David Orr’s book, *Ecological Literacy*.⁴³ In the proposed bi-partisan No Child Left Inside Act of 2013 (H. R. 2702), environmental literacy is defined as “a fundamental understanding of ecological principles, the systems of the natural world, and the relationships and interactions between natural and man-made environments.” (See Appendix A.) NAAEE defines an environmentally literate person as “someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life.”⁴⁴ The primary elements of environmental literacy are described as cognitive (knowledge and skills), affective and behavioral, and interactive and developmental in nature; meaning, individuals develop along a continuum of literacy over time and are not either environmentally literate or illiterate.⁴⁵ A majority of states have developed or are developing a *State Environmental Literacy Plan*, as described in H. R. 2702.

Nature play is a means for activating the experiential, affective domain in environmental literacy, which appears underplayed across the field of EE. Theories of experiential education contend that cognitive learning in early and middle childhood can be more effective if preceded by spontaneous play, free exploration, and direct, personal discoveries in nature.⁴⁶ If not, later stages of cognitive development, served only by “disembodied,” abstract knowledge from indirect, secondary sources (print

and visual media), will be less likely to motivate the kind of strong personal convictions that lead to environmental action. Psychologist Edward Reed presents compelling support for this point of view.⁴⁷ Ruth Wilson suggests that the sensorimotor experiences of nature play early in life are more likely to become deeply embedded in a child and establish a foundation for cognitive understanding as capabilities of symbolic thought mature.⁴⁸

To be effective, the “continuum of literacy” referred to above must be paralleled by a spatial continuum of natural settings within the child’s expanding



2.6 Sensory exploration of nature, beginning in early childhood, is an important, if not crucial, pre-cursor to later deep understanding. Here, as part of the annual *Magic in the Garden* family festival, a preschooler, festooned with the vine crown (“green princess”) of a previous activity, is deeply engaged in earth play conveniently framed in a raised planter. *North Carolina Botanical Garden, NC.*

2.7 Literally getting “into” nature early in life, feeling comfortable and unafraid (child and parents) is obviously a key first step towards becoming an environmentally literate citizen. Here, the picture speaks for itself through the joyful expression on the child’s face. *Nature PlayScape, Cincinnati Nature Center* (Case Study 6)



2.7

2.8 For close-up, extended observation of small critters, a form of container suitably up-fitted helps. Here, the volunteer high school docent is using an observation box with a group of children after they have “hunted” for similar species along the Insect Walk. *Hamill Family Play Zoo, Brookfield Zoo, IL.*



2.8

2.9 Using tools to extend observational skills and awareness of specifics in nature can also start early in life with adult guidance. Here, a knowledgeable parent guides use of binoculars to look at birds close up, which is otherwise difficult to achieve for children.



2.9

2.10 Dramatizing animal life taps into children’s imaginative powers and motivate them to start understanding animal-habitat interdependency—and have fun! Here, a child has made butterfly wings to “be” a butterfly flitting through the landscape, sampling the nectar offered by the flowers. *Hamill Family Play Zoo, Brookfield Zoo, IL.*



2.10

2.11 Hands-on experience with small critters is especially engaging for children and can be surprisingly simple to arrange. Here, the leaf insect has been attracted to a sunny spot on the ground for all to observe. *Hamill Family Play Zoo, Brookfield Zoo, IL.*



2.11

territorial range (discussed in Chapter 4), in and around the child’s home and immediate residential neighborhood. Here, parents, neighbors, and peers act as informal educator/companions. Beyond home, nature play and learning spaces located in child development centers, schools, and nonformal education institutions can extend the continuum of ecosystem experiences. By working with children and families, environmental educators extend the meaning of nature play and learning experiences to help the next generation become environmentally literate, to acquire strong environmental values, and move human culture in a more sustainable direction.⁴⁹

WELCOMING A CONSTELLATION OF USERS

Nature play and learning spaces reach out with open arms to the whole community of users: children of all ages, including in the first months of life; accompanying parents and elders; independent youth and youth groups; all cultures and ethnic backgrounds; people of all abilities and those with special needs; childcare, school, and summer camp groups; boy and girl scouts doing badge work; home-schoolers; out-of-towners; the list goes on. The one commonality is a passion for nature play.

Children grow and develop in genetically driven stages with variations according to individual personality, family relations, socioeconomic circumstances, cultural traditions, climate, and more. Typical stages described in the literature are early childhood (birth to 8), middle childhood (8 to 12), preadolescence (12 to 14), and adolescence (14 to 18). To cover the full spectrum of childhood and to attract repeat visits, nature play spaces must be designed and managed to support the continuity of developmental stages. Current research suggests the following expected outdoor behavior and environmental requirements for each developmental stage, including early childhood, middle childhood, pre-adolescence, and adolescence.

Early childhood which includes infancy, toddlerhood, preschool and early school years (*pre-K to 2nd grade or Montessori Children's House, 3-6 years old*), covers the most crucial period of individual human development.

Infancy (*includes "year zero" and subsequent months of crawling and the first hesitant steps toward "toddling"*). Greenman (p. 241),⁵⁰ calls infants and toddlers "sensory motor scientists who systematically investigate their world using their scientific tools: mouth, eyes, skin, ears, and whole body muscles." If not handled wisely, a baby's first experiences with the natural world may be negative, which could affect future understanding. Spaces are needed for positive, "active exploration" close to adults. Also, recognizing that infants and toddlers



put objects in their mouths, play coordinators must carefully inspect and assess spaces designated for this age group from this perspective as part of the risk management protocol (see Chapter 6).

Recognition of the importance of outdoor experience of nature starting in the first year of life is quite recent in the field of child development and is still not mainstream in research or practice.⁵¹ For the crawling-learning-to-walk child, ground-level quality is critical. Designated spaces can be small, intimate, enclosed with a gate, and have a simple layout. Clean, unitary ground surfaces are required without plant scraps or mulch that could stick to clothes or be mouthed. Possible settings include an undulating lawn to challenge balance, and pull-up rails to practice standing. Sensory stimulation could

2.12 Welcome to the planet! Here, an infant just learning to walk is mesmerized by the grasshopper alighted on the stump. The child testing his balance resembles the grasshopper behavior. *Bright Horizons Family Solutions Child Development Center, NC.*



2.13

From birth, children discover through moving themselves about and manipulating materials about them. The prime concerns of a baby are interaction with others and to be in a position to explore, hence the strong drive to reach, sit up, crawl and walk. This discovery continues until the three- and four-year-old wants to understand such concepts as 'near and far', 'heavy and light', 'lines and curves.'⁵²

2.13 Toddlers like to "interact with stuff," says Jim Greenman. Here, these children, just beyond "parallel play," are engaged in an endless cycle of exploring all the possible permutations of sand, "tools" for manipulating it, the log surfaces, gaps between, and the straw mixed in. *Shepherd's Way Day School, Asheboro, NC.*

include a patch of textured flagstones interspersed with "steppable" plants selected for their strong texture, color, and fragrance. Comfortable, adult seating centrally placed to ensure close contact is essential as is dappled shade during the summer to provide comfort and sun protection for children and adults. A water feature can offer the sound of

falling water and opportunities for hand splashing. A diaper changing station with sink and running water is always appreciated, as well as screened seating for nursing mothers.

Toddlerhood (approximately 18 to 36 months or once the infant has learned to toddle). In



2.14 Children at the upper end of early childhood (6-7 years old), should be sufficiently skilled to range freely, to engage with nature in urban parks and open space, often in the company of older siblings or friends or caregivers in the same vicinity. Here, two seven-year-olds are playing hide-and-go-seek in the complex, three-dimensional landscape of *Teardrop Park, NYC* (Case Study 3).

toddlerhood, spatial exploration expands dramatically. Parallel play (children playing next to each other rather than with each other), dominates because children are still discovering themselves as individuals. Greenman describes how the toddler is “each day practicing and expanding physical skills: climbing, sliding, swinging, hanging, jumping off, and tumbling” (p.242).⁵³ Bilton underscores opportunities for such movement as “probably the most crucial mode of learning” (p.30).⁵⁴ Movement sequences can be created through the three-dimensional design of pathways, ground surfaces, and plant placement to stimulate basic spatial relations of up/down, in/out, over/under/on, around/through.

Toddlers like to interact with “stuff,” to “carry/transport, fill/dump, splash, stack/pile/knock over, take apart/put together, sort/match, put in/take out, and paint/smear” (Greenman, p.242).⁵⁵ They look for, watch, and inspect. Natural objects and plant parts available in the setting, or toys and objects brought to the space by caregivers can help toddlers accomplish this. Nature play and learning spaces for toddlers can be provided as an extension of infant spaces, which will help parents supervise siblings and their friends. As toddlers continue to actively explore through their senses, they require an expand-

ed territory, including more diverse spaces with increased richness of plantings and natural objects. Two year olds begin to transition from toddlerhood, become more competent and confident, but still engage in parallel play as they continue the process of “individuation” (learning the difference between “me” and the external world) and do not fully understand “sharing.” To avoid conflict, ensure multiples of everything. Twos may still be in the process of toilet training, which once accomplished will allow freer movement. Some parents may feel comfortable letting their 2-year-olds “off leash” to explore larger-scale spaces shared with older age groups.

Preschool, into elementary years (*approximately 3 to 7 years old*). Preschoolers move beyond self-centered, parallel play into a more cooperative social world where creative, spontaneous action serves as the socializing process through which they learn the benefits of give-and-take. Preschool is the critical age for beginning to learn lifelong habits. Children this age should be able to confidently explore nature. Observational skills become developed. As rapid brain development is still underway, sensory stimulation through play can further contribute to neurological development before windows of opportunity close.⁵⁶ Since preschoolers

2.15 Middle childhood is the “hunter-gatherer” age according to David Sobel, a time for engaging with nature full-tilt, using skills of observation, naming, classifying, counting and describing. Exposed appropriately, kids can be turned on to science. Here, two girls are collaborating on an insect safari using a butterfly net next to a bed of diverse, flowering, native perennials (plant them and critters will come). *Minnesota Waldorf School, Maplewood, MN.*



construct their world through experience, it is essential to present them with situations we want them to believe in. Qualities such as peaceful, beautiful, ordered, and responsive can be embodied in nature play and learning spaces through careful design and management.

Preschoolers have more strength, skill, and confidence. They “build, construct, tear down, destroy, pound, knead, shape, sculpt, dig, sift, burrow, and experiment” and “exercise curiosity, wonder, ask questions, explore, discover, and pretend.” (Greenman, p.242).⁵⁷ The changeability and unpredictability of nature are “key qualities that support self-organized, open-ended play—allowing adults to step aside” (Bilton p.31,⁵⁸ referencing Stephenson). For these experts, outdoors is where playing, learning, and education become a unified process allowing preschoolers’ imagination and creativity to develop unimpeded, where collecting, sorting, classifying, questioning, and experiencing cause and effect support early science learning.

Five-year-olds enter kindergarten but are still considered to be in early childhood through second grade. At this age, children need to take charge of their own experience, to be challenged intellectually, socially, and physically. They “need opportunities for risk-taking and daring, for construction, experimentation, and problem solving” (Greenman, p.243).⁵⁹

Conducted in nature, these activities develop teamwork and a sense of responsibility, and can increase environmental awareness.

Middle childhood (*approximately 8 to 12 years old, overlaps with preadolescence*). Children this age need similar opportunities for nature activities as their younger peers but larger in scale. This stage of childhood typically extends longer for boys than girls because of the earlier onset of puberty and adolescence in females. Children in this age group create strong friendships, especially of the same sex, and want to belong to a group to feel socially secure. They enjoy being outdoors in

attractive, easily accessible, diverse spaces where imaginations can be exercised in activities that they see as adventurous—that support growth of confidence through autonomous action (fort-building for example). This is especially true for under-privileged children who may lack opportunities for independence away from home. Nature play and learning can help equalize opportunities for underserved children, particularly in science and the arts. Children this age need a space large enough to pretend to be “lost”—an attribute defined by landscape qualities such as topography, tree cover, and distribution of understory vegetation. David Sobel calls middle childhood the “hunter gatherer” age, when territory expands and the collection and classifying of natural objects is popular.⁶⁰ Beginning at this age, clubs linked to nature play and learning at museums, zoos and botanical gardens provide opportunities to build relationships with educators who, as Rachel Carson suggests (and research supports), can help individuals become inspired by nature through working with a knowledgeable adult in a rich, natural environment.⁶¹

Preadolescence (ages approximately 11 to 14, preadolescence, puberty, and the beginning of adolescence). For young people, this is a period of

rapid physical, social, and psychological change. Preadolescent introspection, the search for personal identity, the quest for the meaning of life may find expression through interaction with nature in poetry and drama. Self-expression is also important, and may be inspired by nature through writing, poetry, drawing, painting, sculpture, and music. Through active involvement with the natural world, young people learn deep concentration and experience the joy of accomplishment,⁶² which may create a sense of on-going attachment to a nature play and learning space, resulting in multiple visits to continue working on projects or venture into new ones. Visionary educator Maria Montessori developed learning processes grounded in nature for adolescents.⁶³

Adolescence (approximately 15 to 18 years old). For some adolescents, a nature play and learning space may serve as a “nature club,” as a medium for healthy inter-gender understanding and relationships, a community service opportunity, a viable place to volunteer, an alternative to organized sports, and/or an inspiration to study the expressive arts or science. It may be a place for meaningful adventure and risk-taking as a rite of passage into teen culture.

2.16 For pre-adolescents, nature play and learning places can serve social needs, stimulate interest in conservation and environmental issues, help youth feel useful, and at the same time provide opportunities for emerging leadership skills. Here, a youth group enjoys time together scavenging litter from an urban stream. *Walnut Creek Wetlands Center, Raleigh, NC.*

2.17 For adolescents, nature play and learning places provide opportunities for contributing to programs and site management, including skill development. Here, young adults and youth are working together preparing the area for a children's nature play program. *Nature Play Corps, Alligator River National Wildlife Refuge, NC* (see insert, pp. 46-51).



2.16



2.17

LINKING CHILD DEVELOPMENT TO DESIGN

Three inter-related concepts: *activity setting*, *affordance*, and *territorial range* have proven useful to designers interested in intentionally linking the physical attributes of space to predictable human activity.⁶⁵ Applied together, the concepts are particularly helpful for designing spaces for children, and provide managers with a useful framework for specifying functional requirements, comparing levels of use, estimating investment costs, and shaping design and management strategies.

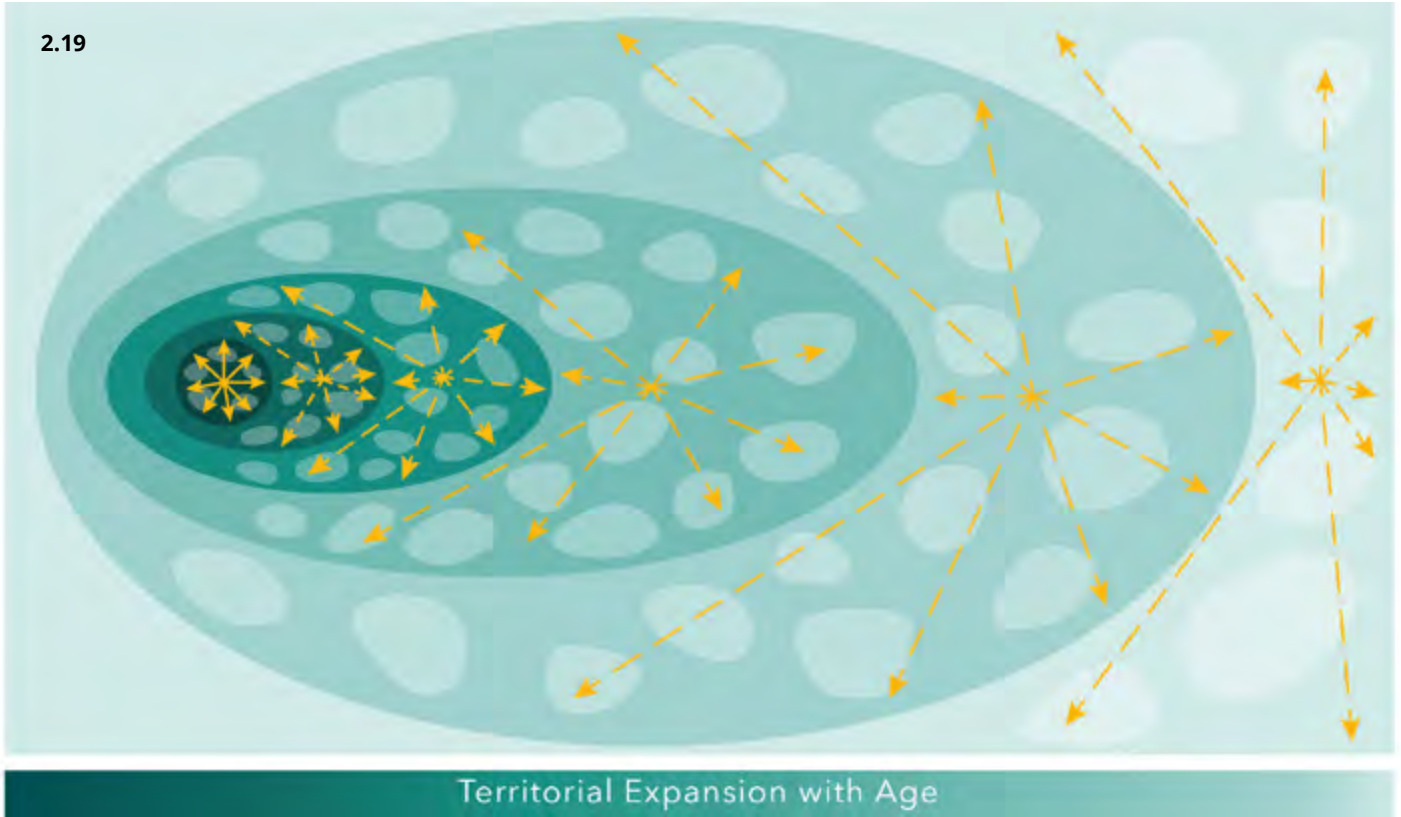
Affordance is “a quality of an object, or an environment, which allows an individual to perform an action.”⁶⁶ The concept helps us understand how children “read,” interact with, and learn the functional properties of the environment to serve their needs.⁶⁷ Environmental affordances are perceived and acted upon as “playable,” “runnable,” “jumpable,” “climbable,” etc., by individual kids. By repeating playful interactions over time, kids “pick up information” and learn the activities that spaces and places have to offer, which may be a function of the layout (pathways, topography, location of settings, etc.), objects (tree, shrub, log, rock, hole, wildlife, drinking fountain, bridge, etc.) and events

(social interaction, game, weather, activity program, etc.).⁶⁸ As children learn affordances, the experiences become embodied as skills and understandings of the world that support ever-deepening feelings and relationships between child and surroundings—in memories that can last a lifetime. Affordances must be discovered, tested and “actualized” by the child or children acting together. Many objects offer multiple affordances or many require a related object to be actualized. When a child first picks up a stick, she or he does not instantly understand all possible actions it may afford, for example as a digging tool combined with dirt (digable), as a device to run along railings

2.18 Adult attitudes and understanding of territorial behavior and children’s need to develop skills in spatial awareness vary greatly. Beyond infancy, children can begin to explore the “great outdoors” (to borrow a phrase from Mary Rivkin) accompanied, of course, by adults. Here, two toddler friends, exploring (with parents) a complex, highly differentiated, intimate, unbounded landscape must feel that it goes on forever. *Teardrop Park, NYC* (Case Study 3).



2.19



Territorial Expansion with Age

Infancy

Sensory exposure to the wonders of nature.

(Birth–18 months)*

- Intimate, small-scale, multi-sensory surroundings.
- Ground level exploration of diverse surfaces and objects.
- Sitting, crawling, learning to walk, exercising body control.
- Uneven ground surfaces challenging.
- Overhead objects stimulate eye exercise.
- Reaching to objects.
- Listening, imitating natural sounds.

Toddlerhood

Differentiating natural objects and phenomena.

(18–36 months)*

- Expanding territorial scale.
- Additional motor skills: run, jump, balance, pedal.
- Ground level activity still important.
- Hands-on sensory exploration/experimentation.
- Observing, following small creatures, insects, birds.
- Naming objects, plants, animals, weather.
- Learning where food come from.
- Parallel play changes to small group interaction.

Primary School

Discovering and understanding the great outdoors.

(3–7 years)*

- Greatly expanded territorial scale.
- Spatial limits negotiated with adults.
- Motor skills extend movement complexity.
- Risk-taking, daring.
- Social, cooperative play, shared experience.
- Discover, understand cycles of life, seasons.
- Gardening.
- Enjoy children's nature literature.
- Cultural expression of nature in music, drama.

Middle Childhood

The halcyon days of childhood in nature.

(8–12 years)*

- Territorial scale highly variable.
- Can navigate residential neighborhood and beyond.
- Bicycle riding, skating, sledding, climbing, etc.
- Interest in collecting and classifying natural objects.
- Want to feel useful.
- Construction skills.
- Motivated by hands-on, ambitious STEAM projects.
- Creativity, imagination through nature.

Adolescence

Nature as a vehicle for personal development.

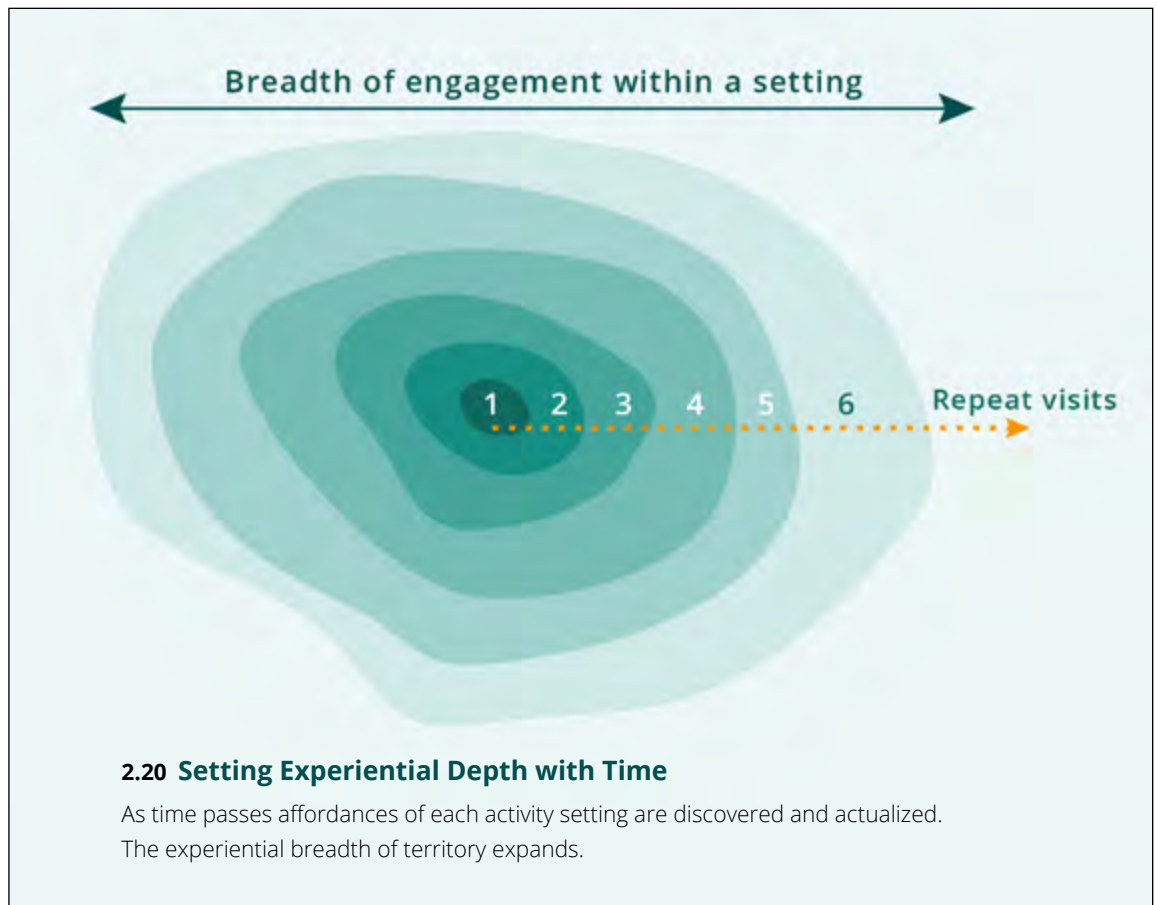
(11–17 years)*

- Nature as a place for social interaction.
- Individual talents nurtured by nature.
- Emotional expression through nature.
- Engaged by environmental/conservation issues.
- Leadership skills emerge.
- Facilitate activities of younger groups.

* All age divisions are approximate, overlap, and vary between individuals. Lists are not exhaustive but aim to highlight developmental attributes related to nature play and learning.

2.19 A child's territory or spatial range continuously expands with age as he or she discovers new activity settings, using skills that are partly determined by genetics. However, skills can also be substantially supported, advanced, and enhanced through access to diverse activity settings in appropriately designed and managed nature play and learning places. The purpose of the diagram is to provide an overview of the territorial expansion process and expected key attributes related to nature play and learning at different age levels from birth to adolescence (through 17 years).

2.20 Each child's territory not only expands in extent or range but also in depth, as more and more affordances in each activity setting are "actualized" through repeat visits. A well-designed and managed nature play and learning place attracts repeat visits because it offers experiential richness. A diverse array of activity settings, appropriate for all age groups, attracts multiple visits as the affordances of each are discovered, actualized, and practiced—enhancing individual skills, which in turn leads to more actualized affordances.



(noise-makeable), combined with water as a boat (floatable), combined with other sticks to make a shelter (buildable), matched with a can (drumable), and so on. A classic pile of dirt is attractive because of its varied affordances: digable, moldable, climbable, slideable, run-up-and-downable, hideable, etc. Affordances motivate play and interaction with environments, which helps children learn.

Activity setting is a subspace with affordances that offer a predictable type of activity. The concept helps us understand how a large area can be subdivided to support different activities.⁶⁹ Setting behavior also has a temporal dimension. On weekdays, a sand-and-water play setting might afford pre-school activity, but on weekends it may attract mixed-age family groups. Children may increase the number of affordances by bringing their own

portable toys and/or by harvesting nearby nature. Such loose parts enrich and extend affordances and associated activity patterns, which in turn are influenced by the social interactions of children of different ages.

Settings affording the same type of activity may differ in character. Sand-and-water play can be designed in many different forms, using a wide range of possible materials to support similar sets of affordances, actualized according to a child's age and ability. Sittable rocks or logs can add comfortable seating for accompanying adults.

Different settings motivate different repertoires of activity. Most settings are physically bounded even though they may vary in size. Like sand-and-water play, for example, they are focused on affordances



related to physical components contained within the setting. Pathways, by contrast, are linear settings linking other settings together, with physical components and related affordances strung along a necklace of play opportunities. Pathway linearity affords chase games, wheeled-toy use, increased movement, and usually higher levels of physical activity.

Territorial range describes a child's behavior in space and time in two aspects: territorial expansion and range development.⁷⁰

Territorial expansion occurs as children mature, gain confidence, venture farther afield, explore and discover new settings, and actualize setting affordances.⁷¹ Parental permission (or apprehension), peer friendships, and the variety and density of settings may influence the rate of territorial expansion.⁷² Nature play and learning spaces designed with closely packed settings offer seamless expansion of territorial range as new affordances are discovered and actualized. Areas with widely dispersed settings may inhibit continuous expansion.

Range development occurs when children return to already discovered settings, continue to actualize their affordances, take risks, and test new challenges. Larger logs may be turned over to discover more exciting critters living underneath. Natural loose parts may be used to build a clubhouse, which on the next visit is used to create a game inspired by children's literature or the latest movie. For territorial range to fully develop, enclosure of the space may be required so that caregivers feel relaxed about leaving children free to roam.

Spaces designed and managed to challenge each child's increasing maturity level will enable an expanding repertoire of actualized affordances and skills to be tested—and accepted as healthy risk-taking by caregivers. Activity settings designed with affordances to motivate children of different ages will strengthen territorial range and may increase repeat visits over the span of childhood and adolescence. As young visitors discover new play and learning possibilities and become more deeply attached with age, they may help manage the space and/or assist with programming.

2.21 Managed, neighborhood woodlands or woodlots, easily accessible on a daily basis, best exemplify the combined concept of diverse activity settings with multiple affordances able to attract multiple visits by neighborhood residents. Here, “nearby nature” offered by a neighborhood patch of woodland with small stream is managed for nature play and learning in collaboration with a local elementary school. *Nature Play Area, Hills & Dales MetroPark, Kettering, OH* (Case Study 1).

2.22 Young adults, especially those considering a career in education, recreation or environment, find multiple opportunities for field experience by working as interns, docents or volunteers in nature play and learning places. Closeness of age and experience offer a particular role for working with pre/adolescents. Here, a college intern encourages a 13 year old to investigate life of a rotting log. *Nature Play Corps, Alligator River National Wildlife Refuge, NC* (see insert, pp. 46-51).



ENGAGING YOUTH

Preadolescents and adolescents are no longer children and, unless accompanying younger siblings, are seldom attracted by places and pursuits perceived as childish. Strategies are required to maintain youth engagement beyond the years of middle childhood. Young people are idealistic and want to contribute to society and, in doing so, discover their talents. Feeling useful and participating in peer groups are strong adolescent needs that could be supported through a nature play and learning space where youth can hang out and at the same time contribute to landscape management, facility development, and nature programming with younger age groups. Under these circumstances, a peer group can provide a non-threatening feeling of companionship and psychological security.⁷³

Supporting special needs Nature play and learning spaces are likely to be more attractive to family members with special needs than more commonplace recreation spaces. Scientific evidence dating to the mid-1980s continues to demonstrate the multiple psychological and therapeutic effects of exposure to nature on individuals.⁷⁴ For children with special needs, nature play and learning spaces

may serve a particularly important role because they afford opportunities that other types of play environment may not offer, including novelty and diversity of ground-level play, change, flexibility, openness, and shade. These attributes may serve groups of children with special needs on weekdays as well as families with individual children on weekends.



2.23

Novelty and diversity increase the likelihood of a match with the diversity of individual special needs. Only one in 85 children with special needs has some form of physical disability. Almost half of special needs children have a cognitive deficit, for which exposure to “green” has a significant, positive effect. About one in five has special communication needs, which again, can be ameliorated by the effect of natural environments designed to be socially interactive; one in 10 has special social/emotional needs, for which nature has a long history of positive effect; and one in eight has a chronic health ailment, for which play in nature can be a welcome distraction for some individuals.⁷⁵ The remainder of special needs covers such a wide spectrum that it is impossible to predict a particular design response. However,

nature provides a diversity of play opportunity and flexibility of use that are keys to meeting special needs. For sites with program staff, nature areas expand offerings to all children, regardless of ability.

Designers and managers are recommended to review the Americans with Disabilities Act (2010),⁷⁶ Chapter 10, covering “Recreational Facilities” (particularly if the proposed nature play area contains buildings) and Section 1008, pages 237-242, which covers “Play Areas” to identify any potential compliance issues. ■

2.23 Research demonstrates the positive impact of nature on human wellbeing, including special needs. A diversity of nature play and learning places can be designed and managed to accommodate a wide range of abilities of people of all ages. Here, a young woman with mobility and developmental limitations is taking an accompanied stroll (and exercise away from her wheelchair) to the “Cloud Chamber” in an outdoor art park. *North Carolina Museum of Art, Museum Park/Cloud Chamber*—Chris Drury, artist.

The Nature Play Corps

In 2011 the National Wildlife Federation and the Natural Learning Initiative at North Carolina State University cooperated with the U.S. Fish and Wildlife Service to develop a pilot project to establish a Nature Play Corps within the 21st Century Youth Conservation Corps.

The project was implemented through a three-week internship for 15 youth (ages 18 to 25, selected from across the nation) held at the Alligator River and Pea Island National Wildlife Refuges on the North Carolina coast. The program was organized by NLI, who developed a training curriculum delivered by a six-person core team (including an off-site coordinator) and two playwork specialists.

The principal objective was to develop an innovative, effective, and replicable model for attracting new refuge visitors by engaging youth as playworkers who, with adult mentors, could design, construct, manage and program nature play areas on public lands.

A Nature Play Corps training curriculum was developed drawing from the best available resources in the emerging field of playwork, including specialists from the North Carolina Zoo and the Eden Project in the United Kingdom. The curriculum was designed to achieve three learning objectives for interns:

1. To appreciate existing refuge resources and management practices;
2. To assess natural resources for their nature play potential;
3. To design, plan and lead nature play programs.

Instructional techniques included formal presentations on child development and design principles; interpretive tours led by refuge staff; site visits and guided observation at child development centers; experiential introduction to playwork concepts and approaches; and development of nature-play-based experiences for refuge child-visitors.

Each week five teams comprised of three interns prepared and presented each Friday morning nature play prototype experiences—known as ‘nature play habitats.’ Play habitat themes grew out information presented by refuge naturalists regarding local animal species and natural phenomena. Themes included bird migration, black bears, turtles, alligators, insect life, animal homes, and fire. Teams developed plans for a 20- to 30-minute play experience inspired by the theme, using natural settings.

A system of paths and pockets accommodated the nature play habitats and included a central island with seating for parents to congregate while their children engaged in free play from habitat to habitat.

The three, weekly nature play events were attended by 90 children ranging from 3 to 13 years of age, and offered a total of 15 nature play habitat experiences. Selected examples are described on the following pages.



1. I Spy Through Animal Eyes

Children were given free range to explore, pretending to be animals, a network of trails that connected five different experiences: 1) pine straw nest; 2) vine-lashed tunnel; 3) small loose parts habitat creation; 4) large loose parts construction area; and 5) a wildlife observation tree house. Prior to the arrival of children, representational images of local wildlife were placed in and among the surrounding trees. Children enjoyed discovering small and large “homes” for the animals they enacted and, at the end, all joined a jubilant baby bird congregation!

2. The Great Fire Escape

The scene had already been set by the huge forest fire still burning at the other end of the Alligator River Wildlife Refuge, resulting in the mass movement of animals from their homes to a new refuge areas. Although plenty of food and water were available, the animals lacked homes

in which they could thrive. Children were asked: How would these animals survive? Can we help them? Children and facilitators rapidly organized themselves as “nature helpers” to build new homes for the displaced animals. Some children instantly became migrating animals ready to enjoy their new homes.

3. Bear Necessities

Children were invited to visit a trail system marked with bear tracks leading up to a “bear den.” They were asked if they wanted to become “real bears.” If so, they received paw prints to be identified. The “bears” played freely in the den, which was big enough to house five children. Some explored the habitat looking for food, digging and finding bones, shells, and sticks. A girl impersonated a ferocious honey bear that generated group rough and tumble play and loud roars. The group ended the session sitting up on top on the defeated hunter (playworker).

4. Be Great, Migrate!

An imaginary migration path was set up for children (as birds!) to find their way around. They understood that after the Summer it was time to fly South to warmer climates. The migration path included food, water and nesting spots marked by logs, string, and signs. “Birds” had to negotiate power lines, leap over obstacles, and fly fast to reach their destinations before the cold weather set in. Even a very young child followed the activity and collaborated in the construction of a nest.

5. Picture This!

Framing a scene helps to focus attention and discover details of the viewed area. Children were given a diverse collection of frames: some were small and easy to hold, others large and installed hanging from trees. One of them was so large that a group could be pictured within it. Participants freely explored the designated area observing quietly through the frames they chose. Many children located the frames at different angles and/or used them from different positions (climbing a tree or laying on the ground) to

gain new perspectives of the landscapes in front of them. Others used the small frames to wander around and observe the surroundings and take photographs using disposable cameras. Most of the children posed, “framed” for the photographs!

6. Habitat Manor

Children first explored an open home set up within the woods complete with a table set, books, and windows and a makeshift wallpaper enclosure made from tablecloths. Children were invited to explore the trail further, where they encountered a bird watcher (playworker) who had been lost for two days after being frightened by a mysterious growl. The children immediately guided her back to their home, where spaghetti (pine needles and leaves) and water (an empty mug) were provided for her recovery. Some children remained to take care of the lost bird watcher, while others went to search for the unknown creature, later revealed to be a bear. The children were especially creative and excited, continuously racing up and down the trail fighting bears and seeking refuge in the homestead. The play continued with massive amounts of energy!





7. Turtle Island

In an effort to celebrate the life of turtles in the area, children were invited to visit Turtle Island. They were greeted by three turtles (playworkers), who encouraged children to become one of them. After a brief moment of hesitation, children became excited to begin the transformation. They each tried on a shell for size (cardboard box) and proceeded to slather paint, glue, and glitter over the cardboard pieces in various designs. As they began to finish their shells, children were led into the woods by Mr. Box Turtle toward the Enchanted Forest.

8. Sky Island

In the land of the first powered flight (at Kitty Hawk, near the program location), Sky Island encouraged children to experience the feeling of flying by lounging on a large net suspended from the trees, five feet above ground. Children of all ages (2-10) quickly took on the role of becoming birds and allowed clambering in the net to challenge them at their own personal level. After the baby

birds (children) learned to fly (in the net), they were free to explore the “Island” via branches (logs on the forest floor setup to act as balance beams) and to help build a person-sized nest. Some were content to sit in a low area. Others flew to the highest points and slid down for landings, both bumpy and smooth.

9. Hideaway Cove

Hideaway Cove introduced children to different types of nest. They inspected the brightly colored large eggs found within each nest and excitedly collected them in and around the “Cove.” The group noted that mama birds would not be happy to see their eggs missing! So the group decided to put the baby bird eggs back in their nests to make mama bird happy, as she could then have baby birds to raise and care for when they hatched. Children’s conversations about the situation showed they already had the concepts of conservation and protection of wildlife in mind!

10. The Enchanted Forest

The “Enchanted Forest” contained very old “talking trees” (playworkers). The play habitat was located in a clearing containing several large dogwoods. The space naturally appeared magical because of the quality of light filtered by the foliage. Visitors were encouraged to have a conversation with the trees. They also learned that it was the birthday of the oldest tree! Everybody sang in celebration and counted the rings to calculate the age. The children then met Mother Tree (playworker), who told them the little known fact that trees actually need children to play with them in order to live! The children were free to roam and explore and play around their newfound tree friends.

11. Sound Island

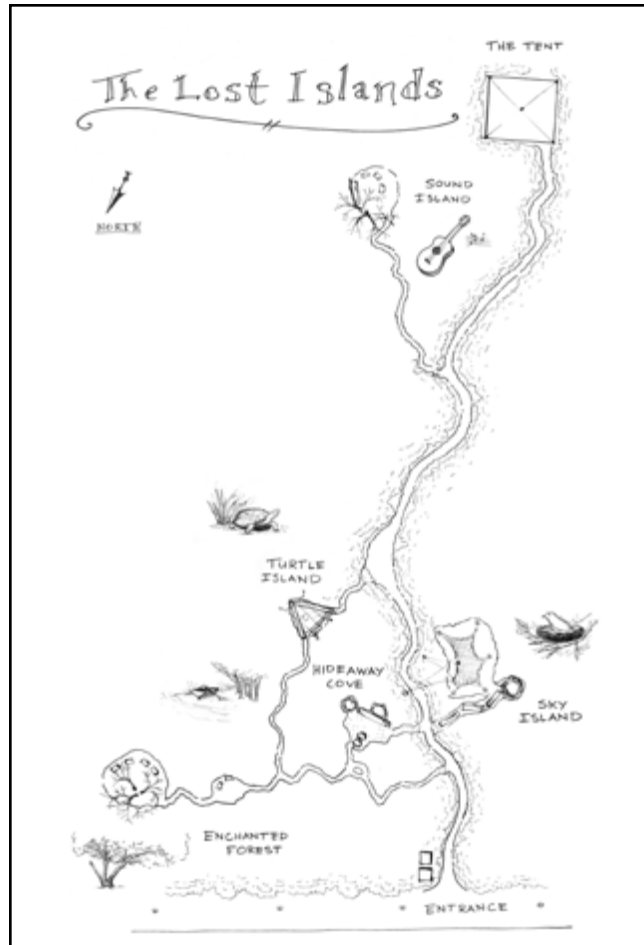
Clink, clank, ring, tap, crunch, howl, growl, sounds of the forest resonated though Sound Island, during the week. The stage was set with a multitude of nature music “instruments,” including a harp (fishing

line strung between two trees); castanets (shells clapped together); wind chimes (silverware found at the beach, strung from a tree); drums (old containers); maracas (plastic containers filled with sand, sea glass, and sticks); drumsticks (sticks and silverware); guiro (carved notches on a tree branch); ocean collage chimes (part of a crab buoy, shells, and sea glass strung on a piece of driftwood). The many instruments created an entire animal orchestra! But it needed an animal choir to accompany it! The kids were encouraged to use their voices and to modify and create instruments of their own. They howled and growled and on occasion we heard howls back (distant playworkers)!

12. Bug City

“Bug City” occupied a special spot, surrounded by magical vines, a fort made from nearby forest material, and structures that looked like bug homes. Children were provided with bug costume objects, magnifying glasses, and bug boxes. They enthusiastically explored the surrounding area looking for bugs and pretending to be bugs! The pilot project demonstrated that nature play-based





programs, based on specific refuge animals and related attributes, can be an effective way to attract new refuge visitors and at the same time help them learn through meaningful nature play experiences. The program experience profoundly impacted the interns. As one summed up the experience:

"I have learned so much, not just about working with children in nature, but about my life goals...Learning from such amazing people, spending time outdoors, and having a chance to be creative...changed my life. I didn't really know what to expect ...I got much more out of it than I had hoped."

Nature Play Corps Team

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Allen Cooper NWF
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Benji Palmer
Stephanie Rustem
Debi Sabo
Sarah Safley
Molly Strayer
Kaitlyn Stubblefield
Terry Welles

(Further details are available at <http://natureplaycorps.blogspot.com/>)

03

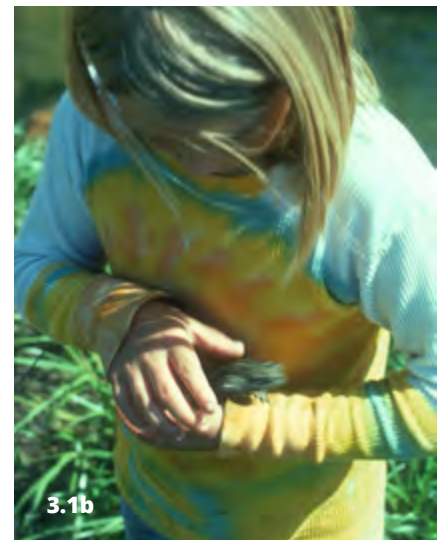
Locating nature play and learning places

“When people connect with nature, it happens somewhere.”
—Robert Pyle

To build a lasting bond between children and nature, opportunities for engagement must be embedded in every place where children and families routinely spend time. Nature play can be designed into a wide variety of locations, including central city, suburbs, mid-sized cities, small rural towns, countryside, and wilderness, as well as at nature centers, zoos and botanical gardens, where intense

engagement is possible. Either nature is brought to children through renovation of the places they live in or use or children are invited and welcomed to where nature already is—for example in the present and future green infrastructure of cities. Either way, nature play and learning sites must be easy to get to or otherwise they will not be used.

3.1 Two best friends (note difference in age) explore a suburban stream behind their home; the older shows her frog-catching skill.



MINNEAPOLIS PARK SYSTEM

Spring-Summer-Fall Highlights

3.2

www.minneapolisparke.org

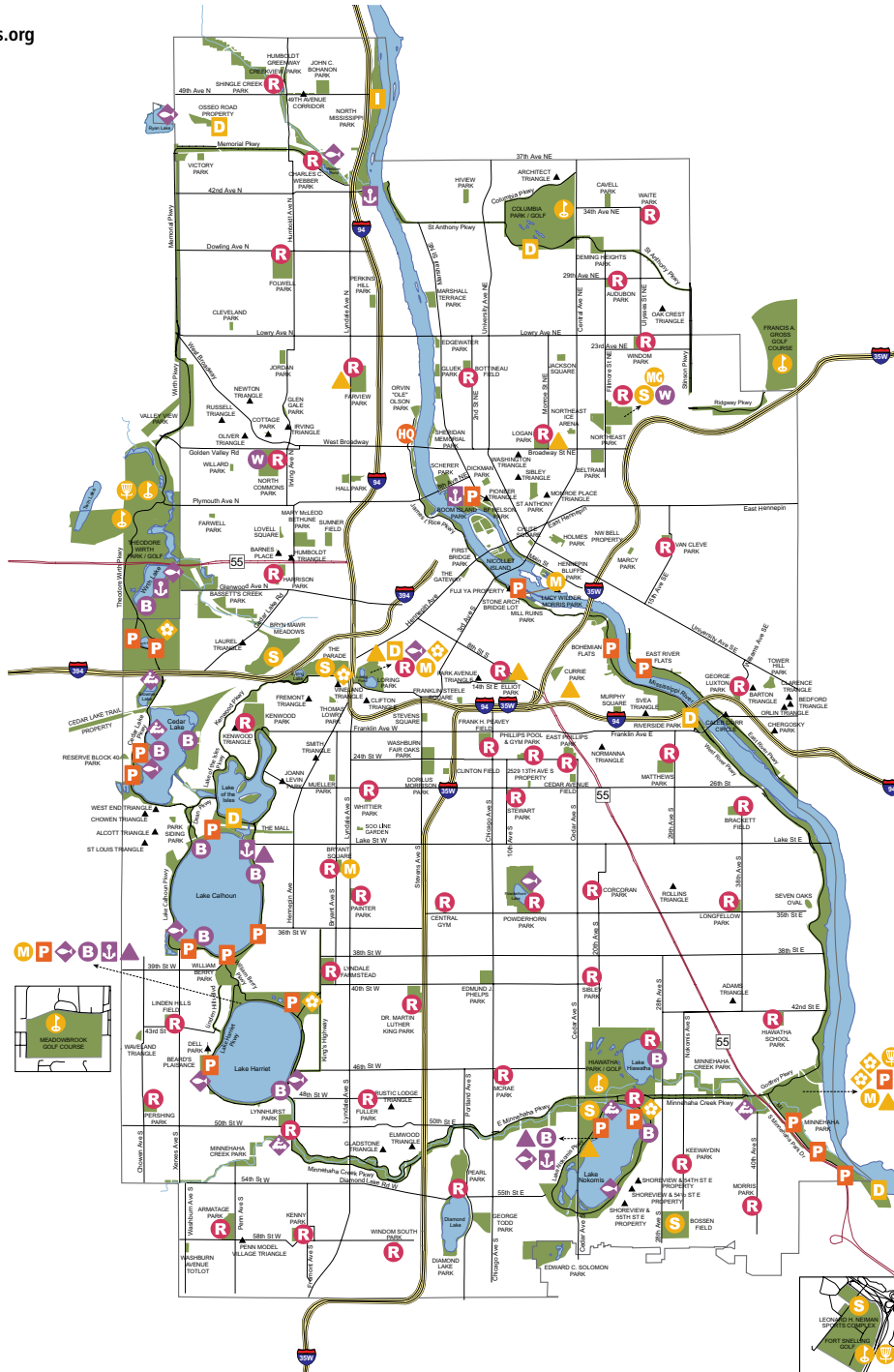
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- D Dog Park
- ▶ Fishing Dock
- G Garden
- ▶ Golf Course
- I Interpretive Center
- MG Mini-Golf Course
- M Music Bandstand
- P Parking
- HQ Park Headquarters
- R Recreation Center
- S Sports Complex
- W Water Park
- ▲ Parkland less than 1 Acre



Jan. 2013

3.2 Green infrastructure binds the green (and blue) spaces of the city together into a unified system—the “big idea” of a continuous network of nature play and learning places (habitats) for wildlife, children, and families. Here, Minneapolis, known for its progressive system of parks, extensive greenways, and trails, offers a vision of green infrastructure, accessible to all by foot and bicycle.

3.3 Every piece of green space, large and small, wild and manicured, localized and linear, can be considered a green infrastructure component. Here, a city park is managed to encourage children to leave the main path and engage in nature play in the adjacent shrubs and trees.



GREEN INFRASTRUCTURE PLAY AND LEARNING

Green infrastructure is defined as “an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations.”^{77,78} Green infrastructure includes “domestic gardens, shared green space in housing developments, green roofs, village greens and other common land, community gardens, urban farms, cemeteries, churchyards, urban and regional parks, formal gardens, informal green space, woodlands, scrublands, grasslands, wetlands, abandoned and disturbed ground, rock cliffs, and quarries—and linkages between them, including green streets and street trees, road and rail corridors, pedestrian and cycling paths, greenways and their corridor rights-of-way. Also included are lakes, ponds, reservoirs, riverine and coastal systems, canals, and waterways” (sometimes called ‘blue infrastructure’) (p.7).⁷⁹

Green infrastructure is a powerful urban planning and design tool aimed at tying the living components of a city together into a unified ecosystem. Major cities such as New York and Philadelphia have adopted green infrastructure plans to help policy makers and citizens understand “green + blue” as a whole system. Cities such as Richmond, Virginia, have implemented green infrastructure plans to engage local neighborhoods and schools

in creating “walkable waterways,” with the potential of becoming a continuous, fine-grained nature play and learning network embedded in neighborhoods, enticing resident children and families outdoors. Such close-to-home, green networks include greenways and “green streets” linking what otherwise are disconnected green “patches” of local parks and schoolgrounds.

3.4 State and regional parks within an urban orbit are also components of green infrastructure and have the advantage of larger land holdings. Here, modest additions to a regional park signal users that boisterous nature play is encouraged. *Five Rivers MetroParks*, Dayton, OH.

3.5 Here, sections of tree limbs have been checked for hazards and left for children's free play, including classic fort building. *Five Rivers MetroParks*, Dayton, OH.

3.6 Larger scale natural elements in regional parks make them more adventurous and attractive to youth. Here, an older sister and brother enjoy fishing together in a gently-flowing, summer creek. *Spruce Pine Riverside Park*, Spruce Pine, NC.

CITY, COUNTY, AND REGIONAL PARKS

City, county, and region parks often include standardized, manufactured playgrounds that can be naturalized to make them more attractive to both children and accompanying adults.⁸⁰ Complete nature play and learning spaces can also be added to provide opportunities for more extensive, hands-on nature play. Because they are easily accessible, larger neighborhood parks may be an excellent option for incorporating nature play and learning in bounded wild zones. Spacious metro, county, and regional parks may offer larger scale facilities to accommodate extended family visits for nature play at weekends and educational programs during the week and activities during summer months. Park professionals are stewards of urban green space, for which missions often include balancing conservation and recreational objectives,⁸¹ implementation of which can engage park users in recreational experiences that also help them appreciate the need for nature conservation.





3.7



3.8

3.7 State parks, especially those near urban populations, offer potential for nature play and learning. Here, an Oregon State Park demonstrates the possibilities for creating themed settings for dramatic play that help users of all ages understand the park as a habitat for animals. *North Canyon Nature Play & Learning Area*, Silver Fall State Park, OR (Case Study 4).

3.8 National parks near urban areas can support nature play and learning. *Nature Play Zone*, Indiana Dunes National Lakeshore (Case Study 5).

STATE AND FEDERAL LANDS

Many state and federal land-holding agencies are promoting the importance of getting children outdoors in contact with nature by creating nature play spaces and nature play programs. Lands include an array of regional, state, and national parks, national forests, National Wildlife Refuges, Bureau of Land Management (BLM) holdings, and non-municipal open spaces of many types. Since these sites are sometimes designated as high value natural resource areas, application of appropriate design and management strategies (such as seasonal rotation) may be critical to success. Research is needed to measure seasonal impacts and monitor recovery on different types of sites.

State and federal sites are often distant from urban areas and attract visitors on public holidays, weekends or during family vacations/camping trips. Under these circumstances, nature play and learning spaces located adjacent to high-use visitor/interpretation centers, picnic areas, and campgrounds make best use of resources as these locations can offer open-access activities and programs facilitated by professional staff trained in nature play and learning (Nature Play Corps, pp.46-51).⁸² As visiting families are removed from their regular rhythm of life, they may be more relaxed and open to learning from experiences that can be taken home and incorporated into everyday life.

SCHOOL GROUNDS

School grounds offer a unique potential for integrating nature play and learning in places children use every day. However, the majority of school grounds are not designed or managed for this purpose and lack the level of ecosystem diversity required for viable, onsite, outdoor environmental education. Monocultures of mown grass (apart from athletic fields) and an overabundance of hard surfaces bereft of nature are still the all-too-common norm. The task here is ecological restoration, which, through student involvement, can offer substantial educational benefits.⁸³ A significant body of literature supports potential educational outcomes from naturalization, such as increase in critical thinking skills, reduced stress, positive social behavior, and improved standardized test scores.⁸⁴

On the positive side, several public school systems (Boston, Denver, San Francisco, Berkeley, Toronto)⁸⁵ exhibit a history of school naturalization beginning in the 1970s, and have made great strides to restore environmental quality to school grounds as healthy places for play, learning, and education. Likewise, independent pedagogical philosophies such as Montessori and Waldorf have traditionally included outdoor play and education as curricular cornerstones. In parallel, “joint community use” of school facilities is also gaining in popularity,⁸⁶ including recognition of school grounds as space available for community use during non-school hours.

The challenge is for sectors of local government, operating with different (tax-supported) budgets, to collaboratively manage this public land for new, expanded purposes. Renovated, ecologically restored sites can augment community park space in underserved communities. Planting trees and shrubs, and installing raised gardens can dramatically extend everyday activities even on small urban sites.^{87, 88}



3.9 Even the most urban schoolyards can be naturalized, especially if supported by policy endorsed by school system leaders. The San Francisco (CA) Unified School District *Green Schoolyard Program*, supported by bond programs, is linked to the district's Department of Sustainability and Landscape Department and ecoliteracy program. Here, settings of native plants for study and relaxation have replaced asphalt.

3.10 Replacing patches of asphalt with soil and plantations of native trees, shrubs, and perennials is a cost-effective method of naturalizing schoolyards. Here, a walk-in, raised bed provides both a social setting for students, as well as opportunities for science investigations, artistic inspiration, and multi-cultural connections to nature. *Martin Luther King, Jr. High School*, Berkeley Unified School District, CA.



3.11

3.11 Annual, incremental development is an appropriate strategy for schoolgrounds, guided by a master plan to ensure best use of limited space, effective circulation, and accommodation of stormwater. Here, pond and observation deck were installed by parent/teacher schoolgrounds improvement committee. *Central Park School for Children, Durham, NC.*



3.12

3.12 Here, a replica pioneer log cabin and council circle were built by parents, teachers, students, and community volunteers to serve as a "play house" and base for outdoor education and community activities.

3.13 Around 11 million U.S. children attend childcare up to 10 hours each day, year round. Flexible programming offers vast opportunities for learning through nature play. Here, naturalization has greatly increased the range of choice. Examples on this page are from *Preventing Obesity by Design* (POD).

3.14 “Earth play” will happen almost anywhere with appropriate conditions. Here, gritty, sandy soil, pinecones and needles, and nearby flowers, provide ingredients.

3.15 Trained teachers can manage the outdoor learning environment as a dynamic place for nature play and learning. Here, a bamboo teepee has become a study center for natural objects.

3.16 Diverse natural settings expand opportunities for children to care for life around them.

CHILDCARE CENTERS

There are approximately 120,000 childcare centers in the United States,⁸⁹ with land holdings estimated at roughly 20,000 acres, or 25 Central Parks.⁹⁰ Nationally, 12.5 million children under 5 attend some form of childcare; of these, 25% or about 3 million are enrolled in licensed facilities, including Head Start.⁹¹ The potential impact for nature play and learning is huge because so many children spend so much time there—every day, year-round. Children enrolled fulltime at 6 months old will spend as much time in childcare as in the rest of their primary and secondary school careers.

Childcare centers are not known for having naturally rich outdoor environments. The vast majority could be considered “blank slates” ripe for naturalization because their native vegetation and soil were cleared off during construction. As childcare is usually regulated at a state level, policy to improve outdoor quality could have a substantial impact system wide, as in North Carolina, where the term “outdoor learning environment” (OLE) replaced “playground” in the licensing rules in 2007.⁹² Outdoors is now regarded as a space available for diverse outdoor activity at any time of day. A statewide naturalization movement has been set in motion to engage young children with nature at a developmental stage when an emotional attachment to nature can take hold for the rest of life.





3.17



3.18

3.17 Nonformal education institutions, including nature and environmental education centers, botanical gardens, zoos, arboreta, and museums, possess two great advantages: professional educators and controlled access, which enables them to offer a broad range of nature play and learning programs. Here, a state zoo offers exuberant water play even in the “off season.” *kidZone*, North Carolina Zoo, Asheboro, NC (Case Study 8).

3.18 Live animal experiences are unique zoo offerings to children. Here, an exotic peacock enthralls a child under the watchful eye of a Play Partner (off camera). *Hamill Family Play Zoo*, Brookfield, IL.

NON-FORMAL EDUCATION INSTITUTIONS

Non-formal education institutions include nature centers, museums of natural science, botanical gardens, children’s museums,⁹³ and zoos. As controlled access sites run by professional staff, they offer great potential for nature play and learning, using risk management protocols to support more adventurous activity while satisfying safety concerns. Food-bearing plants and designated food gardens are more easily managed as integral parts of the landscape. Although sites are more likely to be “drive to” destinations, more elaborate nature-based programs and special events can be conducted that are unfeasible in local parks and on school grounds. Nonformal education institutions also reach out to schools in efforts to bring children close to nature.



3.19



3.20



3.21

NATURE PRESCHOOLS

Contributed by **Patti Ensel Bailie**

Forms of nature-based early childhood institutions have existed for about 100 years, with names that include forest kindergarten, waldkindergarten (German), nature school, forest school, and nature preschool (the model discussed here). All forms have one thing in common, learning through engagement with nature.

However, other dimensions vary enormously, including amount of indoor classroom space (some have none); amount of time spent outside (some all day, in all types of weather, year-round); age range (some extend into primary school years); and curricular approaches, which may vary from emergent, play-based, open-ended approaches to pedagogies with defined learning objectives and procedures. Nature preschools as described here are state licensed early childhood facilities for three to five year olds, housed and/or operated by a nature center or environmental education center. More

than 65 have been registered by the NaturalStart Alliance.¹ Nature preschools are highlighted here because they adhere to a defined model, are the most common form, and exist at the intersection of both early childhood and environmental education—representing the ultimate bridging of these two fields.

The earliest known nature preschool in the United States, founded in 1967 at the New Canaan Nature Center, New Canaan, Connecticut, continues to thrive. This leader and several that followed,

3.19 Follow-the-leader along a fallen trunk, practice balance skills. *Nature Preschool, Chippewa Nature Center, Midland Township, MI.*

3.20 Camp overnight (tent in background). Enjoy the fresh air and early spring sunshine. *Nature Preschool, Irvine Nature Center, Owings Mills, MD.*

3.21 Let's get to work, stacking firewood ready for winter. *Forest Gnomes Waldkindergarten, Natick Community Organic Farm, Natick, MA.*



3.22 Children set out from base for a day in the woods. *Forest Gnomes Waldkindergarten*, Natick Community Organic Farm, Natick, MA.

3.23 Measuring snow depth after the latest blizzard. *Schlitz Audubon Nature Preschool*, Milwaukee, WI.

3.24 Splish, splash, splosh. This is fun! What does it sound like? *Nature Preschool*, Irvine Nature Center, Owings Mills, MD.

including the Mass Audubon's Arcadia Nature Center, Easthampton, Massachusetts (1976) and the Kalamazoo Nature Center, Kalamazoo, Michigan (1982), evolved from a nature center tradition of "Mommy, Me, and Nature."

In the early 1990s, there were still just a handful of nature preschools in the U.S., even though many nature centers provided early childhood programs and several preschools included nature experiences in their curriculum. Today, more than two-dozen nature preschools exist in all regions of the United States, some for over 40 years, ranging in size from a single class to multiple classes. The movement has also taken root in Canada.²

Backgrounds of directors vary, sometimes with both early childhood education and environmental education experience, but usually either one or the other. Operational approaches also differ. Some



3.25 Natural loose parts offer any number of possibilities for creative construction. *Forest Gnomes Waldkindergarten*, Natick Community Organic Farm, Natick, MA.

nature preschools are farm-based, others operate as partnerships with a local preschool or Head Start program, and still others are parent cooperatives.

Defining characteristics include a nature-focused curriculum that includes extensive time in natural areas and the benefit of other resources provided by the associated nature center. These may include opportunities to work with naturalists, to interact with live animals and natural artifacts, to plant trees to tap maple trees for sugar, to garden and grow plants in greenhouses, to visit apiaries, and hiking adventures in diverse habitats.

Children attending nature preschools have daily opportunities to experience different outdoor, natural habitats and engage in learning activities typically framed by nature-based curricula developed through collaboration of early childhood and environmental educators. Nature experiences

permeate each child's learning and serve as a vehicle for child development across all domains. Nature-based activities happen indoors and outdoors, in groups of all sizes, and in a variety of habitats at the preschool and on the nature center grounds. They may exist as native landscape or be created from scratch to serve the nature play and learning program or a mix of the two. Activities may include catching and observing insects, following animal tracks in mud and snow, observing the annual cycle of diverse pond wildlife, and the infinite possibilities of unstructured nature play.

Nature preschools based at environmental education centers offer frequent, positive nature experiences that provide opportunities for young children to become familiar with the natural world and develop an ecological identity. Nature encourages exploration, discovery and experimentation and associated divergent thinking and reflection. By positively



3.26 Everyone enjoys the dramatically changed landscape of snow—just need appropriate clothing. *Forest Gnomes Waldkindergarten*, Natick Community Organic Farm, Natick, MA.

3.27 Lessons for life—working together to achieve a common purpose. *Forest Gnomes Waldkindergarten*, Natick Community Organic Farm, Natick, MA.

3.28 Making our own special place in the world. *Forest Gnomes Waldkindergarten*, Natick Community Organic Farm, Natick, MA.

connecting young children to the natural world, a love of nature is instilled that may help foster an environmental ethic and caring attitude that will follow them throughout their lives.

Another defining characteristic—nature as the central organizing, programmatic concept, ties together the philosophy, methodologies, classroom design, outdoor spaces, and public identity of the institution. A final characteristic is high quality practice in both early childhood and environmental education, requiring teaching staff to be skilled in each field.

The above commonalities broaden the types of programs that may be considered nature preschools. Included are preschools that bring natural materials into classrooms with natural lighting, use nature-themed books, and spend daily time outdoors in a naturalized play area, but not necessarily connected to a nature center. Others may partner with

nature centers where naturalists work with children who have opportunities to meet animals and hike in the grounds of the nature center, although the nature preschool is not housed there.

Natural areas usually include the types of settings described in Chapter 4, such as gardens, sand areas, logs to balance on, grassy hills, rain barrels or other water sources, and a wide variety of “loose parts” (tree cookies, rocks, sticks, etc.), for building. Indoors, classrooms are infused with nature and typical preschool activities such as story time, art, music and movement, and activity center free play are part of the nature-based program.

Only in recent years has early childhood environmental education began to match the more substantial field of early childhood education, reflecting its comparatively long history. Newest developments in the field of early childhood environmental education include a nature-based early childhood



3.29

certificate program at Antioch University New England³ and the Natural Start Alliance a networking organization.⁴

Other forms of nature-based institutions are also growing, including forest kindergartens modeled on European/Scandinavian Waldkindergartens, where facilities are minimal and children (ages 3 to 6) spend 80-90% of their time outdoors in natural areas. In contrast, forest schools are typically public schools that provide children, aged 5-6, with a periodic (half-day or weekly) visit to a nearby forest or other natural area.

As support for nature preschools and other forms of nature-based programs increase, as their benefits are realized by educators and parents alike, they will locate in more mainstream venues to become a significant part of early childhood education in the United States. ■



3.30

3.29 Let's see what we can find down in the wet area, where the reeds are high. *Nature Preschool, Chippewa Nature Center, Midland Township, MI.*

3.30 Look at moss and lichen under your feet as you carefully step along. *Nature Preschool, Irvine Nature Center, Owings Mills, MD.*

1 Natural Start Alliance (www.naturalstart.org).

2 Andrachuk, H. et al. (2014) Forest and Nature School In Canada: A Head, Heart, Hands Approach to Outdoor Learning. Forest School Canada. www.forestschoollcanada.ca Accessed 8-20-14.

3 <http://www.antiochne.edu/teacher-education/nature-based-early-childhood-education-program/> Accessed 8-20-14

4 Natural Start Alliance (www.naturalstart.org).

04

Designing nature play and learning places

Think of designated nature play and learning places and children playing there as dynamic, people-environment ecosystems constantly evolving and adapting to new ideas, user groups, and individual energies—always conditioned by the ebb and flow of time and money. The role of design is to create viable content in flexible spaces that offers users a strong sense of place.

4.1 Surrounded by the highly active play areas of *Brooklyn Bridge Park*, NYC, an intimate, zigzagging, trail of Black Locust boards leads children around a small, boulder-lined, marsh garden where something natural is usually going on. In early Spring, ethereal creamy blossoms of *Catalpa bignoides* enhance the experience. Design: Michael Van Valkenburgh and Associates.



DESIGN AND MANAGEMENT PROGRAM

Developing a design and management program is the core of the design process. It is usually the first major step and normally created through a community engagement process as outlined in Chapter 7. The purpose is to provide a written and visual narrative of the nature play and learning place project, which can then serve as the driver of site design. A typical program includes a project mission statement, goals, and objectives; user groups to be served; age group needs; site assets and constraints; descriptions of each proposed activity setting; federal accessibility guidelines and other mandated requirements; agency needs; and other pertinent information. Explicit cultural objectives may support evolution of the space into a compelling venue for children and families.

Programs reflect the enormous variation in scope, site conditions, and degree of physical intervention of different nature play and learning spaces. At one extreme, where a proposed site is an existing natural area, just a small degree of design intervention will be required to make it usable while conserving as much of the existing natural value as possible.

In this case, management steps required to convert the site will be the program focus. At the other extreme, a barren site devoid of nature may require design of an entirely new ecosystem for nature play and learning as the program focus. Many sites fall somewhere in the middle, containing a mix of light to heavy interventions described in the program.

4.2 The design program defines the project mission, goals, and objectives; describes the nature play and learning settings that support them; and presents a master plan or schematic design showing site layout and circulation. The *Fillmore Discovery Park Design Program* was created through a community engagement process with local stakeholders (Case Study 7).

4.2

Outdoor Discovery Center, Holland, Michigan

Fillmore Discovery Park Design Program and Master Plan

December 2012



A demonstration project of the *Nature Play and Learning Areas Design Guidelines* – a collaborative project of the National Wildlife Federation and the National Learning Initiative, NC State University. Supported by the U.S. Forest Service.

Infant Play and Learning Area

Lookout shelter

At the top of the hill, the lookout shelter is equipped with comfortable chairs, tables, and benches. It serves as a resting spot for accompanying adults while their children freely explore and play in nature. The topographical form of the existing hill permits visibility from the lookout shelter to the infant/toddler and preschool areas, and part of the school-age area. The infant/toddler and preschool areas surrounding the lookout shelter are separated by low interior fencing and contain age-appropriate settings.



A sensory patio with plants of various colors, textures, and scents stimulates young children's developing senses.

Sensory Patio

A patio surrounds the lookout shelter with sensory groundcover plantings planted between textured flagstones. Infants can crawl and discover the fragrances, textures, and colors of the stimulating vegetation.

Lawn

The patio spills onto a small-scale lawn surrounded with textural shrubs for crawling infants to continue exploring. Low log seats and rails provide opportunities for infants learning to walk to pull up and cruise around the lawn.



Small trunks set close together create a low boundary and play surface for toddlers.

6

Fillmore Discovery Park • PROGRAM and MASTER PLAN

Picnic area

Further along the pathway a picnic area provides an additional opportunity for family gathering, school group lunches, or birthday parties. The picnic area is adjacent to the head of the play stream, the log balancing area, and the grass maze.

Grass maze

The grass maze offers children playful immersion in a vegetated wonderland while parents relax at the picnic tables.

Earth play

Continuing around the looped, primary pathway is an earth play area where children work with soil amended with compost or sand to make digging easier.



Grass mazes are immersive textural experiences for children.

Natural construction

Active play continues along the primary pathway with an area for natural construction: loose parts play and boulders for climbing. A loose parts storage shelter in the natural construction area protects materials from the elements.

Stump walk

A stump walk follows a secondary pathway. Stumps can be utilized in myriad ways to encourage active play. Stumps placed within leg's reach with vertical slots for balance create a fun stump walk. Stumps that are 18" high afford jumping and balancing when secured in the ground.



Boulders containing the amended soil for an earth play setting double as seating for adults.

Fillmore Discovery Park • PROGRAM and MASTER PLAN

11

SITE DESIGN

Site design or layout is a further major step in the design process. Focused on circulation and the location of activity settings, this step often includes considerations of age-appropriateness and territorial development. Nature play and learning spaces can be created in any place accessible to the community as described in Chapter 3. Sites vary in physical characteristics such as size, topography, elevation, and climatic zone, and key factors such as demographic profile, projected visitation, budget, and institution type. All influence the design and management approach together with projected levels of financial support, open-access or controlled access, and so on.

4.3 The stakeholder workshop is designed to gather interests of the agency and local community to create the design program—as well as a sense of ownership and commitment to finding resources to implement the project. The stakeholder workshop lies at the heart of the design process described in Chapter 7. Here, the stakeholder workshop for *Fillmore Discovery Park*, facilitated by the design consultant, brought together civic, business, and agency leaders for a half-day meeting.

4.4 The Fillmore Discovery Park site, for which the stakeholders try to imagine how it could be developed and who it would serve (Case Study 7).

Design processes may range from dumping a pile of dirt in a suitable spot in a park, or defining a natural construction zone and supplying it with fort-building material, to hiring a landscape architect and other consultants to design a nature play and learning space with full community participation, production of construction documents and implementation by a team of skilled, qualified contractors.

Small projects may be executed with volunteer professional assistance and may not require full construction documents. If technical issues and/or the degree of intervention are modest, site layout and installation may be handled “in-house” using existing skills and labor and/or with external community assistance, including volunteers (see *Fillmore Discovery Park*, Case Study 7, p. 160).

For substantial projects, in other words, involving investment of more than a few thousand dollars, the preferable process in full or in part is to engage a design professional who can act as a neutral third party to manage the community participation process (see Chapter 7), prepare the site design according to the client intent, ensure that local regulations are addressed, oversee quality control during installation, and match expectations for physical change with available budget.

Site design can proceed, once the draft design and management program is available, usually in three phases: Conceptual design, schematic design, and construction documentation. This sequence of steps, which could vary, in some cases greatly, according to project parameters, is summarized below:

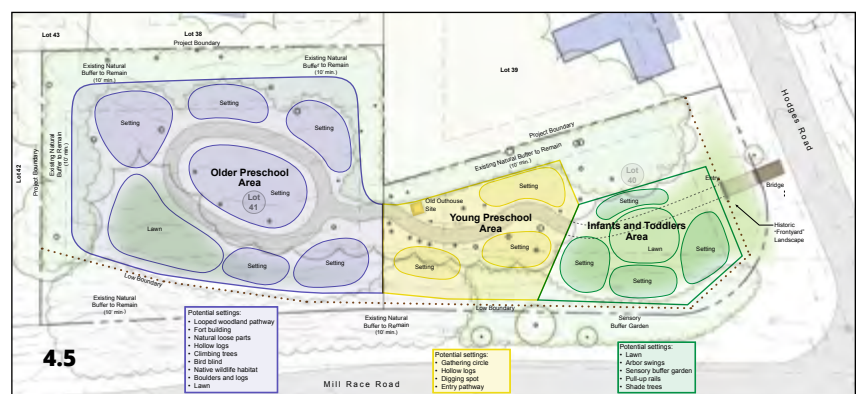




Conceptual design describes the overall layout for the site: location of entrances, primary pathways, main activity settings, placement of buildings and ancillary facilities such as restrooms and parking.

Schematic design can proceed once the parties involved have agreed to the conceptual design. This phase adds a layer of detail to activity settings so that they are better defined and tightly meshed together. Site design may also involve environmental factors such as drainage and erosion control with legal requirements that may call for an engineer to be involved. Factors such as vegetation assessment, tree preservation, and soil analysis may require additional experts, including a landscape architect.

Construction documentation is required to solicit accurate bids for construction costs. Completion normally requires systematic review of construction documents by relevant parties. After each review, design changes become progressively more costly to execute; however, it's better to make changes while construction documents are still in progress rather than during construction when "change order" costs are much higher.



Regardless of the level and type of intervention, a well-executed, accurate site design will specify activity setting locations linked together with looping pathways, which together define the synergy of site affordances and activity options, influenced by factors such as building and entrance locations, centers of activity, and setting "adjacency" (spatial relations). For example, are highly attractive settings such as water play located away from the entrance so that visitors are "pulled" into the site to discover other offerings? Are potentially incompatible settings separated, such as noisy and quiet, active and reflective, mobile and stationary? Are considerations of solar exposure and shade included? The site design should provide a "road map" and useful management tool to guide site development, which may be executed in phases over months or even years as funding becomes available.

4.5 The *conceptual master plan* is developed from the stakeholder workshop. It designates overall age-related areas, setting locations (including main entrance and primary pathways), as well as functional requirements such as service access. Here, the dual-purpose conceptual master plan proposes a nature playground for use by residents and a training site for early childhood educators.

4.6 The *schematic design* is developed from the conceptual master plan and contains a more detailed description of each setting, their relationships to each other, and the circulation system. Locations of trees, shrubs, perennials, and vegetable gardens are included.

ACTIVITY SETTINGS

Design of activity settings and their affordances (defined in Chapter 2) and as described in a typical project design and management program, comprise the third major step in the design process. Design is now focused on details (including pathways), which provide experiences with natural elements.

The most common two-dozen activity settings and their affordances are described below, together with particular considerations and adjacency recommendations. Settings are introduced in the approximate hierarchy of design importance and sequence of consideration when thinking through site layout. How visitors enter the area and move around are key, initial questions. Consideration of trees, because they are large and permanent, is a top priority, including trees already on the site. Thinking about specific activity settings to support nature play and learning comes next. And last but not least, practical matters such as programmatic bases, storage, signage, and setting boundaries—although confirmation of the overall site boundary and entries/exits must be an initial consideration.

section preview

COMMON ACTIVITY SETTINGS

Entrances

Pathways

Plants

Trees

Shrubs

Perennials

Permanent edible plants

Vegetable gardens

Annuals

Natural surfacing

Natural loose parts

Natural construction

Natural play structures

Multipurpose lawns

Meadows

Woodland

Landform

Animals

Aquatics

Sand, Soil, Dirt

Gathering

Program Base & Storage

Signage

Boundaries



ENTRANCES

Entrances are the portals to nature play and learning. Welcome! Play freely! Have fun! Playful, child friendly, naturalized entrance designs can convey positive messages to attract visitors and put them at ease.

Entrance affordances

- Celebrate a sense of arrival and departure
- Express social and cultural meanings.
- Provide a sequential transition zone linking multi-modal arrival by public transit, car/pick-up/drop-off zone, street sidewalk, greenway/trail, and accessories such as bike racks.
- Serve as a gathering and socializing setting.
- Provide a point of information about the facility and its special features.
- Accommodate the needs of visitors of all abilities; connect to an accessible route linking all other settings.
- Help orient and guide visitors by adding sensory cues: visual (bollards, paving patterns, landmark towers, flagpoles, screen walls, particular plantings); tactile (paving surfaces, tactile maps, signs, plant textures); acoustic (wind chimes, the sound of children playing, songbirds); and olfactory (fragrant plants).

Considerations

Consider space for school visits, for assembly and briefing for about 25 children. Think about shady seating. Imagine an entry archway with the name of the space. Create a separate child-size entry, especially if the main entrance has to be large enough to accommodate service vehicles. Specify sturdy materials so that entry structures are built to last.

Adjacencies

Relaxed, intergenerational meeting/seating settings. Subspace with settings for families with infants and toddlers. Restrooms/diaper change facility/changing room. Storage.

4.7 Main entrance to universally designed, family recreation area in a community park, offers a shady place to gather before/after visiting. A diverse, living landscape of shade trees, flowering shrubs, and ornamental grasses awaits beyond, integrated with pathways and play areas. *Kids Together Playground*, Cary, NC. (Design: Robin Moore with Little and Little)

4.8 Fun, "talking benches," created as public art, engage children and adults while waiting for friends at Kids Together Playground.

4.9 Main entrance to designated nature play area at a nature center. Notice the "kids entrance" on the left. *Nature PlayScape*, Cincinnati Nature Center, Teatown, OH (Case Study 6).



4.10



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4.10 The pathways in this universally designed family recreation area are designed as experiential settings for movement and exploration. Primary pathways provide clear pedestrian wayfinding from parking to entrance adjacent to shelter/bathroom (green roof), to multiple settings beyond, continuously curving, wide enough for groups to converse. Highly curved, narrower secondary and tertiary paths are clearly visible. *Kids Together Playground, Cary, NC.*

4.11 Connected to the primary pathway (foreground), a secondary, vegetated, rocky pathway steps up a created hill to play setting on the summit. Wheelchair access is off to the side (not visible). Notice the foreground, vine-covered arbor marking the entrance to an area for families with the youngest children. *Kids Together Playground, Cary, NC. (Design: Robin Moore with Little and Little)*

PATHWAYS

Pathways are the arteries of a space, directing the flow of human energy in a hierarchy of scale: primary, secondary, and tertiary. Children travel wherever they want unless a barrier obliges a change in direction. In a woodland area without protective railings, children will run every which way and wear down groundcovers and fragile understory plants to bare dirt. However, if pathway alignments are defined and edged in some way, environmental impact will be minimized. Primary pathways should also be considered as accessible routes designed to meet federal and state guidelines, and to provide access to all activity settings in the play and learning space. Inclusive design will also serve the needs of families with young children in strollers.

Primary pathway affordances

- Follow a looping form without dead ends, and provide a direct, comfortable route connecting the entrance to all other major play and learning activity settings.
- Provide an accessible route to centers of activity, important landmarks, and facilities such as toilets, drinking fountains, and meeting spaces.
- Offer an accessible surface and ease of navigation on level ground.
- Allow groups of users to interact socially on pathways wide enough (5 to 12 feet) for pedestrian circulation, including school children during the week and family groups on weekends.
- Curve enough to retain a sense of exploration and discovery.

Considerations

Hard-surfaced pathways more easily support wheelchairs, wheeled toys or strollers. Acceptable hard surfaces include concrete, asphalt, decomposed granite, and fine crushed stone. Consider tinted concrete or painted asphalt to add color. In infant/toddler settings where children are still learning to walk, consider a thin coat (3/4") of poured-in-place safety surfacing to buffer falls. To protect adjacent plantings, consider devices such as low, single rail or rope-and-post edging; hoops of curved metal bar; or recycled tires laid horizontally, filled with soil, and planted. The idea is to stop young visitors from running through plantings.

Adjacencies

Primary pathways connect entrances to all other settings and may serve as setting boundaries.

Secondary pathway affordances

- Offer less direct, narrow routes (3 to 4 feet wide).
- Particularly attractive to children, who may follow contorted “up, down, and around” routes that stimulate hiding-and-chasing games.
- Can cross-connect primary pathways so that children can leave the primary pathway to follow more “secret” alternative hidden connections to other play settings.
- Take many forms to encourage children to explore and learn in secluded places by interacting freely with nature and make discoveries at their own pace.

Considerations

Although woodchips or shredded hardwood mulch are typically used as a surface, also consider decking, thick planks of locust or other rot-resistant timber.

Adjacencies

Primary pathways (linked by secondary “cross cuts”) connecting other settings provide an alternative means of moving through the space.

Tertiary pathway affordances:

- Serve as an “animal run” (2 to 3 feet wide) with sharp bends, up-and-down alignments, through green tunnels of bushy vegetation arching overhead, around rocks, stumps and trees to create an endless sense of exploration and discovery.
- Offer a short, “secret” loop off a main or secondary pathway (especially for small children) around a fixed feature such as a tree or group of shrubs.

Considerations

Flagstones or similar can be used as a surface.

Adjacencies

Tertiary pathways can connect to individual settings or special natural play objects such as rocks and sculptures.



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4.12 Primary pathway in preschool area of childcare center enables children to interact with adjacent/overhead vegetation. *First Environments Early Learning Center, RTP, NC.*

4.13 Secondary pathway, articulated with native stones. *John Denver Park/Sanctuary, Aspen, CO.*

4.14 Tertiary pathway. *Kids Together Playground, Cary, NC.* (Design: Robin Moore with Little and Little)

PLANTS

Plants and associated animal life are the crucial ingredients of nature play and learning spaces. The infinite affordances of plants can create a highly interactive environment, greatly extending the range of possible play and learning activity as well as providing aesthetic enhancement for all ages. As described below, for practical purposes here, plants can be subdivided into trees and shrubs (including edibles), perennial plants (including groundcovers, vines, grasses, ferns, and bulbs), and annual plants. Selection and placement of plants is discussed in Chapter 5.

An increasing amount of research demonstrates the healing and therapeutic effects of plants,⁹⁴ including the notion that exposure to native plants may boost the human immune system.⁹⁵ Environmentally, native plants are the healthy choice as they support a greater diversity of indigenous animal species, are adapted to local soil and climatic conditions, and are more likely to be drought tolerant in areas with low, intermittent, or unpredictable rainfall.

A crucial function of plants relates to water quality. Root systems bind the soil and help ground surfaces resist erosion, thereby avoiding negative effects on water quality. Broad-leaved deciduous trees reduce the direct impact of heavy rain and extend the surface runoff period after a storm, thereby reducing the risk of flooding.

What plants offer

The diversity and multiple affordances of plants offer many other unique qualities as an eco-service to nature play and learning.

Manipulability. Plants provide loose parts and play props, including leaves, flowers, fruit, nuts, seeds, and small sticks. Together with soil, sand, and water, manipulative settings can be designed and managed to extend the play and learning affordances of static, fixed structures.

Sensory stimulation. Plants are intrinsically interesting to children. They stimulate the senses

and add a fascinating mix of shade, color, fragrance, texture, and enclosure to play and learning settings, thus adding substantial play value. Trees add a positive ambiance to play settings through modification of light, color, texture, fragrance, and softness of enclosure—sensory stimuli that adults and children appreciate. Along pathways, plants create a complex sequence of texture, smell, light, shade, and color.



4.15 Plants not only provide crucial, living elements, they afford children of all ages an almost infinite range of nature play and learning opportunities.



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4.16 Crossvine (*Bignonia capreolata*), an evergreen, perennial vine, can climb 50 feet using tendrils with end claws. Here, masses of trumpet-shaped, pickable flowers create a memorable entrance. Colors range across red-yellow, spectrum. *First Environments Early Learning Center*, Research Triangle Park, NC. (Design: MIG)

4.17 4.17 Plants with unusual fruits or interesting seeds provide “free” play materials and opportunities to learn about plant behavior. *Elizabeth Anne Clune Montessori School*, Ithaca, NY.



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4.18 4.18 Shrubs used as “plant architecture,” here, selected for arching growth and pruned into an intriguing natural tunnel. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG)

4.19 “Willow tunnel” trained on a sturdy armature of aluminum arches to retain shape and withstand heavy use. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG)



4.21



4.22

4.20 4.20 Shade afforded by single trees is sometimes preferable to continuous tree cover that may block out too much sunlight for understory survival. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG)

4.21 Mini-forest of slow-growing, dwarf conifers. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG)

4.22 Natural construction using a diverse mix of plant types. Educators can help make cultural connections to plant use.



4.23 Planting beds adjacent to pathways are strategic locations for plant diversity to attract interest by children. *Hamill Family Play Zoo, Brookfield Zoo, IL. (Design: MIG)*

4.24 Container planting has inherent flexibility as a “movable garden” and can draw children’s attention to particularly interesting plants—here, flowering thyme.

4.25 Permanent fruiting plants (here raspberries) included as “edible landscape,” usually set in their own setting for ease of management, offer learning potential and a chance for children to learn where food comes from.

4.26 Blueberries include approximately 20 species in the genus *Vaccinium*. Blueberries are considered a health food, high in nutrients and phytochemicals, that may protect against inflammatory disease, heart disease, and cancer. Widely distributed, especially east of the Rockies. Easy to grow and manage. Fun for children.

Dramatic play. Plants add spatial variation to play and learning settings, increasing possibilities for exploration and discovery, fantasy, and imagination—offering ideal settings for dramatic play, hide-and-seek games, and orienteering activities. Specimen plants provide spatial structure and visual orientation.

Shade is provided by trees and large shrubs, which add comfort and protect children from harmful over-exposure to ultraviolet light.

Indoor-outdoor transitions softened with vegetation connect architecture and landscape and help eyes adjust to changing light levels.

Integrate life into activity settings. By integrating plants into all play and learning settings, rather than creating segregated “nature areas,” users will perceive the built environment as a stimulating mix of living and nonliving elements.

Interdisciplinary outdoor classrooms designed as vegetated settings can support activities across the curriculum, from the sciences, to language arts, to mathematics, covering all subjects and skill areas. Children with hands-on learning styles eagerly participate in learning outdoors in natural settings.

Space making. Circles of shrubs create intimate “refuges” where children can escape, relax, socialize in small groups, or otherwise interact with the natural environment and each other. Vegetated nooks and crannies become favorite places.

Create a sense of place. Native plants help children develop an authentic sense of place, to identify with the local region, and become familiar with the native ecosystem.

Communicate seasonal cycles. The passing of the seasons is marked by vegetation—providing a sense of time and annual cycles.

Show where food comes from. Food-producing plants are particularly relevant as health-promoting elements. When children understand that food comes from plants that they can help nurture and harvest, their interest in trying out new tastes and cooking can increase dramatically.

Show where medicines come from. Medicinal plants can be better understood by including them in play and learning spaces. However, care regarding placement and labeling is required as some medicinal plants may have toxic properties.



4.27 A university campus grove of nine maple trees on a regular grid required conserving as part of the design of an outdoor area for young children. The design team convinced campus leaders to remove the middle tree so that an accessible, shady “treehouse” could be installed. *Arlitt Nature PlayScape*, University of Cincinnati, OH (Case Study 11).

Trees

Trees are a basic design element of nature play and learning spaces, available in many shapes and sizes.

Tree affordances

- Offer a multitude of colors, fragrances, and textures throughout the seasonal cycle.
- Protect from harmful rays of the summer sun.
- Increase multi-sensory stimulation.
- Provide edible fruits and nuts to harvest.
- Provide endless supply of nature’s loose parts.
- Define play settings spatially.
- Serve as habitat for diverse wildlife.
- Offer climbing and hide-and-seek opportunities.

Considerations

Use trees as a design element to create shady groves, avenues, and spatial borders. Smaller trees are usually more easily adapted to children’s behavior as spacing can be closer to create more interesting, complex ground-level spaces. Multi-trunked trees accentuate visual complexity. Weeping or drooping forms bring foliage close to children. Consider trees

that flower, smell, have interesting leaves and textures, and produce playable fruit or seedpods. Tree climbing is universally popular among children. All climatic zones have tree species that can support climbing and can be pruned to accentuate strong, low-slung lateral branches that are more easily climbable. Branches less than two feet off the ground provide a challenge for young children, while higher branches offer challenges for older and more adventuresome children. If locations of potential climbing trees are specified, once they are installed managers can ensure appropriate pruning to enhance climbability. A layer of wood chips or shredded wood fiber should be installed around tree bases to protect children from injury if they fall. The trunk of a tree should never be wrapped with rope or wire or have decking installed too close, because over time it will damage or weaken the tree or even kill it.

Adjacencies

Locate trees to provide shade where needed but also take care to not locate adjacent to settings such as vegetable gardens where shade could have a negative impact. Locate trees to mark entrances. Use special trees as landmarks.



4.28

4.28 Shrubs bring nature to children's experiential level. Here, dwarf conifers afford toddlers a "whole body" experience of the softly textured foliage.

4.29 Early blooming Spirea welcomes Spring and provides hiding places beside the pathway, habitat for several species of moths and butterflies, and has medicinal properties.

4.30 Large, "tree-like" shrubs can afford children a complex hide-and-go-seek landscape.



4.29

Shrubs

Shrubs are a basic design element of nature play and learning spaces that are available in all kinds of shapes and sizes, and seasonal characteristics.

Shrub affordances

- Offer a multitude of colors, fragrances, and textures throughout the seasonal cycle.
- Provide edible fruits to harvest where appropriate.
- Larger species protect children from harmful rays of the summer sun.
- Increase multi-sensory stimulation.
- Offer an endless supply of nature's loose parts for play.
- Define play settings spatially.
- Serve as habitat for a diversity of wildlife.
- Offer hide-and-seek opportunities.



4.30

Considerations

Use large shrubs as a design element to create shady groves. Shrubs can bring interesting foliage and fruit close to children. Consider shrubs that flower, smell, offer textured foliage and large leaves, produce playable fruit or seedpods, and add seasonal interest.

Adjacencies

Locate large shrubs to provide shade (at the scale of young children), to mark setting entrances or to create plant play spaces with special character.



4.31 Perennial plants can add enormous diversity to nature play and learning places, especially wild natives, which once established can offer a stable habitat to children and wildlife alike.

Perennial Plants

Perennials live at least two years and typically return each year from rootstock that survives the winter. They including groundcovers, vines, grasses, ferns, and bulbs, are a basic design element of nature play and learning spaces.

Perennial affordances

- Increase diversity of play and learning opportunities.
- Add ground-level interest and nature engagement for children, especially preschoolers.
- Introduce ground-level habitats so that children can experience small animals, grasses and wild plants.
- Provide plants with fibrous root systems, which aid erosion control and provide high play value.
- Contribute aesthetic enhancement.
- Add seasonal color, especially with flowering plants.

Considerations

As native perennials may require specific soil/sun/irrigation conditions for successful growth, identify a local plant nursery that specializes in native

perennials with knowledgeable, professional staff able to advise about selections. Select aromatic plants with foliage or flowers that smell, or plants that have dramatic, unusual, playable flowers, leaves, fruits or seedpods. Plant vines along fence lines. Install arbors and pergolas to support vines (adds almost instant shade). Consider locating tertiary pathways through planting beds to bring plants and children closer together. Protect native perennials from trampling during the nursery period of the first two years. This can be accomplished with low railings, off-the-shelf border edging devices, post-and-rope edging or planted, stacked tires. Early flowering bulbs can be planted as harbingers of spring in easily seen locations, interspersed with still dormant perennials or around trees and shrubs. Allow space for bulbs to naturalize.

Adjacencies

Create protected planting conditions adjacent to use settings. Techniques include planting along fence lines, against retaining walls or other vertical elements, such as rocks and logs, or around shrubs, brush piles or small trees (large trees tend to “steal” too much available moisture). For a naturalized effect, plant in defined beds or rifts and allow space for self-seeding and naturalization.



4.32 As old as hunter-gatherer humans, edible landscapes are again in focus as a means of helping the current generation of young people understand that food comes from the Earth, not a supermarket container. Here, dwarf trees ensure children can get close to the fruit. *Edible Schoolyard*, Greensboro Children's Museum, Greensboro, NC.

4.33 Fruiting trees can be grouped into an orchard—a setting that affords diverse learning opportunities. Here, children gather apples from the dozens of heritage varieties on the schoolgrounds. *The Coombes School*, Arborfield, UK.



Permanent Edible Plants

Integrating food-producing species into nature play and learning spaces, may help children to better understand that food comes from plants. This can be a magical realization for a young child.⁹⁶ Childhood obesity, which is linked to poor nutrition, can be partly addressed by correcting misperceptions about sources of food by engaging children in hands-on activities with permanent fruiting trees, shrubs, and vines. Gardening activities with annual vegetables and herbs could also be added to designated settings.

The proposed site may already contain native, naturally occurring fruit and nut species, which should be identified and celebrated as part of the nutritional landscape. Examples include wild persimmon, hazelnut, blueberry, cranberry, blackberry, wild strawberry, wild plum, and many other species depending on the region. In some contexts, non-native permanent species may be introduced, particularly when food is a focus of the program, such as the Edible Schoolyards in Berkeley, CA, and Greensboro, NC. Permanent food plants can be scattered throughout the landscape, employing the permaculture “food forest”⁹⁷ concept as implemented in Seattle, WA,⁹⁸ or clustered in patches or more formal orchards.

Fruiting species affordances

- Offer children the “magic” of foraging and discovery of forest edibles—picking, cooking, and eating them (after washing).
- Help children understand that food comes from the earth and that some plants are suppliers of food for people and other species.
- Provide educators with authentic educational resources to be used to learn cooking skills, methods of preservation, etc.

Considerations

Fruiting species can remain part of the native landscape if already located there. If not, a naturalization approach can retain the element of discovery and surprise. Or a more formal approach may be used in a region of orchards, where reflection of the local culture is desired. To simplify management, edible species can be planted in small groves, say around a gathering setting, where in the spring children can enjoy fragrant blossoms and learn about pollination. Evaluate introduced species carefully with regard to management implications; for example, species that may be subject to disease or attack from animals.

Adjacencies

Most fruiting species require plenty of direct sunlight and the presence of pollinators to produce successfully. Ensure that plant locations are not overshadowed. Consider inter-planting with species that are extra effective attractors of bees and other pollinators.

Vegetable Gardens

Vegetable gardening is one of the easiest and most popular natural learning activities. It has become a new health promotion imperative to help children accept and enjoy eating fresh vegetables. By cooperating with each other, children achieve almost immediate visible results from their own hands-on activity. In so-called “food deserts,” vegetable gardens could be one of the most important nature play and learning settings. As communities begin to assert control over daily food realities,⁹⁹ a vegetable and flower garden can be added as a play and learning setting and as a source of food and community learning. Gardens attract multiple species of beneficial insects, which help children understand the crucial role of pollinators, including bees.



Location is critical, as most vegetables need six to eight hours of sun exposure per day. However, some vegetables (salad greens, cooking greens, root vegetables, and some types of beans, peas and herbs) can get by with less or with dappled rather than direct sun.¹⁰⁰ Vegetable gardening can start modestly; for instance, with a few containers arranged in a circle. Include flowers to add beauty to the meal table.

Vegetable garden affordances

- Help children accept and enjoy eating fresh vegetables.
- Engage children in gardening processes: sowing, tending, harvesting, preparing, cooking, tasting, and eating together.
- Enable children to learn about the ecological cycle and learn where food comes from.

Considerations

Basic vegetable gardening settings should contain several components: beds at different heights to accommodate children at different ages and abilities, low-rise beds for small children who like

4.34 Vegetable gardening is best conducted in places where children can participate in the process each day—in childcare centers and schools (especially year-round schools), but also in community gardens. Here, raised beds provide several school classes with “seed to table” gardening experiences. *Children’s Discovery Garden, Wegerzyn Gardens MetroPark, Dayton, OH.*(Design: Terra Design Studios).



4.35



4.36

4.35 Childcare center vegetable gardens expose children to the sense of accomplishment of growing healthy food early in life—with the additional advantage of being attached to a year-round institution. This vegetable garden annually produces many 100s of pounds of food, which becomes part of the meals served from the center kitchen. *First Environments Early Learning Center*, Research Triangle Park, NC. (Design: MIG)

4.36 A greenhouse can add value to any vegetable garden.

to kneel, and waist-high beds for older children and wheelchair-users. Beds can be made from treated lumber or masonry. A surrounding wide ledge is useful for resting tools and other gardening supplies. Circulation space should be generous enough to accommodate groups and provide space for wheelchair users. Straw or woodchips provide adequate ground surfacing, which will also inhibit weed growth.

Surrounding vegetable gardens with a high fence to protect them from damage by deer and other foraging animals may be necessary. Low-rise beds can be placed against a fence for vegetables vines (beans, tomatoes, etc.) to climb.

A final ingredient for gardening success is trained staff, possibly augmented by experienced, knowledgeable volunteers. Garden educators, playworkers and similar professionals are essential to ensure effective garden management and learning opportunities. Gardens stimulate social interaction, and hone fine motor skill development and sensory awareness. They help children learn about nutrition, life cycles, and many other commonplace aspects of living systems.

Adjacencies

An adjacent potting shed or greenhouse space is essential for storing tools and potting materials and to prepare seedlings for transplanting. A small, lockable structure with a sunny window can serve this purpose (a fully translucent roof is unnecessary and often difficult to maintain). A worktable is essential for demonstrating gardening techniques and for preparatory work. This service area or programming base should also contain a composting facility to illustrate the principles of recycling and regeneration. A variety of designs are available.

Annual Plants

Annuals complete their life cycle and die within one year. Some annuals are native plants that self-seed before dying (a fascinating fact for children—so do they really “die”?). However, most annuals do not self-seed and therefore need to be replaced each year, which can become a management burden. If overused, annuals may convey a gardenesque image instead of a wild native landscape devoted to interactive nature play and learning. Annuals can be useful wherever a colorful touch is needed, for example around an entrance or resting area or to distract from nature play messiness in locations such as botanical gardens and museums. Annuals can also be a great source of cut flowers, which can involve children in appreciating the aesthetics of nature firsthand in art and craft activity or in enhancing interior spaces such as classrooms. The possibilities are endless.

Annual plants affordances

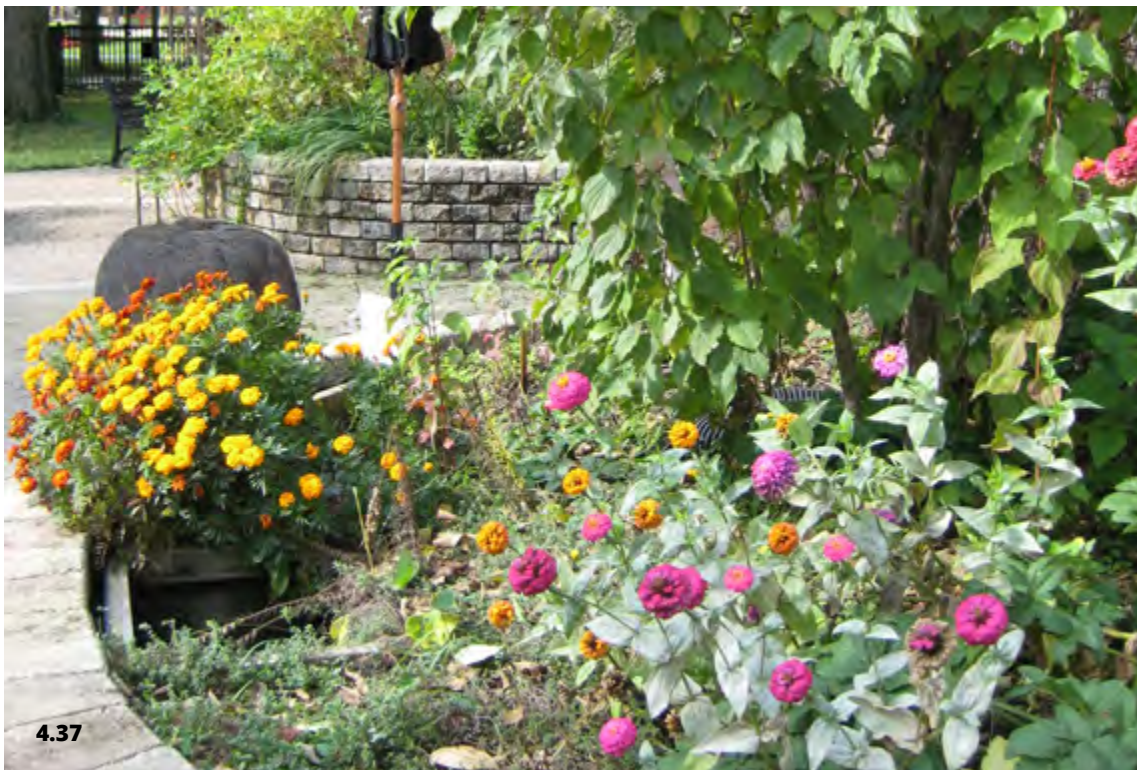
- Add aesthetic enhancement (color, fragrance, texture) to settings.
- Allow cut-flower activity.
- Provide additional plant parts (flowers, leaves, seeds) for nature play and annual variation.
- Offer additional learning and programmatic potential, especially in the arts, because of their sensory attributes.

Considerations

Annuals are ideal for growing in containers that can be moved around the site as needed to add color, fragrance, and texture. Irrigation and other day-to-day maintenance requirements are usually greater than for perennial plants. Many annuals require full sun for 6 to 8 hours per day to flower.

Adjacencies

Can add aesthetic and play value to almost any setting if sufficient sunlight and irrigation are available.



4.37 Annual flowering plants can add color, fragrance, and natural play materials to any activity setting. Here, marigolds and zinnias help make a “Bug Walk” more attractive. Marigolds (Mary’s Gold) include 56 species of the genus *Tagetes*. Are used en-masse as floral decoration in some cultural traditions. Zinnia is a genus of 20 species with many hybrids, and flowers of many colors and forms. Both flowers are easy to grow and naturalize. Prolific flowers are pickable by children for play activities and can be cut and used as decoration. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG)

4.38 Woodchips are a natural choice for ground surfacing along pathways and in circulation areas; as here, where the natural ground cover has been worn by human traffic. The least cost wood chips can be generated on site using a heavy-duty chipper or sometimes, commercial tree trimming companies will drop off a load or two for free. Vigilance is required to make sure splintery pieces are removed. Note the vegetated drainage swale and footbridge along-side. *Emerson Waldorf School, Durham, NC.*



NATURAL GROUND SURFACING

Natural ground surfacing is usually an essential, low cost feature of nature play and learning spaces for protecting ground surfaces from erosion and footwear from mud. For these purposes, chipped prunings may be sourced on site, from adjacent areas or from a commercial tree management company. Use only solid chips free of twigs and rough, elongated material. Carefully inspect material before spreading. For safety surfaces installed around natural play structures, choices include shredded hardwood mulch and engineered wood fiber (the only material that meets ASTM standards), which also provide accessible surfaces, or manufactured woodchips. Each type of surface material has cost and management implications.

Natural ground surfacing affordances

- Control soil erosion.
- Reduce muddy conditions.
- Define areas for group activity.
- Provide loose play material.
- May function as a safety surface.

Considerations

Selection of material may be influenced by initial cost, replacement or “topping-up” cost, durability, accessibility, and fall attenuation properties. Note that engineered wood fiber is different from shredded hardwood mulch because it is certified for use as a safety surface around manufactured play equipment and would therefore serve as a safety surface around natural play structures. Once matted down, shredded hardwood mulch offers reasonable accessibility for secondary circulation in

informal nature play spaces (although it does not meet Americans with Disabilities Act–ADA–specifications for surfacing of an accessible route or primary pathway).

Natural surfacing also serves as a play material, which children use as loose parts in dramatic and constructive play and explore to find insects, worms, and other small critters that may live in mulch. A pile of mulch or wood chips can become a “play mountain.”

Adjacencies

Some types of natural surfacing discussed here may adequately serve as a safety surface for nature play and learning activity settings and should always be considered within a 6-foot diameter area around all anchored, playable natural objects 18 inches above the ground surface.



NATURAL LOOSE PARTS

Children can transform virtually any natural, small loose object into a prop to afford dramatic and constructive play. Examples include insects, worms, cattails, pinecones, driftwood, leaves, twigs, seeds, shells, rocks, dirt, sand, and many more. Larger natural objects such as logs and stones may not be “loose” in the sense of being easily manipulated, liftable, and transportable for place to place, but they may be turned over to see what’s living underneath or rolled around to create spaces.

Natural loose and movable part affordances

- Provide children opportunities to manipulate the environment and transform it into imaginary worlds.
- Extend the play and learning possibilities of any nature play and learning space.

Considerations

Nature is huge supplier of free loose and movable parts. Downed or decaying limbs and sticks can be harvested for use as loose parts. Logs, rocks, and larger pieces of timber can also be added.

Dramatic play can be enhanced by adding manufactured items such as sawn lumber, pieces of textile, sections of plastic pipe, pieces of rope, sheets of heavy cardboard, reused containers, and repurposed safe scrap of all kinds. Dress-up clothes and play props such as animal tails, ears, and facemasks can extend dramatic play possibilities.

Adjacencies

From the child’s point of view of, natural loose parts should be available everywhere to afford the potential for extending and enriching the play repertoire of any given setting.

4.39 There is something magical about the way children create assemblages of natural loose parts, which symbolize something concrete to the maker and appear otherworldly to an adult outsider. Here, parts of the surrounding plants provide everything required. *Nature PlayScape, Cincinnati Nature Center, OH* (Case Study 6).

4.40 A few sticks, fallen leaves, and pieces of rotting log. What is it? You would need to ask but please do not interrupt this child’s reverie. *Nature PlayScape, Cincinnati Nature Center, OH* (Case Study 6).

4.41 Larger scale loose parts become the raw material for natural constructions (opposite). *Nature PlayScape, Cincinnati Nature Center, OH* (Case Study 6).

4.42 Classic “fort” or “camp” built from larger loose parts and harvested natural roofing material. When designing/ managing nature play areas, consider where different types of plants could be grown to be harvested by kids for this type of construction. *Elizabeth Anne Clune Montessori School, Ithaca, NY.*



NATURAL CONSTRUCTION

Many children today need opportunities to shape their own environment, especially children from restricted home situations, who have little control over their environment. The original concept of adventure play using loose parts continues to inspire hands-on, open-ended play with natural materials.

Natural construction affordances

- Enable children to learn properties of natural materials—an ancient cognitive skill.
- Provide positive impact on children's mental health and self-esteem.
- Develop communication, negotiation, and cooperation skills.

Considerations

Provide simple, low cost racks to store different types of material. These may range from sections of tree trunk, lengths of bamboo, large leaves from tropical plants, dried grasses, tree cookies, willow whips for weaving, etc. Children may start with “fort building” but with modest prompting may segue into animal play with the “fort” converted to a habitat for other species.

Adjacencies

Natural construction is best located in a corner of the site to help control dispersal of natural materials.

4.43 Natural play structures can take many forms. The most effective are often the simplest and least costly. Here, a permanent, three-log-high, square structure provides a “base” for open-ended play in the woods. Kids can add loose parts and convert the setting into anything they imagine. *Nature PlayScape, Cincinnati Nature Center, OH* (Case Study 6).



4.44 Large rocks are an easy way to create a natural play structure, once heavy machinery has been procured to assist with the task. Locally-sourced stone is not only more cost-effective, it adds identity and authenticity by introducing young people to the local geology. Here, mother rests while daughter plays underneath. *Nature PlayScape, Cincinnati Nature Center, OH* (Case Study 6).



4.45 Apart from their cost-effectiveness, an advantage of natural play structures is the flexibility offered to designers to create something different. This state park structure has been built as part of a nature play and learning area to stimulate activity that reflects the animals resident in the park (where standard play equipment would be out of place). *North Canyon Nature Play Area, Silver Falls State Park, OR* (Case Study 4).



NATURAL PLAY STRUCTURES

Permanent play structures can be built from natural materials such as logs and rocks with possible cost savings.

Natural play structure affordance

- Support gross motor play.
- Support dramatic play in settings such as play-houses, enclosures and stacked logs and rocks, decks, stages.

Considerations

Seek local artisans who work with indigenous materials. Engage local children to contribute ideas.

Adjacencies

Variable according to site specifics. Locate gross motor settings where high level of physical activity does not negatively impact sensitive adjacent settings. Locate dramatic play settings in quiet, low-key zones.

4.46 Multipurpose lawns are most effective when clearly defined as a setting with functional relations to adjacent settings. Here, a multipurpose lawn in a high-density urban area is surrounded by primary pathways and small adjacent settings (artworks, seating, nature play) tucked in the vegetated boundary. Notice the lawn is tilted south for the benefit of sun-lovers, ball play is underway, mothers and young children are hanging out. Older children are off in the “undergrowth,” exploring. *Teardrop Park, NYC* (Case Study 3).



MULTIPURPOSE LAWNS

Flat and/or undulating grassy areas are often considered essential to any play and learning space, especially for the emerging walker. However, a lawn may not be justified if the overall space is relatively small or soil conditions or irrigation will not naturally support lawn turf.

Multipurpose lawn affordance

- Support informal games and large group physical activity.
- Accommodate programmed activity requiring open space.
- Accommodate community events requiring a large, flat space.

Considerations

Decisions about lawn locations, because they demand space, need to be made early in the design process. Informal, curvy shapes may be appropriate in a nature play and learning space. Size will vary greatly depending on projected range of activity. A key issue for managers is whether or not ballgames

will be accommodated on the multipurpose lawn. Nearby grassy spaces may be available in a park, for example. Consider undulating surfaces and mounding to increase play value such as “rollability.”

Adjacencies

Lawn location and adjacencies are sometimes dictated by site shape and size or by existing flat ground or because grading needs to be minimized. If site flexibility allows, consider locating the lawn in the center, surrounded by other play and learning settings. In this case, take care to create edge conditions such that the lawn is not crisscrossed by so much foot traffic that it may wear out the grassy surface.



4.47



4.48

MEADOWS

Technically, meadows are fields of grass and other non-woody plants managed as “wild” ecosystems to attract diverse wildlife for children to observe and enjoy as they explore and play in the tall plants. Meadow habitats may occur naturally or they can be created from cleared woodland. In the Great Plains, “prairie” may serve as a more culturally appropriate term the naturally occurring ecosystem. Created as a play and learning setting, a prairie would require an appropriate design approach and management procedures.

Meadow affordance

- Provide easily explorable ecosystem, accessible to children, especially for observing insect life.
- Communicate seasonal cycles.
- Help visitors of all ages understand differences between mown and unmown grass (meadow vs. suburban lawn) or how ecosystem diversity can be dramatically affected by different management protocols.

Considerations

Careful management is required to maintain species diversity while simultaneously supporting play and learning activities and minimizing human impact. Access can be maintained by mowing curving pathways through the meadow/prairie.

Adjacencies

Prairies usually require full sunlight to thrive, so do not locate south of tall trees that may overshadow. Sunlight requirements vary for other types of grassland/meadow. Some types can thrive along a woodland edge or within a shady woodland setting.

4.47 Here, a native prairie has been re-established as a natural setting in an outdoor satellite of a natural science museum. Curving mown afford exploration. *Prairie Ridge Ecostation*, North Carolina Museum of Natural Sciences, Raleigh, NC.

4.48 Meadows and prairies represent the difference between the mown and the un-mown. Here, teenage friends enjoy a stroll through the knee-high grass of a no-mow zone of the city forest park. Notice, the girl in pink has plucked a grass stem. *Hanley Forest Park*, Stoke-on-Trent, UK. (Design: LUC).



4.49



4.50

4.49 Woodland play and learning places appear frequently throughout this publication for good reason—woodland works so well. Minimum requirements include pathways and natural loose parts. Useful additions include natural play structures and perhaps a small shelter/storage structure.

4.50 *Coppicing*, an ancient woodland management and permaculture method, is an excellent nature play and learning approach, which also supplies the materials for natural construction.

WOODLAND

Patches of existing remnant woodland, with modest design and management intervention (adding primary pathways to improve access, for example), can provide a ready-made nature play and learning space offering a multitude of affordances. Woodland settings can be created by design and appropriate management, although they are more challenging and time dependent. Coppicing (cultivation of woody material by sprouting from the live stump of fast-growing trees such as willow, hazel, and poplar), can be an effective management strategy to ensure a supply of natural building materials. Coppicing also provides related learning about woodland management practices.

Woodland affordances

- Offer diverse ecosystem of plants, year-round and seasonal streams, permanent ponds, ephemeral vernal pools, and related wildlife, and a vast array of play and learning affordances and opportunities for exploration and discovery.
- Provide settings for adventure play, natural construction, and ranging games.
- Communicate seasonal cycle and the effect of sunlight on plant life through the seasons.

Considerations

Depending on context and available space, woodland settings can provide older children with challenging, exciting places to ride bicycles—especially trail bikes or BMX types. Trails should be laid out for this purpose, in collaboration with future users, in a defined zone with challenging twists and turns and varied topography to maximize attraction. Careful environmental and risk management is required to provide an exciting, safe setting, while minimizing human impact.

Adjacencies

Woodland settings have flexible adjacency requirements often conditioned by existing location. Dedicated boundary should be clearly marked.



LANDFORM

Landforms are a fundamental characteristic of the terrestrial environment. They may already exist as a site feature or be created as part of the design. They motivate play and stimulate learning about relationships between aspect, sunlight, drainage patterns, and vegetation—including erosion and soil conservation. Landforms, major and minor, increase landscape diversity and extend the potential for play and learning.

Landform

- Encourage fantasy play, orientation skills, and hide-and-seek games.
- Provide lookout spots (prospect and refuge) from which children can observe their surroundings.
- Add visual interest and complexity to a site.
- Motivate rolling, crawling, sliding, balancing, and jumping—activities that stimulate the vestibular and kinesthetic senses.

Considerations

Mounds with varied slopes are fun for all children and can be used to increase visual complexity and screen undesirable views. Landforms integrated with fixed structures may enhance play value and protect steep grades from erosion—for example, by using retaining walls, recycled tires, rocks, and plant materials. Berms and retaining walls may improve accessibility to structures.

Adjacencies

Landforms tend to have large footprints and separate opposite activity settings; equally, landforms connect to adjacent settings.

4.51 Landforms large and small can add an important dimension to nature play and learning. Here, a large mound has been built in a regional park (using dirt from a local building site), to attract older children, helps extend the range of play. Notice the standard heavy-duty drainage pipe used as a tunnel. The summit “lookout” and spaces created around the mound afford more complex, three-dimensional chase games. The mound helps create play synergy because it borders a woodland and small stream dedicated to nature play. *Five Rivers MetroParks*, Dayton, OH.

ANIMALS

Animals are endless sources of wonder for children. Play with animals may foster a caring attitude, a sense of responsibility toward living things, and empathy for life. They offer many opportunities for interdisciplinary learning. When children interact with animals, they invest in them emotionally. Animals can provide a powerful therapeutic effect. They are a meaningful socializing medium. They provide companionship in non-threatening ways, which is especially effective for children with low self-esteem. Caring for animals can produce a strong sense of personal competence and pride.

Many types of beneficial animals (insects, amphibians, birds, small mammals) can be attracted to nature play and learning spaces by selecting relevant plants used for food and shelter (especially those producing nectar or bearing fruit, cones, and seeds).

Animal affordances

- Help children understand ecological niches and life processes.
- Stimulate children's learning.
- Foster empathy and respect for other life forms.
- Provide social milieu for children to meet and become friends.
- Provide living resources for outdoor educators.

Considerations

Several types of animals are relevant to children in nature play and learning spaces.

Non-harmful insects and insect-like animals

Small critters such as caterpillars, butterflies, moths, worms, ladybugs, pillbugs, spiders, millipedes, and snails are particularly attractive to children and live in many types of vegetated settings. Such animals stimulate exploration and discovery, provide outdoor education opportunities, and add a critical element of life to the play and learning space but require very little management. The vast majority of insects are beneficial. They do not bite, eat valuable plants or spread disease. They fascinate kids.

Specific plants attract specific birds, butterflies, moths, and other flying insects. Each butterfly species in larval form usually lives on specific types of plants or even one or two specific species. In adult form, most butterflies share equal preferences for nectar plants.

Birds

Avian habitats require nesting places, sources of nesting materials, water, and food-producing plants. Nesting boxes, bird feeders, small water sources and bird blinds can help children observe birds more closely. Birds add movement, color, and sound to play settings.

4.52 Animals fascinate children. If opportunities for animal play are afforded from an early age, children will grow up emotionally attached to animals, which will lead to understanding the interdependencies of the world we live in. Here, preschoolers' attention is transfixed by an insect living in the woodchips around a play structure.



4.53 Classic milkweed-Monarch butterfly relationship.

4.54 Microhabitats can be designed into hands-on settings for kids. The Bug Walk offers close encounters with critters in damp, dark, bug boxes, set behind the raised bed retaining wall. *Hamill Family Play Zoo*, Brookfield, IL (Design: MIG).

4.55 Farmyard animals can be highly attractive. Here, chickens are housed in an enclosed area accessible to children. Eggs are used in the cooking program. *Edible Schoolyard* (Greensboro Children's Museum, NC). (Design: NLI, with Carla Delcambre, RLA, and David Swanson, RLA).

Small mammals, amphibians, and reptiles

Salamanders, tortoises, squirrels, toads, mice, moles, rabbits, snakes, lizards and other typical indigenous species may already be resident in a nature play and learning space developed in an existing natural space—or may be encouraged to become resident by design and management to create appropriate habitat conditions. Or the reverse may be needed to discourage unwanted species such as poisonous snakes.

Pond life

Fish, frogs, and other pond organisms are attractive to children (see Aquatic Settings below).

Domestic and farmyard animals

Farmyard animals can be included in nature play and learning spaces but require trained staff or volunteers (including older youth) to be responsible for their care. Rabbits, chickens, geese, ducks, guinea pigs, and hamsters are the easiest to care for. Larger animals such as sheep, pigs, and goats are a tradition on European urban farms. Rabbits can be very popular with children and can be accommodated in moveable rabbit hutches. Chickens are easy to care for and can be left to roam free in an enclosed setting shared with children.

Adjacencies

Animals will appear wherever there is vegetation. Farmyard animals need adjacent shelter and storage for feed.



AQUATICS

Not only are streams, ponds, wetlands, and marshes critical to environmental and human health, they support a variety of terrestrial and aquatic life that fascinates children. Aquatic settings offer substantial learning potential. They add an aesthetic dimension to nature play and learning, have a strong perceptual impact, and may be vividly remembered in adult years.

Aquatic settings are the most highly valued by children because of their rich and varied sounds, textures, reflections, changes in state and feelings of wetness. Water is highly interactive; it can be splashed, poured, dammed, and used to float objects. Water mixed with sand, dirt, and vegetation provides a broad palette of muddy mixtures for children to create their own imaginary worlds.

One of the most practical water settings for nature play and learning are natural, broad, shallow streams. Successful designs tend to replicate natural forms using rocks embedded in concrete, soil, and vegetation to create shallow, cascading streams and pools. Children may spend hours in these settings, transfixed by water's behavior, which excites and relaxes, promotes social interaction, and encourages children to play together to maximize play value.

Other aquatic forms, such as ponds, wetlands, and marshes, may be constructed as play and learning settings if they do not already exist onsite. In some cases, constructed wetlands may be required to meet water quality regulations.

Aquatic setting affordances

- Engage children in hands-on, multi-sensory experience.
- Provide direct experience of aquatic wildlife in and around water.

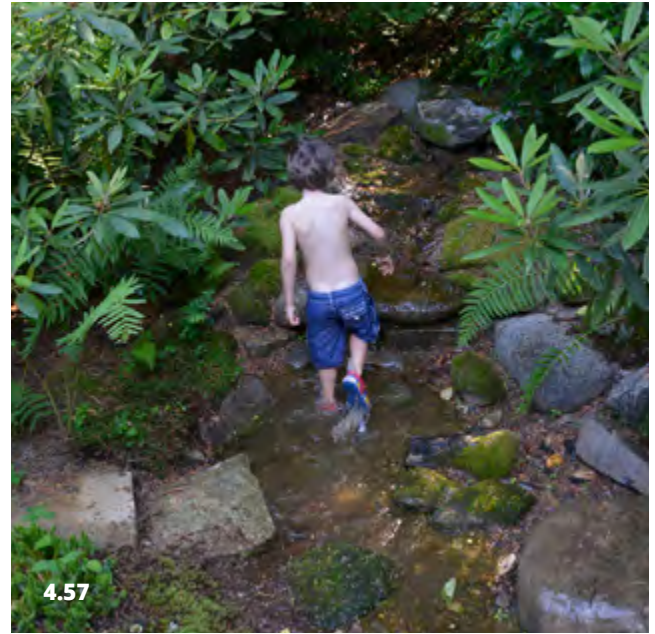
Considerations

Streams, ponds, and marshes occur naturally but also may be intentionally designed, each with its own challenges as a play and learning setting. Naturally occurring streams may be difficult to access if banks are steep and highly eroded. Flash floods and water quality may be safety concerns. In protected natural areas, issues of disturbance and environmental impact may arise. Naturally occurring aquatic settings have a distinct advantage over designed settings. Because they are not artificially provided, they are not subject to local health and

safety regulations like new construction would be (although water quality and/or habitat preservation regulations may apply). However, risk management protocols are still relevant (see Chapter 6).

Designed aquatic settings are subject to local health and safety review. Requirements vary between jurisdictions. One jurisdiction may view an installation as virtually a natural system and allow a simple, unfiltered, circulating stream that conserves water; whereas, another may consider an installation as if it is a swimming pool (for which rules are defined), even though maximum water depth may be less than 2 inches. Local regulations may require a filter and possibly ultra-violet treatment to kill bacteria.

In order to avoid later problems, managers are cautioned to early on carefully check local and state



requirements, involve agency risk managers, and engage insurance underwriters in reviewing the proposed aquatic setting(s). Naming can be a subtle differentiator; for example, the differing interpretations that may arise in comparing “stream,” “play stream,” “educational wetlands,” “mud play,” “critter creek,” and so on. Each will generate different reactions. None would likely call forth an applicable regulation. Regardless of name, all would be important to consider in-house in terms of risk management.

Adjacencies

Location and adjacency are important considerations. Location of an interactive aquatic setting near the entrance to the whole area is not recommended, as it will likely attract a large proportion of users, congest the entry zone and leave much

of the “hinterland” relatively unused. If it is centrally located and surrounded by other settings, the overall use pattern of the nature play and learning space will likely be more evenly distributed during the water play season. Carefully consider location of naturally occurring stream, pond, or marsh from the perspective of use level, visibility, supervision and risk management.

Misters, foggers, and sprays

These features can be used to add sensory interest to an aquatic setting or can be designed as a separate setting. Foggers can add an ethereal quality. All three features provide cooling-off opportunities during hot weather. Consider possibilities for ice formation and ice play/learning in cold winter regions.

4.56 Here, a streambed has been created that is safe and explorable by visitors of all ages. *Kulturinsel Einsiedel Amusement Park, Zentendorf, Germany.*

4.57 Follow the stream to find its source. (Design and image: JT LA)

4.58 A child intently observes micro-life of the wetland designed into the *Nature PlayScape*, Cincinnati Nature Center, Tealtown, OH (Case Study 6).

4.59 A floating deck allows children to lay prone and observe pond life. *Hershey Children's Garden, Cleveland, OH.* (Design: Herb Schaal).

SAND, SOIL, DIRT

Because of its softness and malleability, sand is one of the most popular play materials. It is easy to move and mold. It can be dug, sifted, sculpted, poured, and drawn upon. Combined with water, it provides even more opportunities for creative and imaginative play.

Natural loose parts such as twigs, fallen leaves, and small stones help children create imaginary worlds in sandy settings and places such as the dirt between tree roots. Symbolically, it is like playing with the surface of the planet. Soil is critical to life and therefore has high educational value. Qualities of soil and dirt cover a wide spectrum to be explored.

As a play material, sand can appear to be a highly refined type of dirt. Sand play works best if the setting includes intimate, small-group spaces, play surfaces, and access to water. Sand is an excellent medium for stimulating creative play and social interaction. In large sand areas, children can create imaginary landscapes using all manner of loose parts.

4.60 Sand, soil, and dirt exhibit different but similar qualities as settings for nature play and learning on the surface of planet Earth. Here, “sandy dirt” and accoutrements, both natural and manufactured, surrounded by vegetation (and the loose parts it supplies), afford children classic open-ended play. *Nature PlayScape*, Cincinnati Nature Center, Tealtown, OH (Case Study 6; photo, GroundWork Design).

Sand/dirt affordances

- Engage children in creative, imaginary, experience.
- Provide exploration of the sensory qualities of soil/dirt.
- Offer opportunities for collaborative social interaction.

Considerations

Enclose sand play settings to keep the sand from migrating. On large sites, a generous, expansive sand setting may be feasible. The setting itself

should be at least 2 feet deep with good drainage.

In controlled access spaces, if necessary or required, a net cover can be used to keep animals out of the sand. Rain, air, and sunshine will clean the sand. Do not use an airtight cover, as this will make the sand rancid. Provide access to water, preferably within the sand play setting itself.

A designated sand / dirt play setting can be spatially defined by a boundary of logs or rocks and vegetated buffer to help retain the sand and avoid transfer by children to adjacent settings.

Adjacencies

To ensure accessibility, locate sand and dirt play settings close to a primary pathway but not so close that sand could spill out and become a slip hazard. A sand setting entrance should be pulled back from the pathway with a transition deck or ramped approach so that children and caregivers using wheelchairs can enter easily and safely. Especially on small sites such as childcare centers, try to locate sand / dirt settings away from the center of the site. Choose an enclosed space, preferably with a single, defined entrance.



4.60



GATHERING

Places for individuals and groups to gather with comfortable seating can take several forms, including decks, patios, verandas, gazebos, and “council circles.” Such places recognize that adults usually accompany children to nature play and learning spaces. Positive adult experiences often motivate return visits. Included here are “children only” places such as playhouses and clubhouses. Gathering areas should meet federal access guidelines for Outdoor Developed Areas.¹⁰¹

Gathering setting affordances

- Broaden opportunities for children to develop social relationships with peers and adults.
- Support dramatic play.
- Strengthen existing social relations.
- Build community social capital.
- Offer educators functional learning environments for activities and lessons.
- Provide playworkers programmatic infrastructure.
- Hangout area for parents

Considerations

Design gathering settings to accommodate groups of different sizes. Locate small, intimate settings where children can play quietly, socialize in small groups or withdraw from the noise and distractions

of more boisterous activities. Locate larger settings centrally to enable children and adults to participate in group projects.

Consider raised decks to provide multipurpose dry, warm surfaces for play and educational activity. Designed as a stage, a deck can become a space for performances (see below).

Gathering settings can be designed as inviting, whimsical features. Unusual forms provide a sense of identity that invites visitors to linger, sit, and talk. Add display features (see below) to exhibit children’s work.

Adjacencies

Installing gathering settings of different sizes at a variety of easily accessible locations throughout the

4.61 Gathering settings are an essential attribute of nature play and learning places. Here, a sturdy, contemporary-style gazebo affords a central, intergenerational, shady, multipurpose meeting point in a school park. Students gather there for outdoor activity during the school day. Community groups meet up there out of school hours. *Blanchie Carter Discovery Park*, Southern Pines Primary School, S. Pines, NC (Case Study 10).

4.62 Gathering settings can be created in all kinds of ways. This installation was made by a community volunteer, who salvaged the logs and got to work with a chainsaw. *Building Blocks Learning Center*, Charlotte, NC (Design: NLI). <http://naturalearning.org/building-blocks-learning-center>

4.63 A program base and related storage serve as a center of operations for a nature play and learning area. In some form, it may be essential for effective management and programming—unless the site is adjacent to an existing facility. If not, a modest, beginning base can take many forms and may need to grow over time as resources become available. Here, a sturdy, custom-built shed, with wide interior shelving serves programming and storage needs for an early learning nature area. Notice the wide doors allow easy access. One recommendation (missing here) is a roof light. *Bright Horizons Family Solutions Child Development Center, NC.*



PROGRAM BASE & STORAGE

Play and learning outdoor programs typically require some type of field house to serve as a program base with storage for tools, equipment, and materials. Such a facility is relatively costly and may not be feasible in the first phase of development; nonetheless, the master plan should identify the most appropriate location and set space aside near the center of program activities. Adequate storage where it is needed makes a critical difference to the viability of hands-on programming. It helps reduce the type of clutter that can limit program activity. Clearly defined, labeled and appropriately located storage may encourage children to tidy up after themselves. Such a field house would also serve site management operations with outdoor storage for large materials and salvaged items easily accessible by truck. It may also function as a support base for birthday parties, which are certain to be popular.

site, including at nodal points where paths cross.

Program base, field station, storage affordances

- Provide a central base of operation for programs, a social anchor, a center of communications and an emergency first-aid post.
- Serve as a place to store materials and

equipment, and as a possible toilet location.

Considerations

Easily accessible and clearly signposted.

Adjacencies

Program bases need to be located at the center of action, where they can be easily serviced.

4.64 Outdoor, performance settings come in many shapes, sizes, and styles. Here, a semiformal amphitheater set among shade trees is large enough for community performances for up to 150. *Chicago Botanic Garden* (Design: unknown).

4.65 Dramatic performance can be enhanced by the way the stage and audience seating are arranged. Here, the three essential physical elements: stage, proscenium, and seating geometrically surrounding the stage, are arranged to offer a sense of drama even without human activity. *Chapel Hill Cooperative Playschool* (Designer: unknown)

PERFORMANCE

Performance settings such as raised deck “stages,” campfire circles, and small amphitheatres accommodate group presentations and serve as larger gathering settings.

Performance affordances

- Stimulate self-expression.
- Encourage teamwork.
- Foster a sense of community.
- Help create a “culture of place.”

Considerations

The need for large gathering settings is frequently overlooked during the design programming process. Often, the organization has not fully considered how new nature play and learning space will be an attractive venue for community special events such as parties and weddings. Carefully consider orientation so that the sun is behind the audience and illuminates the stage—and not in the audience’s eyes. Shade is often an issue. Consider manufactured shade sails and tree planting for long-term provision.

Adjacencies

Locate for convenient, direct access by a large audience. It may need to be physically separate from the rest of the facility—but with restroom access.



4.64



4.65

4.66 If visitors arrive by car, a good place to start advertising is on the highway. *Natural Learning Area, Hyco Lake Park and Campground, NC (Design, NLI)..*

SIGNAGE

Signs can be an important element of pathway settings. They support a feeling of exploration and discovery by providing cues and information to enhance the learning process. Layout, typographic style, and materials used should blend harmoniously with the surroundings while meeting functional legibility requirements. Signs provide important sources of way-finding information about pathways and destinations for caregivers, and may need to conform to federal accessibility guidelines.

Signage affordances

- Provide a comprehensive communication system of information that can be easily read and understood by people of all ages, cultural backgrounds, and abilities.
- Communicate clear directions to different places (settings) and practical information meeting strict functional requirements, including font size for accessibility and way-finding.

Considerations

Some nature play managers take a “less is more” approach in recognition of the importance of children constructing their own reality and understanding the world without it being labeled by adults. Carefully consider the number and type of signs really needed. Involve children in place-naming decisions and sign creation. Types of signs that may be needed for nature play and learning spaces include:

Directional signs—located at all entry and decision points, present information indicating the direction to a space or facility, a change in route, or confirmation of a correct route.

Informational signs—placed at all entry points, present general information about the facility and permanent features of the site.

Identification signs—placed within settings, present information in both words and pictographs



about specific features or prompts for caregivers.

Regulatory signs—placed where appropriate, present rules, requirements, warnings, and restrictions, including traffic delineation and control.

Inspirational signs—placed at places of reflection, use poetic expression to stimulate the human affective and imaginative dimensions.

Display settings—add informational value to a setting. Appropriateness for different age groups and audiences is crucial. Displays include:



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4.68



4.69



4.70

4.67 Artwork can provide a subtle form of communication and local flavor to a natural area. Here, local artists created entry panels reminding visitors of the contrasting seasons expressed by the landscape. *Spruce Pine River Park, NC* (Designer/Artist: unknown).

4.68 If signs are lowered to child height and designed to be “read” by young visitors, they will respond. In fact, researchers discovered that children did indeed respond to the map of the *Nature PlayScape* and were able to make spatial connection to their experiences there. Cincinnati Nature Center, Tealtown, OH (Case Study 6).

4.69 The “medium is the message” can sometimes be powerfully expressed by individual signs; as here, at the entrance to an area dedicated to young infants and toddlers. *Hamill Family Play Zoo, Brookfield Zoo, IL* (Design: in house graphic communications department).

4.70 Sign at neighborhood entry can be low key, simply reminding visitors of the main idea: play, respect nature, be safe, have fun! *Hills & Dales Nature Play Area, Hills & Dales MetroPark, Kettering, OH* (Case Study 1).

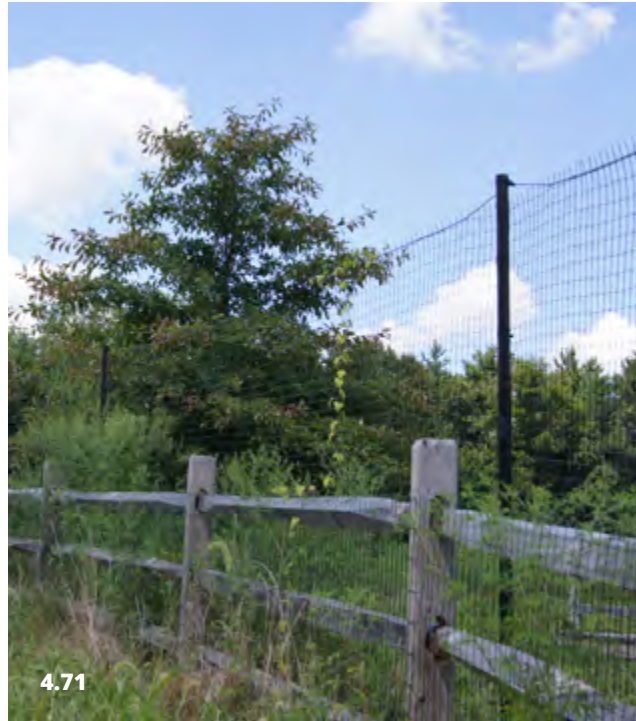
- **Bulletin boards** used to display day-to-day information about nature play programs and community events. Make sure they are large enough to accommodate all types of postings that might appear.
- **Expressive displays** of artwork generated by nature play programs and special events as temporary exhibits. Suspension from overhead wires can increase visibility and offer possibilities

for installations that interact with the wind. Rooflines can be used as physical supports for banners.

Adjacencies

Signs are located according to functional requirements of each type. Entry displays are particularly important and in some cases can be selected by children as temporary exhibits.

4.71 Caregivers notice when a nature play and learning area is fully enclosed and appreciate being able to relax and not worry about where their children are. Here, an area of 1.6 acres, partly wooded and hilly, would be worrisome if not enclosed by a continuous, almost invisible, 8-foot deer fence (also to keep the deer out!). *Nature PlayScape*, Cincinnati Nature Center, Tealtown, OH (Case Study 6).



4.71

4.72 Boundary fences can provide children with a “secret place” within the boundary landscape but inside the park (in this case), where they can play hiding and chase games or just hide from friends and caregivers. *Kids Together Playground*, Cary, NC (designers: Robin Moore with Little and Little).



4.72



4.73

4.73 Natural boundaries can sometimes become almost invisible. Here, a nature preschool in the woods has marked for children the “edge of the known world” with stacked brush, which also adds habitat value and brings animal life closer. *Nature’s Way Preschool*, Kalamazoo Nature Center.

BOUNDARIES

Both external and internal boundaries need to be considered.

External boundaries

Full spatial enclosure of a nature play and learning space is a key element. If parents and caregivers feel their children are enclosed and secure, with one way in and out, they will be more likely to relax and let their kids run free. For sites located in places like urban parks surrounded by high volumes of vehicular traffic, fences and enclosures are essential to ensure children’s safety and security. Urban locations where perceptions of personal safety are sensitive issues may require additional design and management responses in terms of enclosure, entry location, staffing, designated opening hours, and other responses. Various fencing methods are available.

External boundary affordances

- Reassure caregivers that children are safe and secure by wrapping the entire space from one side of the entrance to the other so that it is fully enclosed.
- Protect the space from deer and other animals that may cause substantial damage.

Considerations

Neighbors may be concerned, imagining ugly, high, obtrusive chain-link fencing. They need to be assured that this is not the case. Even chain-link (an inexpensive, maintenance free solution), can be plastic-coated and covered with vines to blend in with green surroundings. Deer-proof mesh fencing is visually unobtrusive and cost-effective.



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4.76



4.77

4.74 Internal boundaries differentiate one setting from another, give a clear sense of structure to the area, help direct behavior, and in particular protect plants and ground covers from being trampled. Here, to define the swing area and protect the surrounding plants, an inexpensive, low edging fence has been painted to both protect it and make it stand out.

4.75 Here, a simple “post-and-rope” method differentiates settings while protecting plants. *Shepherd’s Way Day School*, Asheboro, NC.

4.76 Here, a double-rail-and-post (with finials) timber fence provides a higher level of enclosure and protection in the outdoor learning environment of this center for children with special needs. *Wilmington Child Development Center*, Wilmington, NC. (Design: Robin Moore with LSP3, architects).

4.78 Here, an elegant, simple solution to edge protection using a standard, steel “eye” post and cable rail, just 12 inches above ground dramatically improves protection of fragile plants and ensures an attractive border to the pathway. *Catch the Wind*, Bird observation Area, Museum of Life and Science, Durham, NC. (Design: In house).

Internal boundaries

Internal fences and enclosures should reflect the physical structure of the site and the patterns of activity within it. Vegetation can be an effective enclosure, helping to differentiate settings, screen them from those adjacent, and add a sense of mystery. Fences can be doubled back on themselves to define small play settings. Low walls can define different activity zones and provide informal seating.

Internal boundary affordances

- Differentiate one setting from another.
- Delineate pathways, enclose activity spaces, and define settings.
- Protect ground covers and smaller plants from trampling by edging pathways and directing the flow of pedestrian movement.

Considerations

Boundaries can define interfaces between natural habitats and structured play areas, and protect natural areas without compromising visual quality. Although visual access to natural settings is important, fragile environments must be protected from pedestrian traffic.

Adjacencies

Internal boundaries mark or follow adjacency lines between settings. ■

05

Managing nature play and learning places

“Do what you can, with what you have, where you are.”
—Theodore Roosevelt

Children’s hands-on interaction with nature calls for a dynamic, time-sensitive approach to ensure that environmental stewardship is pursued as an essential goal, while at the same time recognizing that nature play is manipulative and often messy. Managers understand that settings may get worn through use but also can be managed to recover, including supplemented with prepared natural materials to augment play value. Both management and maintenance are involved as distinctly different levels of professional responsibility.¹⁰²

Effective management attempts to balance stewardship with continuing efforts to keep the nature play and learning space attractive to children so they keep coming back for more. Tasks include replenishing physical resources, training staff, encouraging volunteers, launching innovative programs, producing special events, installing

new settings, and refreshing those already there. Plants get diseased and damaged and need to be replaced. Invasive plants need to be removed. Natural settings are seasonal, constantly growing and developing, and require nimble, flexible techniques that respond to the requirements of living systems. Management tasks may also include accommodating individuals with special needs who, prior to a visit, seek printed guidance or online information about all available opportunities to enhance their visit.

Effective maintenance, in contrast, is focused on upkeep, repairs, and keeping things in order. It means tidying up at the end of the day, making sure equipment and materials are properly stowed, ensuring risk management protocols are executed—leaving the space in “shipshape” condition for the next day.

MANAGEMENT FACTORS

Regardless of location (as described in Chapter 3), several factors frame management approaches, including type of project, type of access, programming, type and size of organization, and resource availability.

Type of project

Type of project covers a range of beginning conditions on the ground, which define possibilities for implementing different types of nature play and learning space. A project may be primarily renovation or new construction or a mix of the two. Either may include ecological restoration. The distinctions are not always obvious, especially when project implementation is phased. By understanding the differences, those promoting nature play and learning are better able to identify local opportunities for nature play and learning and ensure that policy is developed to embrace them.

Renovation applies to an existing site, such as a standard school playground, to be naturalized by adding diverse plantings in and around equipment to increase opportunities for engagement with nature. Extension of the playground area to embrace a separate but connected natural area (in itself new construction) could increase nature play and learning possibilities.

New construction refers to a project starting from scratch. The Nature Playscape at the Cincinnati Nature Center is an example (see Case Study 6, p. 156). The center of the site, which previously was an open, bramble-infested field, was replaced by a professionally designed playscape containing many of the settings described in Chapter 4. However, the new construction centerpiece was surrounded on two sides by existing woodland zones, which to be viable required only pathways connected to modest “new construction” settings (built out of locally sourced timbers and rocks).

Ecological restoration (or eco-restoration) can apply to either renovation or new construction when a degraded ecosystem or one that once existed on a site is being restored or re-established. The term may also apply for a nature play and learning space being installed within a larger restoration project, such as an urban stream corridor.

5.1 A range of options, from renovation to new construction is available to managers implementing nature play and learning projects, all include possibilities for eco-restoration. This school park renovation (from a virtual desert) included a strong Longleaf Pine restoration component, reflecting the regional ecology. *Blanchie Carter Discovery Park*, Southern Pines Primary School, S. Pines, NC (Case Study 10).

5.2 This university campus site contained a stand of semi-mature trees to be conserved but otherwise was new construction. *Arlitt Nature PlayScape*, University of Cincinnati, OH (Case Study 11).





Type of access

Whether access is open or closed is fundamental to management approaches because the degree of environmental protection and levels of potential diversity differ greatly.

Open access invites visitors to freely engage with nature as a positive experience without an entry fee. Because time in contemporary life is tightly structured, children and families seek close-to-home opportunities for engaging with nature in the green infrastructure of local neighborhood parks, school grounds, and stream corridors. However, neighborhood natural spaces are often small with limited carrying capacities that may be unable to support heavy use. Without deliberately intensive management, recovery may be slow, leading to gradual reduction of both natural diversity and play value.

Controlled access applies to sites such as zoos, botanical gardens, arboreta, and museums where entry is through some type of portal controlled by opening times and where an entry fee may be charged. Here, messages about appropriate use can be delivered, which may help protect natural resources from damage. The site can be managed by rotating subareas so they recover from heavy use. Access may also need to be controlled in urban areas where perception or actual occurrence of crime may be higher.



5.3 Open access is communicated by the welcoming gates to a bounded nature play and learning area. *Nature PlayScape*, Cincinnati Nature Center, OH (Case Study 6).

5.4 Controlled access is ensured by this entry setting, which includes payment booth (notice child-height window), welcoming sign, and visitor information. Protected stroller parking is provided beyond the booth. *Hamill Family Play Zoo*, Brookfield Zoo, IL. (Design: MIG) Photo by Ko Senda.

Play and learning programming

Programming (not covered in detail in this publication) should reflect the mission, goals and objective of the project as conveyed in the design and management program. It may include science learning, the expressive arts, and many other possibilities. At the Hamill Family Play Zoo (an innovative child-centered model launched in 2000 at the Brookfield Zoo near Chicago), programming is focused on helping

5.5



children develop an emotional attachment to nature through hands-on experience and dramatic play facilitated by playworkers.¹⁰³

In both open and controlled-access spaces, play programming may help to instill a sense of stewardship among users, reinforced by secondary communication via signage, brochures, websites, etc. Programming requires trained staff, which on the one hand increases play value and educational benefits but also increases cost. Staff capacity may also need to include site management, which could be invested in the same individual or spread across a group responsible for developing and delivering programs.

Type and size of organization

The organization sponsoring the nature play and learning space will influence the level of management responsibility and degree of freedom. For community leaders and nature play advocates, an understanding of the pros and cons of different organizational contexts may help determine which to target to promote nature play and learning spaces.

Governmental organization usually implies navigation of a large bureaucracy, which can be time-consuming and at times frustrating. However, once nature play and learning policy has been adopted, fundraising is legitimized and action plans can move ahead assured of some level of stability.

Nongovernmental organization (often a nonprofit organization) is usually smaller, less bureaucratic, with creative initiative more likely to be celebrated. Collaboration between government and nongovernmental entities can result in a win-win strategy for nature play and learning programming, especially in local parks.¹⁰⁴

Resource availability is usually a key controlling factor on progress. An important role of the management team is to devise ways to creatively stretch budgets by organizing and training volunteers in both site management and play and learning programming, seeking material donations, reaching out to high schools and colleges to establish service learning opportunities, etc. Applied to nature play and learning spaces, best

5.5 Many national government and nongovernment organizations have joined the children and nature movement as symbolized here. Many similar state and local organizations promote getting children and youth outdoors—in nature.

ENVIRONMENTAL MANAGEMENT

Best practice environmental management applied to nature play and learning spaces recognizes the necessity of flexible trade-offs between the human development goals of nature play and learning, and environmental protection. Historically, “best practice” was introduced in the U.S. Clean Water Act (1977) as “best management practice” (BMP), which has become a broadly applied concept but limited to water quality resource management.

practice management provides a flexible framework that recognizes the reality of innovation as an open-ended work in progress. In 2014, the Natural Learning Initiative published best practice guidelines for the design and management of child development center outdoor learning environments.¹⁰⁵ The Sustainable Sites Initiative¹⁰⁶ offers a relevant, broader site design best practice framework, which could encompass the specialized field of nature play and learning. Also of note is the excellent Play England publication, *Nature Play: Maintenance Guide*,¹⁰⁷ which discusses nature play management and maintenance linked to research-informed staff training guides used by the UK Forestry Commission.¹⁰⁸ Even though the U.S. context is different, many of the principles are adaptable to U.S. conditions.

Ecosystem thinking

Ecosystem thinking is especially relevant for a new site. How can it be designed and managed to reflect local ecosystems so that users will experience firsthand the place where they live—their “ecological address.” Each has climatic and physiogeographic characteristics that influence soils, water, topography, and animal and plant life.

Ecosystems vary enormously in quality and vulnerability, which may greatly influence the approach to design and management. Is the site of high, average, or low ecological value? Are ecosystems being restored as part of the renovation (see Chapter 5)? Can users be involved in the restoration process? Can the site be easily adapted to nature play and

learning? Is the intended nature play and learning site near or adjacent to a manufactured equipment playground, which may create some positive synergy between the two models?

Healthy ecosystems support dynamic landscapes that grow and change over time. Regardless of whether a nature play and learning space is initiated as a renovation, restoration or new construction site, managers will need to plan for long-term landscape evolution. Landscapes installed at a single moment in time risk trees aging out simultaneously, which can be avoided by choosing species with different growth rates and climax conditions planted in phases at different times. By recording initial conditions and following management protocols, present and future managers can implement informed decisions. What if the site is a tree-less Midwest tall grass prairie, where the aim is to conserve its strong ecological identity? The management protocol would possibly include controlled burning. A restoration site such as the Blanchie Carter Discovery Park (Case Study 10, p.172) has the same need for recordkeeping, which can also support curriculum objectives.

Basic ecological health is reflected in water and soil conservation and the diversity of plants (native or otherwise). As these factors vary by region, management plans will benefit from advice from local experts in Cooperative Extension, the State Soil Survey Office, and/or state and local water quality regulators and arborists found in departments of environment and natural resources.



Water

Water is not only recognized as a finite, planetary resource essential to life, it is also the most popular play setting for children. Protection of water quality is enshrined in multiple regulations and best management practices (BMPs) across all levels of government. This suggests triple responsibilities of managers to, a) make sure “playable” water is available, b) ensuring that environmental quality is not permanently compromised, and c) that users of all ages are helped to understand the need for water quality protection and how to do it. For example, best practice means harvesting rainwater and retaining as much as possible onsite for irrigation and/or for feeding aquatic features such as streams, ponds, and wetlands to extend play and learning possibilities.

Soil

Human life depends on soil. Our food is grown in soil or animals used as food eat plants growing in soil. Caring for soil and helping visitors understand its importance are tasks for site managers and educators. Protecting soils from erosion is critical. Onsite soil quality enhancement can be implemented using permaculture practices such as composting, mulching, and vermiculture. Hands-on opportunities for children to participate will help them understand the difference between good and poor quality soil and how to improve the latter.

Plants

Plants are the most important components of nature play and learning spaces and the activity settings they contain. To maximize benefits as hands-on resources, an informed management approach is required, which offers guidance on types of plants, their selection, and placement, as described below.

5.6 Soil quality is a key to ecosystem thinking. Here, students examine a soil profile. Photo courtesy George R. Hess, NC State University.

5.7 Ecosystem thinking includes the basic parameters of water, soil, and vegetation (and therefore healthy animal habitats). All work together in dynamic synergy. Here, a “constructed wetland” demonstrates keeping storm water on site as an aesthetic/ educational feature. *Emerson Waldorf School*, Durham, NC.

5.8 Vermiculture fascinates children. Here, a plastic container with food waste and shredded paper as the medium. The resulting compost is used to boost quality of the vegetable garden. *Preventing Obesity by Design*, NLI, NC State University.

Basic plant types

There are many ways to classify plants, ranging from detailed, systematic scientific nomenclature to popular everyday parlance. The types described below fall somewhere between these two extremes. The intention is to provide professionals from fields other than horticultural science and lay persons with appropriate terminology and background information to be able to converse with others and to make informed planting decisions. At the beginning of the project, ensure that a plant assessment is conducted to identify existing species, particularly those that may be native or invasive or toxic.

Native plants (or “natives”) are often preferred because they are considered better adapted to local conditions. However, this is not always true, as many introduced plants demonstrate equal adaptation to a particular locale. Technically, native plants have co-evolved with a given locale. Hence, native plants are better choices for supporting populations of local pollinating insects and are far superior to introduced plants for serving as larval host plants for beneficial lepidopterous insects (order of insects that includes moths and butterflies). Some natives exist in narrow eco-niches because they are adapted to rare habitat conditions; other natives are widespread because they are adapted to a broader range of conditions. However, plant distribution is influenced by other factors besides site adaptation. The new reality of global climate change continues to influence plant adaptation and distribution, resulting in constantly evolving definitions and interpretations of nativity. For example, the USDA Plant Hardiness Zone Map, which defines limits of plant adaptations based on latitude and other physiographic conditions, has been updated several times since being launched in 1960.

Introduced plants are non-natives introduced through human activity to a new locale where previously they did not exist but are adapted to

the same conditions as existing natives. Through the course of time, introduced plants may become “naturalized,” meaning they are able to reproduce and spread without human help. Invasive plants (see below) are a problematic, to-be-avoided, small subgroup of introduced plants.

Ornamental plants (or “ornamentals”) are bred for special qualities such as color, fragrance, architecture, texture, and seasonal appearance; therefore, a single species may include many varieties (often called “cultivars”) exhibiting different characteristics. Native or introduced plants can be ornamental, and vice versa.

Exotic plants (or “exotics”) is a broad term previously used for non-native plants, now abandoned by the green industry but potentially encountered in popular usage.

Invasive plants (or “invasives”) are non-native species dispersed by humans, animals, wind, water or other forces of nature to new locations where they can dominate local ecosystems to the point where basic equilibrium is severely compromised or destroyed. The definition of invasive can be problematic because in one location a species may be invasive and in another not so. Native plants can show invasive tendencies in some cases, especially in habitats that have been disturbed by human activity.

Native and non-invasive introduced plants should be considered the gold standard for play and learning spaces. Ornamental types have a role to play, too, because they attract and entertain children, especially when used as “surprise” elements. Examples include aromatic plants, such as lavender or rosemary, or non-invasive clumping bamboo, which can create an appealing sense of magic.

Plant selection

Selecting the proper plants, installing the plants correctly, and attentive management immediately after planting are keys to success. A variety of factors should be considered when selecting plants to use in a nature play and learning space to help ensure long-term success. Criteria to consider include:

Purpose. Consider the purpose of the plant, shrub, or tree. Different plants may provide shade; offer habitat value to attract wildlife, including local pollinators; create a windbreak; provide seasonal color, etc., and should be selected with those purposes in mind. Inclusion of edible species may be appropriate and feasible.

Availability. The types and specific cultivars of plants available for purchase vary by region, season, and vendor. Supply of specific species can be a problem, especially of uncommon native plants, which may have to be ordered bare root from afar. Be sure to ask around if looking for something specific, but because of the variability, it is best to keep the purpose of the plant as the main goal and to be flexible about the specific cultivar. The best advice for managers is to establish relationships with local nurseries and tree farms as they can be a great source of local knowledge and may be willing to grow plants for a guaranteed market.

Size. Select intermediate-sized plants, meaning not too small (can get trampled) or too large (more expensive, difficult to move without equipment, and harder to adapt to new soil/irrigation/shade conditions).

Growth rate and eventual size. A mix of fast, medium, and slow-growing species is usually desirable, especially for an initially barren site so that it quickly becomes green, which is one of the best ways to attract enthusiastic visitors. However, rate of growth is associated with longevity. Fast

growing trees mature faster and do not live as long as slower growing trees, so a mix is important. Small and medium-sized trees or large shrubs are usually more appropriate. They still provide adequate shade, can be positioned to allow varied sun penetration to support understory planting and can be flexibly located relative to activity settings. Large trees tend to shade out large patches of ground and inhibit understory vegetation.

Mix deciduous and evergreen species. The key point is to mix deciduous and evergreen species so as to avoid a bland winter landscape. Evergreens can add foliage interest but also colored berries and wildlife attraction, can respond to the wind, and add visual interest to snow cover. If possible, avoid locating evergreens on the south side of activity settings where they will block winter sunlight. To the contrary, locate deciduous shade trees on the south side so they will let the sun through in winter but shade the setting in summer.

Cost. Affordability of plant material is one of the biggest considerations. Larger plants, shrubs, and trees will cost more money to purchase, but also can help create more immediate impact. Larger trees often require significant effort and cost to install, while smaller ones may be more easily installed, even without professional assistance. On a tight budget, consider balancing smaller, more affordable plants with several larger specimen plants.

Health and quality. When selecting plants from a nursery or garden center, inspect the plant for general signs of health. If it appears damaged, diseased, or as if it is struggling, choose a different plant. Look for vibrant leaves, new growth, and healthy root systems that are not excessively crowded.

Time of year. If possible, install new plants during their dormant period, so that plants have the

chance to grow roots and establish themselves, and will be easier to maintain during hot, dry spells in the summer or harsh winter. Depending on location and time of year, plant selection may be limited.

Trees and shrubs

Tree and shrub selections are the most important plant decisions, especially trees because they are costlier and require more effort to plant. Other types of plants are smaller and less expensive. The manner in which trees and shrubs are grown and sold—container grown, ball-and-burlap, and bare root—can have a significant impact on decisions and their consequences.

Container grown trees and shrubs are more easily transported and are usually available year-round at nurseries—an advantage when the ideal planting season doesn't coincide with project completion. The disadvantage of container grown material is the possibility that the plant will be pot-bound, meaning that the roots run out of growing space inside the pot and begin to encircle the root ball, essentially strangling the plant. This can be avoided by inspecting roots at the nursery and by taking measures to loosen the roots before planting to help guide them outwards.

Ball-and-burlap trees and shrubs are grown in a nursery field and dug out prior to planting, leaving a “ball” of soil intact around the roots, which are wrapped in burlap fabric. These trees tend to be larger, more expensive, and more difficult to transport, and require more people-power to install on site. However, they will generally establish themselves in their new environment quickly if planted and irrigated properly, making them a good investment for “specimen” trees (for special places) or in areas where shade is needed as soon as possible.

Bare root trees and shrubs are grown in a nursery field, then harvested by digging them from the

ground while the tree is dormant and removing all soil from the roots. This makes them easy to transport and ship. Many fruit and nut trees are sold in this manner, and need to be installed immediately upon arrival to the site, since they have no soil on their roots and can dry out quickly.

Plant placement

Many variables affect plant placement decisions, particularly sunlight, shading implications, and water and soil requirements, all of which vary greatly by specie. If possible, install trees and shrubs during their dormant season.

Care

For new planting, an initial management protocol should focus on staking, pruning, fertilizing, mulching, irrigation, and weed removal during the “nurse period”—up to five years depending on plant size and site conditions. Minimal annual pruning, if required, should include careful thinning for plant health and visibility (to avoid young children being completely hidden by dense planting). Edible, fruiting species may need more attention.

Managing the wild

Plants are what visitors see, which may directly influence perceptions of the nature play and learning space as being messy or tidy. Some settings likely need to appear tidy—around the entrance for example. In contrast, “far flung” settings may be managed as wild and jungle-like as possible. To achieve this range of visual and ecological quality, managers need to create protocols across the manicured-to-wild spectrum, define zones where each level should be applied, and train the landscape maintenance crew to implement the management protocols. At the “wild” end, fallen material can be left in situ to decompose and support the forest floor ecosystem. An annual inspection by a licensed arborist may be required to ensure that trees are safe and will not drop limbs.



5.9



5.10



5.12



5.11

5.9 Managing the wild requires protection devices or fences and railings—mostly the latter, not to keep people out but to direct traffic, ensure fragile plants don't get trampled, and to differentiate activity settings. Here, in a central-city park, a single, steel rail, 12-15 inches above ground, has an obvious effect in protecting wild plants. Notice the anti skateboard bumps. *Teardrop Park, NYC* (Case Study 3).

5.10 A higher, welded, steel rail effectively separates the main path from the woodland but still permits access for children wanting to explore. *North Carolina Zoo, Asheboro, NC.*

5.11 Hoops fashioned from standard, steel rebar are used to deter "corner cutting," thereby protecting plantings—a simple, inexpensive, sustainable solution. *kidZone, North Carolina Zoo, Asheboro, NC* (Case Study 8).

5.12 Edging constructed from saplings harvested on site provides protection to new plantings until they become established and can survive on their own. Such a method usually lasts for approximately five years until the ravages of time (insects, rot, and weather) get the upper hand. *Discovery Cove, Bay Area Discovery Museum, Sausalito, CA.*

Seek professional advice from a County Agricultural Extension Officer, horticultural expert, landscape professional or qualified plant nursery staff on all vegetation management matters, including plant selection, placement, care, and related topics such as specialized pruning.

Locally sourced materials

Sustainable management includes using locally sourced materials, such as stone, boulders, masonry, sawn timber, un-sawn trunks, and many other materials both natural and manufactured. Pieces of fallen tree and items such as large rocks can sometimes be "salvaged" from construction sites with a community-minded contractor willing to drop items off at a nature play and learning site.

Balancing impacts of users and environment

Achieving a balance between user engagement and protecting the existing landscape from damage is a management challenge. As described earlier in relation to pathways, single-rail fences are critical to ground-level plant protection and can be installed—even temporarily—as a management procedure to help worn settings recover or newly installed plantings to become established. Railings are not to keep children out but to protect plants from the unintentional damage of wandering children intent on having fun. Trying to get children to "be more careful" defeats the purpose of creating natural settings where the idea is that they should freely explore nature through play. An alternative measure is to close off worn areas as fallow land until recovered—and reopen next season. An important function of the management protocol is to periodically measure the effect of protection so that the balance between use and environmental impact can be calibrated. ■

Risk management

“The desire for safety stands against every great and noble enterprise.”

—Cornelius Tacitus, Roman historian (55–120 AD)

Risk management in children's play settings has historically focused on injury avoidance, and standards for manufactured play equipment (ASTM) and playground guidelines (CPSC) were developed to achieve that goal. Unfortunately, an exclusive focus on injury avoidance has tended to produce uninspired, “cookie-cutter” playgrounds with diminished play value.¹⁰⁹

Nature play and learning places are of interest in part because they offer a more varied, challenging, and stimulating play environment with greater potential play value than that available from strictly manufactured equipment. Providers of natural play and learning opportunities must pursue two goals simultaneously: “to offer children and young people challenging, exciting, engaging play opportunities while ensuring that they are not exposed to unacceptable risk of harm.”¹¹⁰

This is not a simple task. One rule does not fit every setting or organization. Each provider must decide what level of challenge is appropriate for their particular situation—depending on age, level

of supervision, and degree of modification of the natural setting. For example, a supervised natural outdoor space may allow children to take greater risks relative to the children's maturity level than a public park where no supervision is provided. In each context, the management goal should be to create an ongoing balance between developmental benefits and risk of harm.

In nature, many children will seek play and learning opportunities to engage and challenge themselves, foster their curiosity, and provide risk-taking that is appropriate to their individual developmental level. Children normally recognize risks, make judgments, and respond within or at the limits of their skill development. Under these developmentally appropriate circumstances, injury is unlikely. Consider this example:

A circuit of horizontal and angled logs has been installed for children to climb on, to step or jump from one to another, practicing balancing skills, and jumping off having completed the circuit. The size of the logs, the height above the ground, the inclination



6.1

angles, the gaps between them, and the overall scale appear to have been carefully considered to attract children 5 years old and older who jump from one to another to complete the circuit. However, the more skilled 4-year-olds are not to be left out and try climbing on individual logs. Some succeed and delight in jumping off—and endlessly repeat the climbing-jumping sequence. Others see the climb as too challenging and zigzag around the logs at ground level. At other times, this multipurpose setting serves as a meeting circle. Older children who read the setting as insufficiently challenging self-select out and find something else to do.

Children attracted by the level of challenge of the logs experience the risk by balancing above ground, judging the distance between logs to traverse, exercising gross motor skills as they leap from log to log, and enjoying the sense of accomplishment at the end. From previous experience, the children have learned that if they judge the distance incorrectly they might lose their balance and fall but likely will stay upright and, if not, may experience a knock or scrape. In this example, an unacceptable risk of harm would be present if the logs appeared to be anchored but in fact were not and could topple when children stood on them.

6.1 A child carefully “tests the affordances” of logs spanning a small stream as he faces the challenge and calculates the risk of crossing to the other bank. At the same time he is honing psychomotor balancing skills that may be put to use later in life as gymnast, fireman, or just navigating a piece of furniture down a staircase.

HAZARD, RISK, AND INJURIES

Words like “hazard” and “risk” are often used interchangeably and without precision, but it is important to have a shared agreement about what the terms mean to achieve the desired outcome of a play and learning space that is challenging, but does not present an unacceptable risk of harm.

Hazard refers to any potential source of harm. “Hazard” is often used to describe a situation that is unacceptable and requires mitigation, but a moment’s reflection makes it clear that hazards are present in every situation, in the sense that any action or object has the potential in certain circumstances to cause harm.¹¹¹ Even safety materials in certain circumstances can be hazards; pea gravel and poured-in-place rubber surfacing are commonly used for impact attenuation, but they are also choking and burn hazards under certain conditions. The challenge for the risk manager is not to eliminate all hazards, but to assess the risk presented by the hazard, and to remove hazards that in present and foreseeable circumstances present an unacceptable risk of harm. “Dangerous” and “safe” are also used to describe children’s play settings, but

they are imprecise, contribute to unclear expectations, and therefore are not useful.

Risk is defined as the combination of the probability of occurrence of harm and the severity of that harm. A *Risk Assessment* involves consideration of the developmental benefit of the hazard, the probability that the hazard will cause harm, and the likely severity of the harm.¹¹² Risk is present in virtually every situation both in nature and in life, and part of growing up is learning how to navigate risk. A setting devoid of risk is boring and, from a developmental perspective, lacks opportunity to develop skills and judgment. For this reason Frost concludes that, “a reasonable risk level is necessary in play but, as in other life activities, there must be limitations on the degree of physical risk.”¹¹³

6.2 Which situation poses a hazard, if any? What are the relative risks and benefits of each? What is the adult role in each situation, if any?



Severity of injury can be described in terms of the Abbreviated Injury Scale, with range of severity from 1 (minor) to 6 (unsurvivable injury).¹¹⁴

An important goal of a nature play and learning space is to present and maintain a reasonable risk level, so that challenging, interesting conditions are present but an unacceptable risk of harm is not. In conditions of reasonable risk, minor injuries, such as scrapes resulting from a boulder scramble, should not be regarded as adverse outcomes at all—unless they indicate the presence of an avoidable or bad risk such as a hidden sharp object, or a design or other fault that is likely to cause more serious injury. Risk of severe and life-threatening injury should be vanishingly small—but it is important to observe that, short of removing all trees and draining all bodies of water, some risk will remain, and the occurrence of serious injury is not in itself evidence of a poorly managed space.¹¹⁵

A reasonable risk relates to the play “affordances” discussed earlier. As children move around their environment, they “read” the risk affordances, evaluate them, and choose whether to activate them. In this way, risks are learned and mastered. With the newly acquired skill, the child seeks out and tests new levels of risk. As described in *Managing Risks*, “Good risks and hazards in play provision are those that engage and challenge children, and support their growth, learning and development. Bad risks and hazards are those that are difficult or impossible for children to assess for themselves, and that have no obvious benefits.”¹¹⁶ A manager will strive to cultivate good risks, and eliminate bad risks.

An example of reasonable risk comes from the Santa Barbara Natural History Museum’s fort building station, which consists of lengths of bamboo poles up to 8 feet long and four inches in diameter (6.4). Children lean the lengths against a slanting tree to create a temporary structure, and regularly



remove, adjust, and replace the poles. One day a child remained under the structure while other children were dismantling it and a pole fell and struck her head. The child cried for a few minutes before resuming play and the adult supervisor asked her, “What did you learn from that experience?” “Not to stay under the fort when we are taking it down,” she replied.¹¹⁷ Despite the risk of being struck by a pole, the risk was reasonable, because the poles were light enough not to cause even minor injury and because there is developmental value in the fort building activity. To the manager’s knowledge this was the only time that a child had been struck by a falling pole, which suggested that most kids were able to “read” the risk and avoid falling poles. Even the child who did not catch on at first will probably not be surprised again!

6.3 Tree climbing, once an unquestioned, quintessential, right of childhood, now appears contentious. Nonetheless, any tree-climbing kid can discriminate between “good” trees (like the one pictured here) and the to-be-avoided variety (lowest branches too far from the ground, not enough limbs and/or angles too vertical, insufficient crotches to hang out in, etc.). Why is tree climbing so attractive? Is it dangerous? What are the facts?

6.4 (Inset) “What did you learn from that experience?” “Not to stay under the fort when we are taking it down,” she replied.

DEVELOPING A RISK MANAGEMENT PROTOCOL

This guide is not intended as legal advice, nor is it intended to establish design standards. Instead, we urge managers to establish a systematic risk assessment and management protocol in order to provide a stimulating play environment while eliminating exposure to unacceptable risk of harm. An effective **risk management protocol** can be developed by following the steps below:

Step 1

Determine applicable design standards and standards of care in your jurisdiction.

There are no national design standards for nature play and learning spaces, and applicable liability standards are generally established by state legislatures. At the time of publication, to our knowledge no states or regulatory bodies have adopted design standards for nature play and learning spaces.

Managers should be aware of the following standards and guidelines for traditional manufactured playgrounds. The American Society for Testing and Materials has promulgated standards for manufactured playground equipment and for impact attenuation systems under and around playground equipment. An additional source is the Consumer Product Safety Commission's Handbook for Public Playground Safety. Because the field is changing rapidly, it is important that managers determine what design standards, if any, are applicable to a nature play space in their jurisdiction.

Even if there are no binding design standards for nature play spaces, the standard of care will likely be identical for a nature play space as for manufactured play equipment because both are designed and intended for use by children. The applicable standard of care is determined by case law in state courts, or by state legislation. Many states have adopted recreational use statutes, which modify the common law standard of care to favor providers of recreation, but these statutes vary widely in terms of which types of landowners qualify under the

statute, so it will be important to consult your agency's general counsel or a recreational law authority in your jurisdiction.

Generally speaking, while a manager has no duty to mitigate or warn users of dangers in an unmodified natural area, if the area is designated as a nature play space or modified with the intent that it serve as a natural play space, the manager will have a duty to remove dangers that are not open and obvious to the intended user and that present a risk of injury above what is acceptable to society.¹¹⁸ In some cases a nature play area may include traditional manufactured play equipment and, while the presence of manufactured elements will not change the treatment of natural elements, a manager can expect that the same regulations and standard of care will apply to the manufactured equipment as would be the case if it was installed in a traditional playground.

Step 2

Engage your insurer or risk manager.

Adequate insurance coverage is essential to every agency, so it is recommended that an agency's insurer be engaged when planning a nature play space, since private insurers may have their own risk management requirements. This early consultation will allow you to make a case for your design and risk management plans, and will avoid unpleasant surprises after funds have been invested. Agencies that are self-insured will have considerably more flexibility in developing the risk

management policy of their choosing, but it will still be important to engage internal risk managers early in the planning process.

Step 3

Conduct a risk assessment and eliminate hazards presenting undue risk of harm.

The more common hazards that apply to nature play risk management are summarized below.

Potential for falls. The greatest cause of injury on standardized playgrounds is falls. The risk of injury increases with height. When placing natural objects such as logs and boulders that are intended to be climbed, consider what a child might land on if he or she were to jump or fall off. Low stones, logs and stumps that have no moving parts and minimal fall heights less than 24 inches reduce the need for safety surfacing. However, when creating permanent structures utilizing natural materials, careful consideration should be given to design and installation in relation to the extensive knowledge about how and where children are injured on standardized playgrounds—particularly height and surface material. Information regarding impact-attenuating surfaces is available in the Consumer Product Safety Commission's *Handbook for Public Playground Safety*, publication No. 325.¹¹⁹ Remember to also give consideration to installing surfacing that would enable a person using a mobility device to interact with the object.

Trees in designated play spaces raise issues related to falls. Generally speaking, the risk of falling from a tree after climbing it would be considered an open and obvious hazard, so no modification of a tree to prevent climbing is necessary since even a child climbing a tree would be seen as assuming the risk of doing so. But if climbing aids are installed, allowing children to ascend to heights greater than they could have reached on their own, the modified tree would be viewed the same as a



manufactured climbing structure and additional fall-prevention and impact-attenuation measures should be taken. In both cases, if children are known to climb a tree, attention should be given to removing shrubs or smaller trees that might injure a falling child, placing additional wood fiber to offer fall protection and keeping the ground from becoming compacted.

6.5 The bamboo pole is part of a risk-management protocol and marks the allowable height for preschoolers at this child development center. Logs serve as “boosters” to get to the first limb.

6.6 No doubt this huge old tree, placed in a regional park nature play area, is an attractive climbing opportunity. The contorted, remnant root ball is an intriguing spot to explore and must stimulate many dramatic play episodes. To what extent are the root ball and trunk hazards, if at all? If so, why? Is there a risk of entrapment? How? What about the space under? Is that an entrapment possibility? How can the risks be measured? How can they be equated with the benefits of playing there?



Head Entrapment. Head entrapment can occur when a child enters a completely bound opening feet first, then slides his or her body through the opening and entraps their head. Entrapment is more likely to occur for children under 5, as their heads are larger than their shoulders or trunk. For manufactured equipment, completely bound openings that measure between 3.5 inches and 9 inches must be evaluated to determine whether they are entrapment hazards. In nature play and learning settings, these same measurements may be used to evaluate the configuration of openings that could be considered head entrapment hazards. Examples could include a situation where several logs or branches are permanently attached to one another to construct a fort or a climber, or a hollow log with openings that children can climb in and out of. Such a log should be evaluated for completely bound opening entrapment.

Protrusions. Clearly, nature is full of protrusions, so their potential to cause injury must be carefully considered but with discrimination. Some of the most common potential hazards are the ends of pruned branches of trees and shrubs at the eye height of children. However, the harmful potential varies greatly by species. Plants with rigid, horizontal branches are the most obvious. Another situation with similar potential could be the exposed rootball of a fallen tree. In this case, eye level roots that a child could run into or fall against would be trimmed and/or sanded smooth. Small vertical projections, such as a broken branch or the sharp stump of a small diameter tree, should be evaluated as hazards if it is possible that a child could fall and be impaled or bruise an internal organ. Stumps or roots presenting this sort of risk should be removed.

Stability. Natural objects installed in the environment should be stable if the intent is for children to sit, walk, stand or climb on them. For example, a stack of large stones used for seating or climbing should either be heavy enough not to move under the weight of many children or should be securely anchored.

Step 4

Conduct a risk assessment of natural features within a designated nature play space.

Generally a manager has no legal duty to assess and mitigate risks in an unmodified natural space. But if an area is designated a nature play space, all features of the space will need to be assessed to ensure that the level of risk presented is reasonable for the intended audience. For example it is foreseeable that dead limbs in a designated play space might fall and injure the children who have been invited to play there, so the agency has greater responsibility to inspect and trim dead limbs.

Step 5

Develop an inspection routine.

An inspection routine should consist of a reasonable inspection schedule and a checklist that identifies potential hazard sources for each setting. The checklist may vary depending on the type of space and geographic location. For example a checklist from Five Rivers Metro Parks applies to a woodland natural play area and includes poison ivy, widow makers (high unsecured limbs that could fall and cause serious injury), sharps (sharp-surfaced protrusions), and landing zone surfacing. A play and learning space in an arid, treeless region that featured a boulder scramble would include boulder stability as an item. Inspections should not be limited to stagnant timeframes but should include observation of play as children may morph the intended usage to a different use than expected.

Step 6

Document and evaluate all incidents.

Developing an inspection routine for a nature play and learning space and documenting all incidents demonstrates conscientious compliance with agency risk management policy to provide safe play and learning settings for children. When required, incident evaluation includes the following steps:

1. Detailed description of the incident.
2. Did an injury result and how serious was it?
3. What was the cause of the injury?
4. Is it possible and practical to remove the cause of injury without reducing play and learning value of the space? If so, the cause should be eliminated.
5. If not, complete a risk assessment of the cause:
 - a) Is the risk of injury apparent to the children who use the play and learning space? If it is not, can it be made more apparent through signage and/or modification?
 - b) What is the likelihood of the incident recurring?
 - c) Is this level of risk acceptable to the agency and community? If the level of risk is not acceptable, the condition should be remediated.
6. A review of prior incident(s) at the site, which may indicate a level of frequency leading to a potential severity of injury.

Step 7

Maintain records of inspections and incident reports coupled with regular staff evaluations and recorded responses

This record will demonstrate consistent and reasonable risk management, and offer a defense in case of litigation.

Step 8

Communicate with users of the space.

It is important to indicate your agency's commitment to and approach to risk management. Signage on-site is an opportunity to do this, and should also provide clear information about who to contact if there are problems.

From a risk management perspective, a nature play space is no different from other lightly modified natural spaces such as trails, ponds, or playing fields. A thoughtful risk assessment and management protocol will make it possible to provide children stimulating and challenging play settings while making sure they are not exposed to unacceptable risk of harm. ■



BALANCING RISKS AND BENEFITS

Linda Kinney Manager of Playwork Programs, The North Carolina Zoo

At kidZone, playworkers accept the fundamental principle of playwork, that children cannot learn life lessons without taking risks, be they social, psychological or physical. Playworkers accept the notion that kids will occasionally get hurt—but to a minor degree. To ensure that serious hurt will not happen, the playworker must make continuous judgments about whether or not each interaction between children (usually more than one) and environment is an acceptable balance of risk and developmental benefit.

A policing approach, born of ignorance and fear on the part of rookie playworkers, lies at one end of the spectrum where the environment is so controlled and apparently “safe” that it offers little in developmental benefit. To move the needle further towards a balanced approach, volunteers needed help to recognize and observe the situational affordance and carefully but promptly consider if the play value balance was reasonable.

An underlying assumption at kidZone was that minor bumps, bruises, grazes, and cuts happen as an integral aspect of adventure play—the adventure of life, if you will. The purpose of risk management is to avoid serious injury by ensuring that potential hazards are not present. The zoo’s design team helped locate items appropriately and to anchor them in place.

One day a large, upside-down root ball was installed. Although considered a “natural play object,” it was positioned completely un-naturally. Playwork staff considered it their obligation to ensure the absence of sharp root ends that could result in eye injury or entrapment. Careful inspection resulted in removing or sawing off the ends of hazardous-looking roots and sanding the ends to reduce sharpness—actions which did not affect the play value of the whole.

Implementing nature play and learning places

“The ultimate test of man’s conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard.”

— Gaylord Nelson, former governor of Wisconsin, founder of Earth Day

Successful project implementation entails key factors such as leadership, community engagement, a viable site, finances, and trained staff. Project completion may be constrained by budget and occur in increments over time, though managed as a viable nature play and learning space from the beginning. The primary principle is to initiate change—even on a pilot basis—so that something tangible appears on the ground that staff can work with, thereby learning-by-doing. The kidZone play zoo at the North Carolina Zoo started this way, allowing staff several years to test a variety of low cost, temporary settings to discover how well they

worked (*kidZone*, Case Study 8, p. 164).

Possibly the most important point is to recognize the diversity of possible projects, which may range from a few thousand dollars (or even just hundreds by using volunteers) required to open up a wooded lot to neighborhood kids for nature play, to large projects serving a regional population and costing hundreds of thousands of dollars. Likewise, the need for professional landscape assistance may be minimal at the modest end (although always a good idea that may save money in the end) but essential at the upper end—with many variations between the two extremes.



7.1

INITIAL PLANNING

History tells us that great projects, like great social movements, are often initiated by a single champion who has a bold idea, is able to articulate it, starts to proselytize, perhaps has good political connections, and gathers together like-minded believers as a coordinating committee to start the ball rolling. Then what?

Institutional partners need to be engaged. A community engagement process must be defined. A stakeholder group needs to be formed, alternative sites and organizations identified and evaluated, kick-off funding support needs to be raised and, depending on circumstances, a project coordinator or manager appointed. These and several other steps may be considered initially and feature in the planning and implementation process (7.2).

7.1 Planning nature play and learning places always starts with people—getting organized and focused. Timing is crucial so that energies coalesce around the project to map out its scope and make decisions before energies begin to dissipate.

7.2 Implementing a nature play and learning place usually involves five key stages covering many steps. Of the 23 listed here, some may not apply as conditions vary greatly between one project and another.

steps to follow

PLANNING, ENGAGEMENT, DESIGN AND IMPLEMENTATION PROCESS

Creating a sustainable nature play and learning space is a process with many possible steps, which may not all be required for every project. The five key stages are outlined below:

I. Initiating the planning process

01. Create a coordinating committee and stakeholder group, and possibly a nonprofit organization; or
02. Collaborate with an existing organization;
03. Engage with prospective government and nongovernment partners and collaborators;
04. Find a suitable site;

II. Defining the community engagement process

05. Define the scope of the project;
06. Organize a participatory design process;
07. Search for kick-off funding support;
08. Appoint a designer and/or site manager;
09. Conduct a community survey;
10. Organize a stakeholder design workshop;
11. Organize a children and youth design workshop;
12. Produce a progress report;

III. Creating a design program/design

13. Develop a design and management program;
14. Create a site design with continued support of the coordinating committee;

IV. Raising money

15. Launch a capital campaign;
16. Use the completed master plan as a fund-raising tool for construction funding;
17. Execute value engineering if necessary;

V. Implementing the project

18. Move ahead with construction documents and selection of contractor(s), once funding is secured;
19. Appoint a manager and program staff;
20. Invite the community to a ground-breaking ceremony;
21. Proceed with construction/installation;
22. Organize a grand opening/ribbon-cutting ceremony;
23. Manage the site for success.

INSTITUTIONAL ENGAGEMENT

Nature play and learning spaces can be created in a variety of locations (Chapter 3), each within the jurisdiction of an organization (Chapter 5). A first step for local advocates searching for sites and implementation strategies could be to scan and assess the range of organizations and alternative potential pathways to success. Institutional alternatives and their characteristics include:

City and county parks work with appointed volunteer citizen boards that set policy, which is implemented by professional staff. Some systems contract out specialized programming responsibilities to nonprofit organizations, which could be the case with nature play and learning. Initial contact could be made by staff or by an advocate group in the community. In either case, the proposal should be brought before the parks board for endorsement. If board opinion is divided, suggest launching a pilot project with high visibility for a summer or year in a location where the chance of success is high.

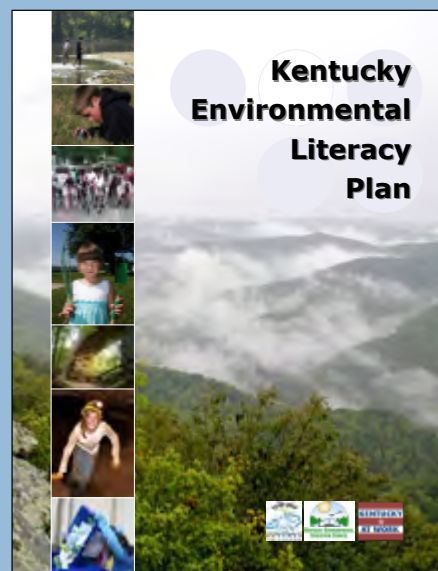
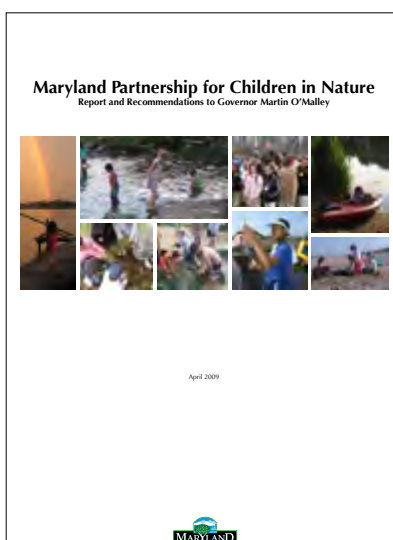
A pilot project may be the first feasible step to help staff get their feet wet and confirm community support. If the pilot is successful, the department will work out how to proceed and whether an external organization could be involved. The scope of management will depend on whether a programmed space is proposed or not. A management committee could be formed hosted by the parks board, with representation of local community groups and stakeholders such as schools, childcare centers, churches, banks, and civic organizations—and, of course, children. This group would be responsible for developing and implementing the design, related management plan, and fund-raising strategy.

Public schools are governed at county or city level and in some cases as entities independent of such jurisdictions. Typically, school policy is set by elected bodies and implemented by professional staff. Although some city school systems

have implemented explicit school grounds renovation programs, few, if any see school grounds as primarily nature play and learning spaces. For decades, scattered individual schools have taken this approach but, without a formal mandate, such efforts are vulnerable. Management of school grounds typically falls under the physical plant department (rather than curriculum and instruction). However, the growth of site-based school management, with teachers and parents asserting more influence, may increase possibilities for improving and managing school grounds, which could lead to “joint use” for nature play and learning as discussed in Chapter 3.

Independent schools are more likely to value nature play and learning as part of their educational philosophy and may be open to creative design and management of their grounds. Typically, independent schools run their own affairs with a board of trustees that may include leading citizens and/or alumnae, or supporters of an educational philosophy that values engagement with nature. Montessori is an obvious example of a well-established approach that embraces the natural world not only as a vehicle for learning but also within the Montessori grand vision of the child and the universe.

Childcare centers, although an obvious candidate, may require engagement with regulatory agencies to develop policies and incentives to consider outdoor spaces as nature play and learning environments. Once policy has been established



7.3 Governmental and non-governmental organizations continue to develop policies and initiatives, increasing the pathways to action on nature play and learning. Community collaboration is the vehicle.

and field personnel are on board, work at the individual site level is easier to justify and support. To empower individual centers to move ahead with naturalization, a professionally developed master plan is typically needed to guide installation, which may take place over several years of incremental development as resources become available.

Nonformal education institutions, such as nature centers, botanical gardens, arboreta, zoos, museums, and children's museums, are controlled-access sites with established educational programs and therefore offer tremendous potential as nature play and learning sites. Typically, a citizens board runs such a nonprofit organization with a passion for things natural, as well as an ability to apply political clout and access community resources. Implementation of nature play and learning may require nothing more than dedicating and managing a space for the purpose.

Camping organizations with an explicit focus on direct experience of nature and environmental stewardship, such as the American Camping Association, Boy Scouts of America, Girl Scouts of the USA, Camp Fire, 4-H, and YMCA, collectively represent great potential for promoting and implementing nature play and learning spaces—at camping locations but also, and more permanently, in the local communities they serve.

State and federal agencies administer vast land holdings with missions focused on nature conversation and getting youth outdoors. As budgets tighten, public agencies may more commonly work with nonprofit groups to install visitor facilities, including nature play and learning spaces, particularly around visitor centers, day-use areas and family campgrounds. Strong links with the local visitor communities may increase visibility, strengthen promotion, and make fund-raising easier.

Selecting a site

Site selection may involve the addition of a nature play and learning space to an already existing park, school, child development center, nature center, children's museum, zoo, or botanical garden. Or a landowner may be willing to donate or lease a site if an appropriate administering organization can be found. A residential neighborhood, local conservation organization or community group may be promoting the idea of nature play and learning and looking for a site. Nature play and learning spaces come in all shapes and a range of sizes, and may be located in an array of types of communities—reflecting the social and cultural diversity of the United States. Regardless of the situation, selection of a nature play space should be approached like any prospective development site, whether public or private. Key selection criteria include:

Size

What is the site size? Typical sizes range from 5,000 square feet (neighborhood lot), to 4 acres (serving a large nature center, for example, where at least 50% of the area is made accessible but left undeveloped for self-initiated and guided “play in the woods”). The most popular size appears to be 1 to 1½ acres, which makes sense in relation to cost, manageability, and supervision.

Community access

Is the site close to centers of population and accessible by public transit? If not, underserved populations will be less able to participate. Is it possible to collaborate with other institutions to provide transportation for their members (YMCA/YWCA, Boys and Girls Clubs, churches, child development centers, etc.)?

Boundary

Is the site already bounded by buildings, thick vegetation, fences, etc.? If so, the initial expense of enclosing the site may be lessened or avoided.

Terrain

Is the terrain varied? Are there hills and dales? Are natural landscape features with high play value present, such as rock outcroppings? If a large proportion of the terrain has steep slopes, it may be too challenging to develop the whole site and to make it accessible.

Water

Are there natural year-round or ephemeral streams on the site? Wetlands? Ponds? Is the site connected to a potable water supply, either from a well or piped, potable water for washing, drinking, and irrigation?

Soil conditions

Are the site's soils conducive to tree and shrub planting? If not, creating tree cover and ground-level, diverse planting may become a lengthy, costly process. Up to a certain point, the process can be a rewarding community engagement effort; however, if too slow and too challenging, it can become disengaging.

Environmental Site Assessment (ESA)

If the prospective site has prior use that may indicate contamination, has an ESA Phase 1 been conducted to determine if environmental contamination may be present?¹²⁰

Rare, threatened or endangered (RTE) species

Has an initial basic review been conducted to determine if RTE species may be present? Is or could the site be designated as critical habitat? Has the site been surveyed by the state Natural Diversity/Heritage Inventory?¹²¹ If so, this could result in a positive outcome leading to added educational value as well as resource protection.



7.4 Public housing Natural Learning Environment developed as a result of multiple partnerships across governmental and volunteer organizations. Project was initiated by Community in Schools program. *Heritage Park*, Raleigh, NC (see p. 139). (Design: NLI with Harriet Bellerjeau).

7.5 Young residents review master plan during on-site health festival with community volunteer.

7.6 Community service student group from NC State University works with community to plant trees donated by local nursery.

7.7 Natural Learning Environment within sight of downtown.

Tree cover

Is there variable tree cover on the site, affording a mix of sun and shade? If so, the varied microclimate may offer increased seasonal interest in both plant diversity and human comfort. Are there patches of undisturbed woodland that could afford immediate nature play and learning opportunities?

Legal status

Have the legal boundaries of the site been carefully verified by qualified professionals? This is a surprisingly common issue. There is nothing more distressing than discovering, after installation has started, that a site boundary is incorrect.

COMMUNITY ENGAGEMENT

Community engagement is the foundation of successful implementation and sustainability of nature play and learning projects. If the community is involved from the beginning, the project is more likely to succeed. By working together, the community becomes engaged in an educational process, and begins to understand the type of space needed to support nature play and learning. As people work together, develop creative ideas, and see them take shape on the ground, engagement builds social capital, which further strengthens the roots of sustainability.

Every community is different

Although the main steps described above (Figure 7.2) are typical, many variants of the process may be influenced by factors such as the type of sponsoring organization. Each community has its own characteristics and personality, its own history. The sequence of actions and mix of methods will reflect local circumstances and requirements. Successful

community design processes tend to follow predictable steps, while recognizing the need to adapt to local needs and constraints. This may present a greater challenge for urban sites in communities where crime and incivility may be issues, or that lack traditions of children being outdoors engaged in nature play.

7.8 Meaningful, enjoyable community events will bring people out. Here, the “Hoedown” celebrating the opening of the *Edible Schoolyard*, Greensboro Children’s Museum, NC, beautifully captured the moment (early Fall) and first harvest of the new community education garden in downtown Greensboro. Kids had leaf fights. The *Angel Band* (dedicated to teaching kids music) energized the evening. People “rode” horses. Potted plants for sale raised funds. Local restaurants offered their latest creations (organic, of course). An evening to remember, forever warmly associated with the institution. Priceless!



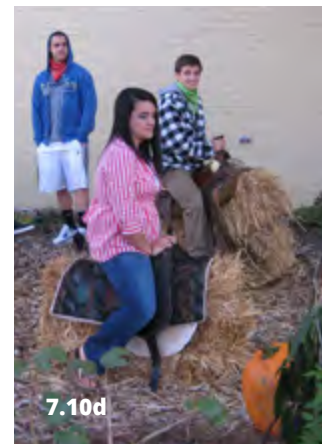
7.10a



7.10b



7.10c



7.10d

Conduct community survey

A key initial step for the coordinating committee, if possible, is to organize a community survey and/or conduct interviews with key individuals. Surveys are an efficient, systematic, cost-effective method of gathering information to inform the planning process and design program. They also serve to educate the community and can contribute to an awareness campaign. Several types of survey exist. Online surveys are usually the most efficient. Other methods include door-to-door, telephone, and mail-out. The object is not to conduct a controlled research study but to gain a broad, more substantial base of community input than is possible through stakeholder workshops or other forms of face-to-face meeting.

Survey services

Several user-friendly, low-cost online survey services exist, which work by sending the survey link to each prospective respondent in the survey sample. The most challenging first step is usually to select the sample of participants and to obtain email contact addresses. Related organizations may need to contribute their contact lists. For membership organizations sponsoring a nature play and learning space, such as museums and nature centers, the task may be easier.

Sample

Although not a scientific research project, efforts should be made to create a representative sample of prospective users; for example, with a balanced representation of girls, boys, age groups, and family culture. If resources are available, construct a stratified sample. Seek assistance from a social survey expert at a local university to help with instrument design and sampling methods. With supervision, a trained graduate student could create the instrument, conduct the survey, enter the data, and analyze the results. If resources are not available, a less ambitious survey can still be implemented. Some information is still better than no information. However, it is important to consider potential sample biases that may affect the results.¹²²

Questions

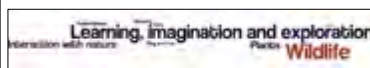
An effective survey usually contains a set of “closed-ended” questions with predetermined alternative check-box answers. Analysis of responses is therefore, almost instantaneous, like an election. Closed-ended questions should cover common sense topics or be based on an already existing valid, reliable survey tested by others or be informed by research. “Open-ended” questions, which prompt written responses, may also be used—but sparingly because analysis requires additional expertise and can be time consuming. A common open-ended question is the “other” last question in a series.

Survey structure

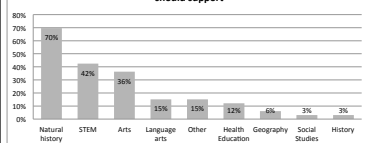
A minimum survey may include closed-ended questions related to personal demographics (race, age, gender, etc.), organization affiliations (civic clubs, scouts, city commissions, etc.), existing site-use (user or not, if so with whom, how frequently, etc.) or future site use with similar answers. Three basic open-ended questions (especially if the project is the renovation of a site currently in use) include: What do you like currently about the site? What do you not like about the site? What would you like to see added or changed to make the site an improved nature play and learning space? The latter question could be converted to a set of closed-ended questions but, if so, make sure a choice is forced (e.g., “choose top five”), otherwise respondents will be tempted to check off the whole list, which then provides no sense of priority.

Conduct structured interviews

As a follow-up to the previous question, educator respondents were then asked give a reason for their favorite. Most answers mentioned wildlife, learning and exploration, interaction with nature, and plants. The word diagram below graphically illustrates the relative frequency of each response.



Most relevant content areas the Family Adventure Garden should support



Educator respondents were asked to select from a list of content areas, which would be most relevant for the Family Adventure Garden. Responses included 70% natural history, 42% STEM (Science, Technology, Engineering, and Math), 35% arts, and 15% language arts. Respondents added comments as summarized below.

Community Survey Results: SABG Family Adventure Garden Design

10

The word diagram below graphically illustrates the relative count of each educational feature that would encourage repeat visits.



An additional open-ended question asked educators to list up to five activities that they would like to conduct in the Family Adventure Garden. The top five most mentioned responses were learning about plant and insect life, learning about plant care and gardening, observing seasonal changes, learning about different plant parts, and an observation scavenger hunt. Other responses are summarized below.

Activities	Count
Observing/learning plant/insect life cycle	9
Learning plant care/gardening	8
Observing seasonal changes	6
Learning about different plant parts	5
Observing scavenger hunt	5
Art with nature	4
Observing wildlife	4
Observing/understanding plant-animal relationship	4
Plant identification	4
Cultural garden: learning about different cultures through plants	3
Bird identification	2
Learning about ecosystem	2
Learning to make compost	2
The history of the environment	2

The word diagram below graphically illustrates the relative count of each activity that educators would like to conduct in the Family Adventure Garden.

Community Survey Results: SABG Family Adventure Garden Design

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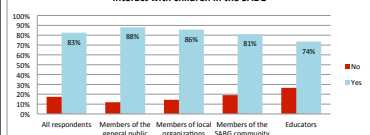
Organization respondents were asked (open-ended) about spaces or features in the Family Adventure Garden that would encourage repeat visits. Answers summarized below contain mentions of water features, wildlife, nature play, native elements, and more.

Special features code	Count
More water features	12
More wildlife	7
Nature play	7
Native elements	5
Hands on activities	4
More technologies: webs, apps etc.	4
Changes in elevation	3
Films or plays	3
Family restrooms/picnic areas	2
Butterfly garden	2
Herb garden	2
More species of flowers	2
More planting areas	2
Shade structures/trees	2
Vegetable garden	2
Observatory for children	1
Trails that lead to display	1
Sensory desert	1
Area for carnivorous plants	1
Vertical plants	1
Fully ADA	1
Involve exercise	1
Less technology	1
Loose parts	1

Community Survey Results: SABG Family Adventure Garden Design

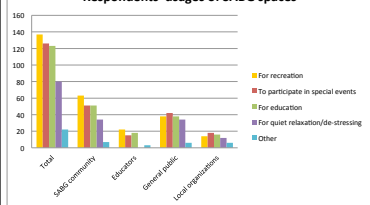
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Do you/members of your organization currently visit/bring or interact with children in the SABG



Overall, the majority of respondents (84%) reported that they currently bring children to the San Antonio Botanical Garden.

Respondents' usages of SABG spaces



Most respondents use the SABG for recreation, to participate in special events, and for education. Some people use it for quiet relaxation/de-stressing, and a few use it for other reasons. One of the most commonly mentioned "other" reason was for "volunteering."

Community Survey Results: SABG Family Adventure Garden Design

4



Members of the public were asked (open-ended question) to list up to five activities or programs that could be offered at the Family Adventure Garden to encourage repeat visits. Responses are summarized below. The top five most mentioned types of programs or activities are special classes and events for kids, butterfly/bug watching, teaching and learning about nature, short gardening lessons, and concerts/movies/storytime for children.

Five activities	Counts
Special classes and events for kids	17
Butterfly/bug watching	10
Teaching and learning about nature	10
Short gardening lessons	10
Concerts/movies/storytime for children	10
Hands-on activities	7
Art and sculpting	7
Night activities	5
Scavenger hunt	4
Drop-in days	4
Camps	4
Astronomy sessions	3
Interactive activities	2
After school programs for kids	2
Events on weekends	2
Festivals	2
Compost analysis	2
Plant identification	2
Eco-friendly educational display	1
Catch and release fishes	1
Exploring tree cookies	1
Activities for toddlers	1
Scavenger games	1
Concerts/events for adults	1
Easter egg hunt	1
Drop-free days	1
Farmers market	1
Seminars	1

Community Survey Results: SABG Family Adventure Garden Design

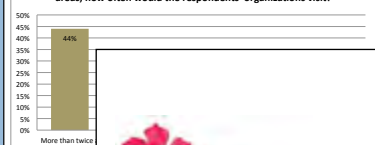
38

Insect show and tell	1
Micro & macro viewing activities	1
Nature play	1

The word diagram below graphically illustrates the relative count of each activity mentioned by organization respondents that they would like to see offered by the Family Adventure Garden.



If the Family Adventure Garden supports desired content areas, how often would the respondents' organizations visit?



Organization respondents

Garden if it supported at

twice a year, or at least

Community Survey Results: SABG Family Adventure Garden Design

Family Adventure Garden Design COMMUNITY SURVEY RESULTS

Prepared for: **The San Antonio Botanical Garden**
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March 14, 2014



7.9 Community online surveys can provide more substantial information from a range of community members than is usually possible at a community meeting. It is helpful to present the survey results at the community meeting, as information from a broad cross-section of interested parties. A successful example is the survey conducted for the San Antonio Botanical Garden (SABG). The programming phase of their new Family Adventure Garden (working title) information was gathered from four distinct constituencies: SABG members, members of other related organizations, regional educators, and the general public.

The survey was structured around the four subcommunities and reviewed through several iterations by SABG staff, who working with local organizations, created a combined email list of more than 2000. Response rate averaged more than 10%.

Results from both close-ended and open-ended questions, provided substantial information to the initial Stakeholder Workshop and helped frame key design and programmatic issues.



7.10

7.10 Structured interviews with key individuals in the community can add valuable insight and depth of information that may contribute to overall planning and design programming. Here, a focus group with Latino representatives helps the design team understand relationships between where residents live, location of park space, and related issues of perception and access.

with key individuals

Structured interviews with selected, key individuals such as elected officials and community leaders can be used to gather information about community perceptions and attitudes toward the project, relationships between groups involved, and specific ideas about particular items that should be included in the design program. Interviews also serve to inform interviewees about the project and to elicit their informal feedback.

The main purpose of a stakeholder workshop is to

Organize stakeholder workshop

A typical community process for nature play and learning projects centers on a stakeholder workshop preceded by the organizational planning phase (7.1), which may include site selection and an online community survey, as described above.

Especially if based on results of a community survey and input from key individuals, community-based workshops can serve as a principal democratic method of deciding what the design program should contain. Refer to *Principles of Facilitation* by David Sibbet, or *Meeting of Minds* by Daniel Iacofano, or *How to Make Meetings Work* by Michael Doyle and David Straus—all great sources of important advice about facilitating stakeholder meetings, including graphic recording.¹²³

develop a narrative document describing the desired development, which can be used to develop the design program.

Ending the workshop with a community event or celebration such as a cookout with local produce or nature play day, traditional outdoor games, etc., can raise awareness and help guarantee that participants leave with positive feelings.

Identify community stakeholders

It may be necessary to meet informally with individuals and small groups to identify community leaders and potentially interested stakeholders to promote the idea of a nature play and learning space.

Stakeholders may represent specific *user groups*,

such as school-aged children, families, homeschoolers, adolescents, retirees, local schools, youth organizations, people with disabilities, and groups engaged in special activities such as disc golf, kite flying, etc., and many others. *Potential user groups*, who could benefit from future site improvements, such as those with special needs (or their representatives) may need to be encouraged to participate in the project. User group needs may have been assessed via a community survey.

Broad *communities of interest* may need to be involved, such as recreation interests, early childhood organizations, environmental groups, community arts advocates, faith communities, etc. A first step may be to meet with individual representatives to clarify and prioritize their interests, including



7.11 For useful guidance about how to organize and facilitate community engagement processes and especially how to run effective community meetings/workshops, refer to the three expert books pictured below and referenced in the text.



7.12

7.12 Room set-up uses rectangular folding tables to form an open “U” accommodating up to 25 participants. The open end faces a blank wall for projection with large sheets of paper for recording key points. The meeting facilitator maintains direct eye contact with participants and is able to move around to facilitate discussion.

7.13 Alternative room set-up for a large group (if a large room is available) uses round tables (48” or 60” diameter), arranged in a semicircle, to accommodate up to 50 participants. Useful when small group tasks are part of the agenda (as here).



7.13

reaching out to engage civic organizations and governmental agencies.

Careful judgment may be required to decide which groups to invite, as workshop size is finite. Compatibility with nature play and learning may be a deciding factor.

Create a stakeholder workshop agenda

The coordinating group will be responsible for creating a detailed stakeholder workshop agenda in collaboration with other project leaders or administrative staff. A carefully detailed agenda, circulated ahead of time, is a key to success (7.8).

Workshop size and structure

Several different scales of workshop are possible. For a half-day workshop, the ideal number of participants is between 12 and 25. Fewer than 12 may imply insufficient representation of community interests. More than 25 may make it difficult to find a large enough meeting space. Also, the larger the group, the less air time per participant. Limiting the duration to half a day most likely will attract a larger

number of significant stakeholders whose time is valuable.

A full-day workshop could accommodate more participants and more time could be spent working in small groups to increase the contact time. One-day workshops with a flexible structure may be required. One-and-a-half day or two-day workshops are still reasonable for large projects. For projects serving several neighborhoods, it may be necessary to hold workshops in different locations to ensure that all voices are heard. Try to respect the “natural” spatial divisions of the community. Discuss with community leaders what would make sense—and feasible for the time and resources available.

Room set up

Room should be organized conference style with an open “U” arrangement of tables and enough space to move around comfortably. The open end of the “U” should face a flat wall, with preferably at least a 10-foot width of unencumbered surface.



Graphic record

Secure a roll of 48-inch-wide, white bond paper. Cut it into 10-foot (or greater) lengths and mount in layers on the blank wall. Graphically record in real time the main points from the meeting discussion. Identify other walls around the room where sheets could be displayed once created, so participants are reminded of results of discussion.

Assign meeting roles

Decide typical roles ahead of time. These include who's responsible for opening and closing the meeting, the meeting facilitator, the graphic recorder (both roles could be performed by a single person), and meeting minutes-taker to enter the record directly into a laptop computer.

Workshop segments

Warm-up exercise

Make the first segment personal and individual. Ask each participant to express on paper (pictures, words, diagrams) a vision of what the nature play and learning space should be or become—without thinking about feasibility or cost. Subdivide into small groups to share visions and ask each group to appoint a spokesperson to take notes and present results to the larger group. Are there common themes? Challenging issues? Compelling ideas? Discuss.

Define project mission/vision

Frequently, a mission and/or vision statement has not been developed for the project prior to the stakeholder workshop. Even if available, an earlier statement should be presented to the group for validation and amendment if desired. If not, a statement can be created successfully using a Post-It™ technique (7.14).

Brainstorm goals and objectives

Discuss and decide as a group the goals and objectives for the design program. What is the purpose of the site? Who should it serve? Which age groups? What should it contain? What settings and facilities? Graphically record. Try to limit goals to seven or eight to avoid overlap or redundancy. Discuss and record the detailed physical setting requirements needed to support each goal or objective.

Identify potential user groups

The site may be used already. Will those uses continue? Review survey results. What other user groups might be attracted by a nature play and learning space? Who might use the site on weekdays, such as early childhood groups versus weekend use by families and special programs, for example? What types of seasonal programs and special events might occur?

7.14 “Sticky note method” is useful for creating a mission statement. Each participant gets 3-5, 3" x 5" sticky notes (for a total of not less than 60), and writes a single key word on each, representing the most important project attributes. Keywords are collectively organized on the wall in clusters of similar words until an order of priority emerges. The facilitator then offers to draft a statement for later committee approval.

7.15 Photographic “precedents” (i.e., best practice examples of nature play and learning places from elsewhere) are extremely helpful to professionals and nonprofessionals alike as decision-making stimuli. Here, full-page precedent prints are displayed gallery-style so that participants can view during breaks and/or as directed by the facilitator.

Conduct a site safari

If the bulk of workshop participants have not visited the site, as is often the case, a site safari ensures a visit by all stakeholders at the same time. This will encourage the sharing of perceptions and opinions, including the value of existing features and settings, which can be important for kids—who may already use the site as a place to play (7.19).

Prepare a 11x17-inch base plan of the site, including boundaries and main features, mounted on a piece of cardboard with two paper clips. Ask participants to make notes on the drawing as they move around. Specific questions can be included to prompt comments about particular features that participants may like or not like, and the potentials for future development. Encourage participants not to converse as they walk around so they allow themselves time to observe undistracted.

Back in the meeting room, debrief the site safari, noting observations, pro and con, on an enlarged plan of the site. Encourage participants to discuss where different program settings might be located. Record on the same base plan as the site safari notes (make large enough to allow space to write).

Use precedent photographs

Prior to the stakeholder meeting, ask participants to take photos of places they like or that illustrate settings they want included. This works well with children and youth. These and other photographs can be displayed as a wall-mounted “image gallery” to help stakeholders visualize setting proposals (7.18).

Decide timeline for future actions

What is the timeline? When will the design program and schematic design be ready? What are the plans for fund-raising? What program elements have the highest priority for fund-raising? Will the project be phased? Can Phase One or priority settings be prototyped as a temporary program, to test, to get publicity? Will a smaller task force committee and/or fund-raising committee be appointed to keep things moving? Climatic seasons may influence the timeline but also public holidays, cultural celebrations, political events, community programs, etc.

Produce and disseminate report for sign-off by those directly involved and to inform the broader community of interest.

7.16 Site safaris have been used since the 1970's for engaging community members with the site. They can be conducted in a variety of ways from formal (prescribed map with observation stations, standard questions, etc.) to informal (leisurely stroll). A degree of formality usually yields more useful information. Here, a group of children are exploring with adult facilitators probing their perceptions and feelings about the site (*Heritage Park* public housing wooded area).





Conduct design workshop with children and youth

Engaging young people in the design programming process is essential for three main reasons: because they have a right to be involved in decisions that affect their lives; because they have great ideas that adults will never think of; and because participation by community children and youth will create a sense of ownership, respect, and responsibility.

Use drawings and models to express ideas

Kids can usually express more diverse ideas using pictures and models than with words. Drawing exercises can be conducted with small groups (three or four children or adolescents) using 3x3-foot sheets of cardboard covered with white bond paper and water-based markers to draw with. The advantage of this method is that cardboard provides a work surface, can support the drawing, and makes it easy to present.

A variant for teens is to paint ideas and slogans on a large canvas on the floor or outdoors on a flat surface. The mega-poster can then be displayed in a prominent location to promote the project and recognize the young people's contribution.

Models work well with all age groups, using common scrap materials. The exercise can be made open-ended, again using a 3x3-foot cardboard baseboard. Or the exercise can be made more realistic, using the real base plan of the site with existing features already constructed, possibly with a group of up to six working together. Disseminate a report of results.

7.17 Young residents work on their design using prepared construction paper cut to scale.

7.28 "HP 4 Life" final design, showing pathways, vegetable garden, flowers, "game place" and pond.

7.19 Model of "shelter for all"—was built.

STEPS TOWARD IMPLEMENTATION

The coordinating committee may stay engaged for several more steps, including:

Disseminate progress report

A progress report containing summarized results of workshops and other community engagement efforts, integrated into a single document for review by participants will keep all parties up to date on progress.

Develop design and management program

Once reviewed and agreement reached, the progress report can be used as content for the design program, integrated with site external requirements and organization needs, as described in Chapter 4, p. 67.

Appoint design professional

Early in the community process, a design professional may need to be appointed (could be a volunteer) to assist with developing the design program, creating a schematic design, and identifying the regulatory requirements and schedule for necessary submittals.

Community presentation

An open community meeting may be held to present the draft design to invite feedback before finalization. Participants should include original stakeholder participants, municipal officials, if appropriate, and organizations with an interest in the project.

Internal review

Internal parties such as the board of trustees may need to review the design to make final decisions on the budget and steps toward implementation. Value engineering may be required at this point to trim the budget.

Raising money

Use completed master plan as a construction tool or, if funding is secured, move ahead with construction documents and selection of contractor(s).

Appointing staff, including manager and program staff.

Installing the project, including groundbreaking, construction/grand opening/ribbon cutting.

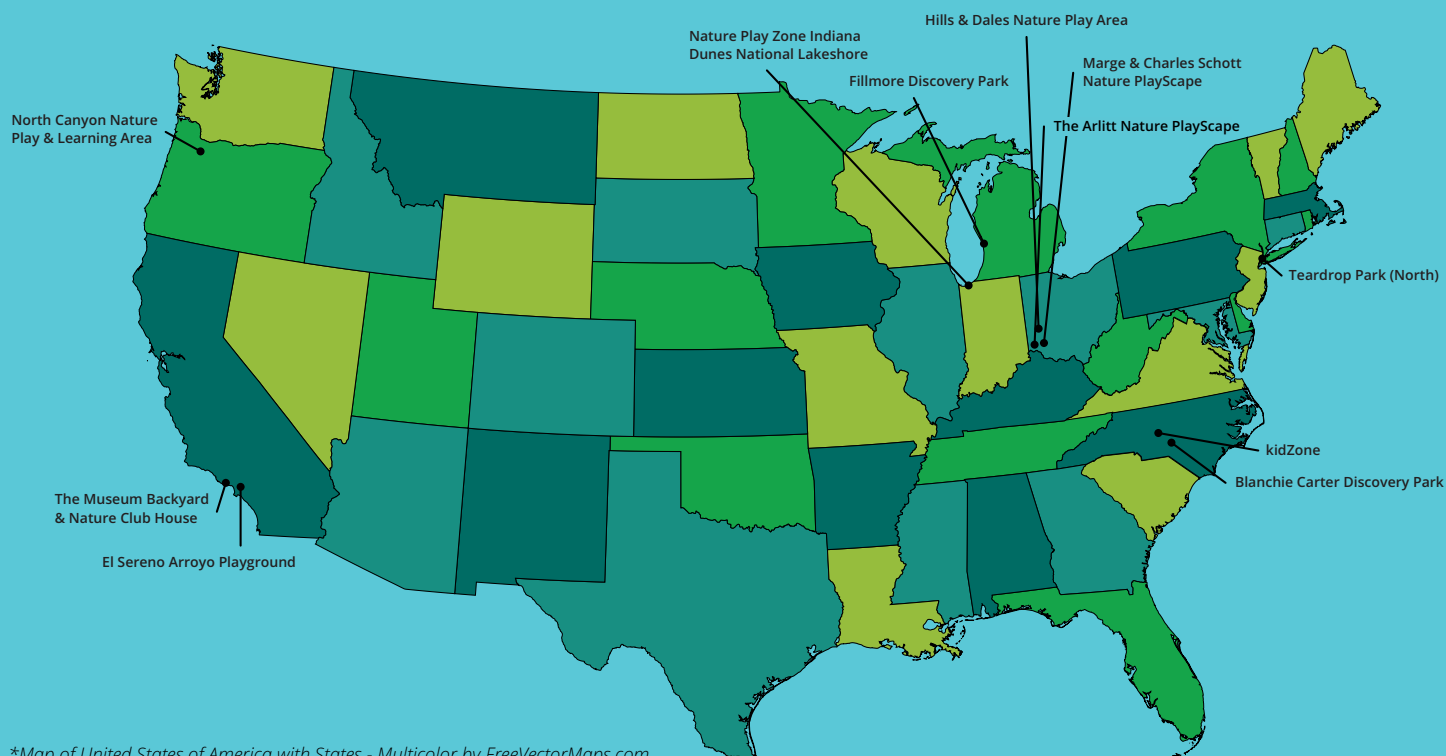
Managing the site

Overseeing site management for success, especially during the first couple of years (guided by Chapters 5 and 6). ■

The eleven case studies described in the following pages are play and learning places as defined on page 23. They were selected because for different reasons: some were a component of the cost sharing agreement with the U.S. Forest Service and implemented during the project timeline (e.g. Fillmore Discovery Park); others (the majority) had full NLI design process documentation; some were recommended by the Steering Committee; or they were registered with the Nature Play and Learning Guidelines Registry. Overall, an attempt was made to select a set of cases representative of the scope of *Nature Play and Learning Places*, as well as the range of current practice and diversity of contexts.

A required attribute of case studies is that gathered information is standardized so that systematic comparisons can be made across cases. The NLI-NWF project team developed the information categories, which were also used for the Nature Play and Learning Places Registry (which remains open). Additional requirements included the project staff being willing to collaborate in creating the

standardized text and availability of usable photographs to illustrate the case. Many more nature play and learning initiatives and projects are underway across the nation. As additional cases are developed beyond the release of this version (1.0) of *Nature Play and Learning Places*, they will be posted on the Nature Play and Learning Places website.



*Map of United States of America with States - Multicolor by FreeVectorMaps.com

CASE STUDY 1

Location

Hills & Dales MetroPark,
White Oak Camp,
2606 Hilton Drive,
Kettering, OH

Context

Urban residential
neighborhood

Site type

Urban woodland

Opened

2008

Size

3 acres

Age range

All ages

Access

Walk (Safe Routes to School
walking route), bike, car,
Regional Transit Authority
bus line

Who initiated

Park Manager Todd Catch-
pole; MetroParks Nature
Play Committee; Director
of Education, Robert Butts
Jr.; Green Hearts Institute
for Nature in Childhood,
consultant

Principal stakeholders

Five Rivers MetroParks,
surrounding neighbors,
elementary schools near the
park, childcare centers in
the vicinity of the park, Safe
Routes to School and play in
the vicinity of the park, Day-
ton Regional Transit Authori-
ty bus route to the park

Estimated construction cost

\$800.00

Actual construction cost

\$500.00

Funding sources

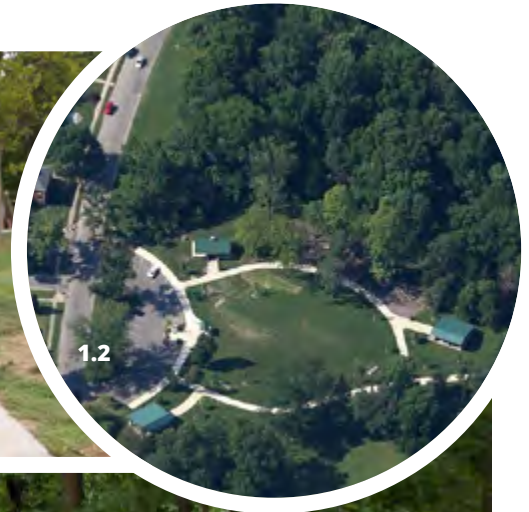
MetroParks general fund
(homeowner taxpayer levy),
earmarked for Nature Play
Area construction

Contractor

In-house MetroParks staff
and volunteers

Hills & Dales Nature Play Area

Located south of downtown Dayton, in historic 65-acre Hills & Dales MetroPark,* adjacent to a renovated, naturalized equipment-based playground, near park entrance and restrooms. Demonstrates how a section of mixed hardwood, remnant forest can “give permission” for nature play to local children through installation of welcoming entrance, woodchip pathways, prepared natural loose parts (sections of tree limbs and stumps), and provision of digging implements and magnifying glasses.



1.1 Main entrance to the park. Restrooms on the left. Community playground straight ahead with Nature Play area beyond. Family-friendly synergy

1.2 Aerial view showing restrooms (building on left) and Nature Play Area above. Image courtesy Google.

1.3 Large scale loose parts play.

How initiated One of several natural park spaces set aside and developed for nature play as part of MetroParks' comprehensive policy and mission, adopted in 2008, to connect youth and families to nature.

Mission Protect the region's natural heritage and provide outdoor experiences that inspire a personal connection with nature.

Overall theme Re-engage youth and families with the natural world by going off trail, playing in the creek, flipping over logs to look for salamanders, building forts with tree limbs, catching frogs in the pond, etc.

Design goals Place-making in the woods by making explicit an invitation with permission to play freely, get dirty, wet, etc. Communicate ideas of what can be done there. Recognize that plants are intrinsically interesting and enticing to youth. Create a place where youth and family feel comfortable interacting with nature.

Planning and design process Four years of discussion and development getting leadership and risk management buy-in. Consultation and visits to potential sites with Ken Finch, Green Hearts Institute.

Primary settings Entrances with Nature Play Area bulletin boards, woodchip pathways, prepared loose parts, hand-tool station, child-created hideaways, fort-building places, small pond and creek to explore.

How installed Through MetroParks Park Services staff, Park Manager, and volunteers.

Activity programming Education staff delivers programming to help families get comfortable interacting with the natural environment, along with resource interpreters, naturalists, and volunteer Play Naturalists.

Site management Park Services conducts daily inspection for any hazards or other issues of significance. Park manager reaches out to the public, through speaking engagements, etc., to promote the value of natural playscapes for the wellbeing of youth and development of a conservation ethic. Leadership support provided by Executive Director down to law enforcement and front line staff.

Source of staff support MetroParks general fund.

Volunteer upkeep Available if needed.



1.4 Neighborhood kids play around the retaining wall where a small stream emerges.

1.5 Parent joins in the stream play fun.

1.6 Real, muddy stream play by mixed age group of friends!





1.7 Wild, free play.

1.8 Exploring upstream.

1.9 Classic micro-imaginative play. Children have created a domestic scene on the other side of a drainage ditch ("Living Room in the Woods") with small dolls and miniature furniture mixed with natural loose parts.

1.10 Close up of "Living Room in the Woods."

Evaluation Working with the University of Cincinnati, Arlitt Center, Nature PlayScape model to gather more systematic data on outcomes. Anecdotal until now.

Impact Families are observed joyfully re-engaging with the natural world. Children express a desire to protect it. The local community advocates for the preservation of green space. Exemplifies how varied entities within one agency can achieve a common understanding of the good that nature play can offer youth and families served by parks.

Future development MetroParks is continuing to install natural playscapes throughout the park district in natural area parks.

Unique aspects Serves as a neighborhood meeting ground and social network for neighborhood kids. Generates a sense of solidarity among parents who play there with their children. Used as classroom

extension by nearby elementary school to implement nature-based approaches to Ohio's New Learning Standards (2010). Though the Reggio Emilia "project approach" to learning, the place functions as a bridge between school and neighborhood.

Major challenges Achieving organizational support for something that could be interpreted as risky. Concern of conservation departments about potential environmental impacts. Apprehension of safety/risk managers about letting youth go off-trail and freely play. Responding to law enforcement interpretations about what is and is not okay. Accepting park managers' differing levels of buy-in and support.

* Park was a gift from John Patterson (co-founder of the National Cash Register Company), designed by the Olmsted Brothers, landscape architects, and opened in 1907.



1.11



1.12



1.13

1.11 Teacher from the local elementary school out in the woods with neighborhood kids after school.

1.12 Tool station (trowels and lenses). Honor system. So far, nothing missing.

1.13 Parents hang out together with classroom teacher after school.

Location

Lowell Avenue and
W. Mission Road,
Los Angeles, CA.

Context

Urban

Site type

Public park

Opened

December 2012

Size

1.0 acre

Age range

All ages

Access

Bicycle, walk, car, bus.

Who initiated

Concerned Neighbors of El
Sereno.

Principal stakeholders

Concerned Neighbors of El
Sereno, District Council, Los
Angeles Department of Rec-
reation and Parks (LADRP),
California Department of
Transportation, Trust for
Public Land, Council Mem-
ber Jose Huizar, Assembly
Member Gil Cedillo, Sierra
Park Elementary School.

Estimated construction cost

\$1.5 million

Actual construction cost

\$1.5 million
(includes whole site)

Funding sources

LADRP; PlayCore; Nation-
al Recreation and Park
Association; First 5 LA; The
Rosalinde and Arthur Gilbert
Foundation; Aileen Getty;
Grifols; EPT DESIGN; Breen
Engineering, Inc.; Com-
mercial Paving; ValleyCrest
Landscape Companies;
Kaiser Permanente; Union
Bank Foundation; Trust for
Public Land

Designers

EPT DESIGN, GameTime,
Natural Learning Initiative
design consultants.

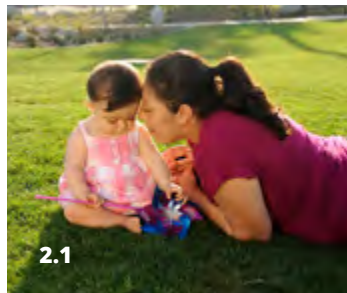
Contactors

Through Los Angeles
Department of Recreation
and Parks.

CASE STUDY 2

El Sereno Arroyo Playground

New construction, on leased public land, combining equipment-based playground and nature play area containing sand and water play, a habitat garden, rolling lawn, rock clusters, pathways, and shade trees. Initiated by Latino community group in underserved urban neighborhood. Maintained by city parks.



2.1



2.2



2.3



2.4

2.5

2.1 Mother and child relax in the new community landscape.

2.2 Active play in a safe setting that never existed before in this neighborhood.

2.3 New planting beds provide green play opportunities for neighborhood youngsters.

2.4 Hand-operated water pump plus sand. A perfect nature play combination.

2.5 Layout of the new playground. Naturalized playground at northern (upper end) and nature play (southern end).





How initiated Concerned Neighbors of El Sereno, a community organization, had worked for decades to improve the site, held by Caltrans (state transportation agency) for possible use as a freeway entrance ramp. The community group negotiated a 25-year lease with Caltrans and got a small grant to plant trees. Trust for Public Land secured a grant of \$230,000 to develop a nature play area for young children. The National Recreation and Park Association made the site a Parks Build Community project and secured additional funding and partners.

Mission Provide recreation amenities grounded in community history and values.

Overall theme Rustic natural park and play area.

Design Goals Provide a safe, active place for recreation and exercise in the local community, including children's play. Express the role of arroyos in community history. Enhance with native plants and shade trees.

Planning and design process Multiphase planning process beginning with community planning meeting in 2009. Multiple community design meetings resulted in conceptual design, followed by efforts to seek funding. Additional community planning after restricted funding was secured. Pro bono design assistance created construction documents.

Primary settings Entry plaza, concrete perimeter walking path, natural play area for younger children, open lawn, picnic area, play equipment, fitness zone, decomposed granite hillside walking path. Mosaic artwork.

How installed LADRP site works. Community volunteer build day installed play equipment. Non-profit installed planting over multiple volunteer days.

Activity programming Daily use by nearby childcare center. No ongoing programs.

Site management LADRP.

Source of staff support LADRP

Volunteer upkeep El Sereno Arroyo Vecinos, a community group, cares for park with regular community cleanups.

Evaluation Results of a pre/post evaluation survey suggest that the park is frequented and well liked by the local community. A balanced number of women and male users were observed, and in certain areas of the park (including the playground, fitness zone, and lawn) moderate and vigorous levels of physical activity were observed. In addition to visiting parks more often, the community also reports a higher level of neighborhood satisfaction and higher levels of perceived safety.

Impact Over 5,000 children ages 0 to 5 live within two miles of the park. Previously, the area was a recreation desert, with no park within a half-mile and a single park within one mile.

Future development No current plans.

Unique aspects Community-initiated project with a broad group of stakeholders in an underserved urban community. Surplus land owned by the state transportation agency, originally intended for a freeway interchange, leased to community for development.

Major challenges The most significant challenge was to persuade Caltrans to allow the community to develop and manage the property for recreational purposes.

2.6 Community members created ceramic artwork depicting Latino cultural traditions.

2.7 Previously fallow land in underserved community restored to social and ecological value. Image courtesy of Google.

2.8 Children respond to classic play form—a circle of smooth boulders.

CASE STUDY 3

Teardrop Park (North)

Small park in a dense urban context (Manhattan), surrounded by tall buildings, that nonetheless offers children an exceptionally compelling place for nature play and learning. Serves as a site for highly innovative play programming by Battery Park City Parks Conservancy.

Location

Park Place West,
Battery Park City,
New York, NY.

Context

Dense urban.

Site type

Public park.

Opened

2006.

Size

1.75 acres.

Age range

All ages.

Access

Walk, bike, bus, subway, car.

Who initiated

Battery Park City Authority
(BPCA).

Principal stakeholders

BPCA, Battery Park City
Parks Conservancy (BPCPC).

Estimated construction cost

\$17 million

Actual construction cost

\$17 million

Funding sources

BPCA

Designers

Landscape architect:
Michael Van Valkenburgh
Associates
(MVVA).
Artists: Ann Hamilton,
Michael Mercil.
Play equipment:
Fred Druck, PlayWorx.

Contractors

Construction manager:
Humphreys & Harding, Inc.
Site contractor: Metro-
tech Contracting Group.
Landscape contractor: Kelco
Landscaping, Inc. Metal
work: Post Road Iron Works.

Play consultants

Natural Learning Initiative



3.1 The complex, highly differentiated landscape is ideal for creative play programming, including the famous, biannual "Fairy Days" run by the Parks Conservancy. The "Marsh" is a favorite place for children, fairies and elves alike.

3.2 A fallen log in the Marsh provides fairies with a mildly challenging path to navigate, testing their psychomotor skills.



How initiated Michael Van Valkenburgh and Associates (MVVA) were appointed lead designers and assembled a team of specialists to advise on the many technical issue such as soils, irrigation, and lighting. MVVA viewed children as the most important users and appointed the Natural Learning Initiative (NLI) as play consultants.

Mission Create a public park in lower Manhattan that transcends its small, overshadowed site, and mid-block location through bold topography, complex irregular space, and robust plantings.

Overall theme Park as natural playground for all.

Design goals Respond to the harsh local microclimate (wind off the Hudson River) and lack of sunlight (overshadowing by tall building). Sustainability as an organizing principle, including fully organic soils and maintenance regimes, recycled materials and grey water from adjacent apartment buildings, and captured rainwater for irrigation. Offer urban children adventure and a green sanctuary engaging mind and body.

Create a complex, 3-dimensional landscape using topography, water features, natural stone, and lush plantings, to achieve intricately choreographed views and dramatic changes in scale.

Planning and design process A series of work sessions conducted by BPCA with the design team and representatives of the many city interests. MVVA presented a range of conceptual approaches from classic axial to avant garde, which evolved into a complex, intricate design of 15 distinct settings, including art works, linked by a hierarchy of sinuous pathways.

Primary settings Shadbush Hill, Tunnel, Water Play, Slide Hill, Sand Lot, Sand Cove, Amphitheater, Overlook, Marsh (children's natural hideaway), Lawn Bowl, Geologic Section, Beech Grove, Reading Circle (favorite adolescent hangout), Ice Wall, Witchhazel Dell, and multiple broad to narrow pathways.

How installed Managed construction.

Activity programming BPCPC offers a year-round program of Teardrop special events for children and

3.3 Enclosed, gated area for infants, toddlers and caregivers (rare feature of urban parks), provides a broad deck, stepped to sand and water play, as a friendly surface for crawling children and social caregiver space.

3.4 Micro trail of smooth stones and plants offers toddlers challenging, first experiences in nature.

3.5 Mother and infant to take time out together on the soft, sweet-smelling lawn. Ice Wall is in background.

3.6 The lawn is large enough for letting off steam!



3.7



3.7 A hierarchy of curving paths, bordered by diverse plantings, traversing settings of varied character and elevation, offer children and seemingly limitless nature play space.

3.8 Plan of Teardrop Park clearly shows the pathway system woven through the active south end (left) and pastoral north end (right) subdivided by the Ice Wall (inset 3.5) and main pedestrian cross route.

families, as well as groups with a special interest such as urban wildlife, public art and poetry (the park is adjacent to Poets House). Developed by Abigail Ehrlich, “Fairy Days” has become a famous, biannual Teardrop event. In the springtime “days of enchantment,” fairies and elves are called forth as protectors of woods and streams, and in winter they hibernate in snow-covered houses (constructed for them by friendly children, of course).

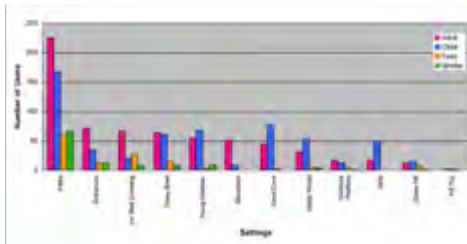
Site management BPCPC

Source of staff support BPCPC

Volunteer upkeep None.

Evaluation Post-occupancy evaluation conducted by NLI, 2007. Replicated for the Landscape Architecture Foundation (LAF) by the University of Virginia, 2011.

Impact Attracts an estimated 40,000 annual visitors (LAF study). Nearly 17,000 plants (including 3,260 woody trees and shrubs) installed for human enjoyment and wildlife habitat on a previously barren fill site.



Future developments Teardrop Park South installed in 2010.

Unique aspects Demonstrates how landscape architecture can create compelling, sustainable, natural spaces in dense urban environments. The dripping Water Wall (iciced in winter), the Marsh, the Water Play, the stone Reading Circle, and 30,000 tons of native rock re-assert the idea of nature play in the city and demonstrate how the expressive potential of natural materials can attract children for outdoor adventures.

Major challenges Microlimatic limitations of the site and its small size.



3.9 Behavior map shows an intergenerational mix of users and the contrasting, intended levels of use between the two halves of the park.

3.10 Family hangs out on the huge native boulder—a setting in its own right, people-watching while enjoying the bird-friendly landscape.

3.11 Summertime, intergenerational water play!

CASE STUDY 4

North Canyon Nature Play & Learning Area

Quarter-mile loop with adventure pods where children can safely climb a tree, hide in a cougar den, growl like a bear, weave a bird's nest, look for tracks, and have a chance to learn about the forest and to see the world through the eyes of other animals.

Location

Silver Fall State Park.
20024 Silver Falls Hwy,
SE Sublimity, OR.
East of Salem 26 miles.

Context

Rural.

Site type

State park.

Opened

2014.

Size

10 acres.

Age range

0-12 and adult caregivers.

Access

Bicycle, walk, car bus. Park-
ing free.

Who initiated

Oregon Parks and Recreation.

Principal stakeholders

Oregon Parks and Recreation.

Estimated construction cost

\$75,000

Actual construction cost

\$118,000
(includes design)

Funding sources

Planning Budget, Park Operations & Business Account Budget, District Budget, Cooperative Group Support (Friends of Silver Falls)

Designers

Greenworks and Learning Landscapes

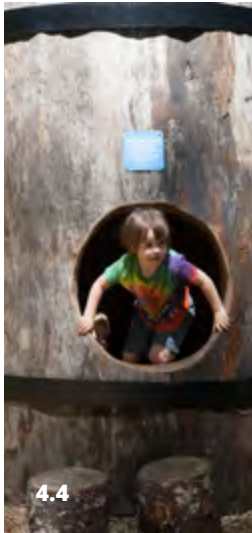
Contactors

GR Morgan Construction.



4.1, 4.2 Animal-themed adventure play pods (Cougar Climber and Hawk Nest) constructed of natural materials.

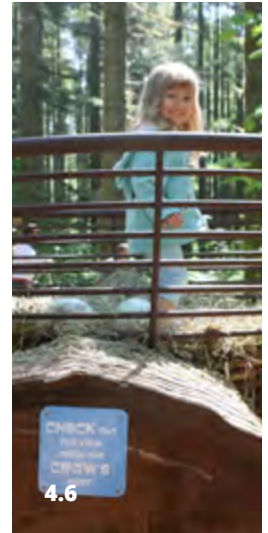
4.3 Layout shows curving, looped trail and adventure play pod locations—to be added to over time.



4.4



4.5



4.6

How initiated The idea grew out of the Oregon Parks and Recreation 'Stepping Stones' program.

Mission A nature inspired, safe place for kids' unstructured play, created to spark the imagination and encourage physical activity.

Overall theme Animal-inspired adventure play in forest surroundings.

Design Goal Get kids outside connected with nature.

Planning and design process A 2008 kick-off planning workshop engaged park staff, designers, kids, and educators who proposed animals as a way to connect kids to nature. Two design workshops followed, where park staff were joined by landscape architects, educators, children and volunteers to lay out the preliminary design. Design consultants, GreenWorks and Learning Landscapes, completed the final construction documents, administered construction, and developed draft inspection and maintenance guidelines. Construction began in 2010 (trail) and took five years to complete.

Primary settings Looped trail with 'adventure play pods' designed to stimulate learning about aspects of animal behavior (bear, ant, cougar and bird), stimulating children to run, peek, explore, and get in, on, and around everything the play pods afford, including loose parts. Children pretend to 'hatch' bird eggs and flip over the game pieces in the bear area to see what lies underneath. Animal-themed pods are arranged to generate excitement and anticipation with running ahead, giggling and yelling to the next pod. The area is far from major roads or drop offs, which allows children to wander freely, while parents relax.

How installed Licensed contractor and community volunteers.

Activity programming Self-directed.

Site management Oregon Parks and Recreation.

Volunteer upkeep None.

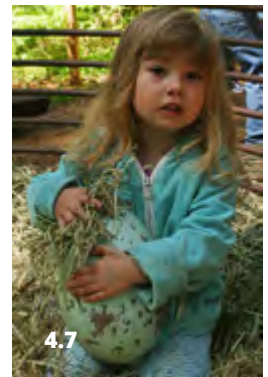
Evaluation The area is evaluated and inspected on a monthly basis to assess safety and maintenance needs.

Impact Average summer use is estimated at 30 groups per day and off-season use 2-5 per day. A trail counter is being installed to provide more accurate use data.

Future development When complete, the nature play area will consist of 16 animal-themed, adventure play pods in a fir tree and fern forest, distributed around a 1/4 mile loop trail, each dedicated to a particular animal. Future nature play and learning areas are planned as the Stepping Stones program moves ahead.

Unique aspects Draft inspection and Maintenance Guidelines developed.

Major challenges Main hurdles include overcoming safety and maintenance concerns and promoting a paradigm shift in thinking about new ways to provide outdoor play and learning for kids.



4.7

4.4 Woodpecker play pod.

4.5 Close-up of adventure play pod details.

4.6 View from Crow's Nest and...

4.7 Mother crow with egg!

CASE STUDY 5

Location

Indiana Dunes National Lakeshore, Gary, IN.

Context

East of Chicago, in the eastern section of Gary, IN, north of historic Miller Beach, near U.S. Steel plant and amidst residential neighborhoods. Area was formerly a railway junction, now part of the national park site called Douglas Center for Environmental Education.

Site type

National Park.

Opened

2013.

Size

About one acre.

Age range

All ages; but young children are the largest group of users.

Access

Bicycle, walk, car (no parking fee), bus.

Who initiated

Park superintendent, Constantine Dillon, and interpretive staff.

Principal stakeholders

Local families, National Park Service, Gary Parks and Recreation Department, Miller Beach community organizations.

Estimated construction cost

\$50,000

Actual construction cost

\$50,000

Funding sources

National Parks Service and the Dunes National Park Association.

Designers

In-house, interpretive staff.

Contactors

Unknown.

Nature Play Zone Indiana Dunes National Lakeshore

Area of previously disturbed land, in an otherwise protected National Park site, explicitly set aside for nature play using the natural materials found on the sandy zone. Initiated by staff, supported by the National Park Service and a dedicated booster organization. Implemented with local high school volunteers. Behavioral evaluation initiated when launched.



5.1 Constructing a camp.

5.2 Enthusiastic, young visitors.

5.3 Girls demonstrate cooperative tree climbing.

How initiated Interpretive staff read Richard Louv's *Last Child in the Woods*, including the park superintendent, who suggested initiation of an unstructured nature play area. Other regional nature play areas were visited and staff started testing ideas at the park, spring of 2012.

Mission Create an inquiry-oriented space, different than traditional playground, where kids ask questions and find answers on their own or with the help of adults or other kids.

Overall theme Nature play using found natural materials on site. Orientation panel explains that the site has different rules than the rest of the park.

Design Goals Introduce nature play without conflict with the overall mission of the park to encourage nature play, environmental awareness, and stewardship.

Planning and design process For the staff, the site had to meet the four key criteria: near parking; close to a staffed site where staff could interact with participants; away from possible endangered species habitat (the park contains two federally protected species); and developed on previously disturbed land. A site was chosen close to the Douglas Center for Environmental Education, which 50 years previously has been a railroad junction. Staff executed archeological compliance and entered the project onto the Planning, Environment, and Public Comment website for feedback. A high school group identified vegetation. Volunteers cleaned up the site and helped remove invasive species. The project then received a green light.

Primary settings Much of the play activity relates to the site vegetation, including dune grasses, grapevines, small oaks, cottonwoods, horsetail, and native species that show up at different times of the year. Prickly pear cactus is a favorite and was left for children to explore and "learn the hard way"—no one has complained. A shade structure was installed through the NPS Healthy Parks Healthy People Initiative.

How installed Only installations were a shade shelter and permeable concrete walkway and pad.

Activity programming Self-directed and programs run by park interpretive staff such as "plant scavenger" hunts to find as many common plants as possible. Larger groups explore on their own. Fort-building contests encourage family play.

Site management National Lakeshore staff.



Source of staff support National Park Service.

Volunteer upkeep Clean out trash occasionally; remove poison ivy in the spring.

Evaluation Staff used an "unobtrusive observation" form to observe adult and child behavior. Learned how adults interact with children relates to how children behave. When adults were comfortable and relaxed, children explored, experimented, and engaged in imaginative play stimulated by nature's magic. When adults got upset because children got dirty, behavior reverted to quarreling and the nature exploration faded. Cooperation between children increased with loose parts provided to build elaborate structures. Public response has been overwhelmingly positive. Systematic evaluation of impacts on visitors and the natural setting continues.

Impact Accessible to thousands of residents in an area without playgrounds. As an incentive for children to continue exploring nature at home, 'Nature in my Neighborhood' was launched with backpacks filled with tools such as binoculars, journals, and a field guide, provided to the first 1000 visitors after opening, April 2013.

Future development Park staff are working to bring a water line to the site so that water features could be added in the future. Planning to expand and include a small wetland nearby in the long range plan.

Unique aspects Possibly the first nature play area developed in a national park.

Major challenges Removal of poison ivy using low-grade herbicide the first season. A small patch was left so visitors could see what it looks like.



See article by Kimberly Swift in *Park Science*, 20(2), 48-51. <http://www.nature.nps.gov/parkscience/index.cfm?ArticleID=645> Accessed August 2, 2014.

5.4, 5.5 Permissive, free play in the dunes.

Location

Cincinnati Nature Center (CNC),
4949 Tealtown Rd, Milford,
OH.

Context

Suburban/Rural.

Site type

Nature center.

Opened

2011.

Size

1.6 acres.

Age range

All ages.

Access

Visitors arrive by car (no public transportation or sidewalks). PlayScape entry is free with nature center admission fee (members free).

Who initiated

Cincinnati Nature Center (Bill Hopple, CEO), in collaboration with the University of Cincinnati (UC).

Principal stakeholders

Cincinnati Nature Center, members and visitors; Arlitt Child and Family Research and Development Center (Arlitt Center), UC.

Estimated construction cost

\$200,000 (2009).

Actual construction cost

\$500,000

Funding sources

Private donations, corporate donations, in-kind contributions.

Contractors

Sharon Floro, GroundWork Design Cincinnati LLC; Rachel Robinson, Design Landscape Architecture, LLC; Luke Schelly, LJS Design and Build; General Contractor, Andy Argo Construction; Bzak Landscaping; DeVore's Land and Water Gardens, Inc.; Eads Fence Company; Jonathan Young, Elk Run Construction.

Design Consultant

Natural Learning Initiative

CASE STUDY 6

Marge & Charles Schott Nature PlayScape

Professionally designed, all-ages installation using natural materials, surrounded on two sides by patches of existing woodland, fully enclosed with a light deer-proof fence, easily accessible from parking. Recirculating stream. Intentionally avoids elements that are found at a typical playground. Part of the Cincinnati Nature PlayScape Initiative to ensure the children of Greater Cincinnati have access to nature and to educate adults about the importance of outdoor play for healthy child development.



6.1



6.2

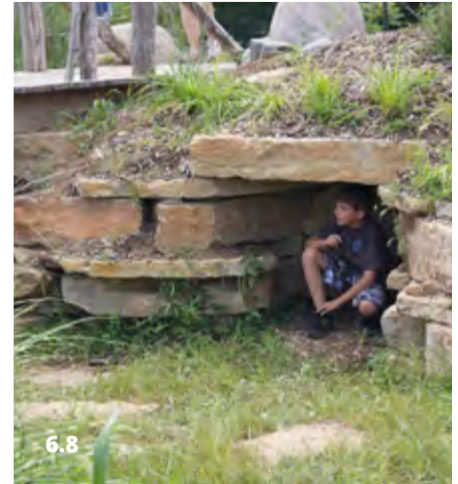


6.3

6.1 Newly designed landscape already looking wild in the first growing season.

6.2 Layout shows curvy, primary, perimeter pathways with varied, secondary crosslinks interconnecting nature play settings.

6.3 Family-friendly entrance.



How initiated In 2007, the Natural Learning Initiative (NLI), NC State University, was retained through a partnership of Cincinnati Nature Center (CNC) and the Arlitt Center as Nature PlayScape design consultant at both institutions. The Niehoff Urban Studio, UC, collaborated with NLI to deliver a professional development program (PDP) on design for childhood and nature to a regional group of landscape architects. PDP participants observed development of the Nature PlayScape design program via facilitated design workshops, including children. A team of PDP “graduates,” responded to an RFP and was appointed project landscape architects by CNC. NLI remained involved as a consultant.

Mission To stimulate healthy child development, family enjoyment, creativity, learning, a passion for nature, and sense of stewardship through spontaneous outdoor nature play, regardless of income or physical abilities.

Overall theme Provide a dedicated place where children can wander off trail, dig, climb, pick flowers, build forts, play in mud, hop on rocks, and engage in all manner of natural adventures—in contrast to the strict rules in the remaining 1000-acre nature preserve.

Design goals For children: Facilitate child initiated learning; encourage curiosity, exploration and discovery; motivate physical activity; stimulate creativity; facilitate social interaction and respectful behavior; prompt decision making to test limits and become confident. For adults: Demonstrate replicable nature play elements for families; encourage use as a research site and teaching tool; model play facilitation and build community among visitors, volunteers and members; inspire users to invest playful nature in residential yards, parks, and school grounds; train caregivers and teachers to overcome barriers to nature play.

Planning and design process Design workshops with NLI engaged CNC staff, stakeholders, CNC members, and children in creating a conceptual design—developed further with the design team, who produced construction documents.

Primary settings Recirculating stream; gathering terrace; pathways; wetland; hills; rocky places, tunnel and cave; fallen logs; forest and field habitats; willow tunnel; dirt, sand and pebble play; multipurpose lawn; diverse, seasonal plant textures and colors. Outside the entrance: pavillion, shady picnic tables, convenience station, and storage shed.

6.4 Stacked, local sedimentary rock creates a stimulating three-dimensional landscape. Here, a “tunnel” and “hill”—archetypal landforms, together with “canyon,” “bridge,” and “cave” (also illustrated).

6.5 “Canyon” and “bridge.”

6.6 A choice of “dirt play” settings are available, each with loose parts, here near the entrance for younger children.

6.7 More distant dirt-play setting embedded in the landscape.

6.8 “Cave.”



6.9a



6.9b



6.10

6.9 Comfortable, shady, resting area for adults with a view across the central space. Feeling at ease is assured because the nature PlayScape is fully enclosed by a light, perimeter deer fence (inset).

6.10 Large-scale loose parts play setting in the existing woods with permanent natural play structure to give focus and identity—one of several.

How installed General contractor, supervised by CNC staff and landscape architect. Local artisans hired for rockwork and rough timber construction.

Activity programming CNC staff and trained volunteers provide periodic play opportunities and materials. Usually, the Nature PlayScape is unstaffed.

Site management Duties not limited to the Nature PlayScape. Seasonal gardener 40 hours/week. Family program coordinator plans, delivers, and oversees the Nature PlayScape (15 hours/week). Part-time staff assist, including birthday parties. Mowing, replanting, importing materials such as logs, etc., executed by CNC grounds and facilities staff.

Source of staff support Operating budget and small endowment.

Volunteer upkeep Ad hoc volunteer groups perform maintenance and help with programming.

Evaluation Early science learning investigated by Arlitt Center with National Science Foundation grant. Site monitored to develop Nature PlayScape Management Plan (2013).



6.11

Impact Nature center family memberships increased almost 30% in the 12 months after opening.

Future developments Shade structures by stream, while trees grow, so parents feel comfortable and stay longer. Modify stream to better handle sediment loads from mud play. UV treatment to recirculating water.

Unique aspects Designed by landscape architects trained in outdoor design for children and families. Hands-on, nature play area within a nature preserve. Part of a regional nature play strategy. Nature Preschool established. Perimeter deer fence with a single entry/exit reassures parents that children cannot leave.

Major challenges To convey to visitors the notion of personal responsibility for assessing risks and help them not to assume that everything must be safe so that no thinking is required on their part.



6.12

6.11 During much of the year, the stream flowing through the central, open area, is the main attraction. Also a photo-op for the mother.

6.12 The stream is an active play setting. Newly-planted trees will offer necessary summer shade in years to come.

Location

Fillmore Discovery Park
5733 142nd Ave,
Holland, MI.

Outdoor Discovery Center
Macatawa Greenway (ODC-
MG), 4214 56th Street
Holland, MI.

Context

Suburban.

Site type

Open public area connected
to a nature center.

Opened

2013.

Size

6 acres.

Age range

All ages.

Access

Walk, bike, car.

Who initiated

Travis Williams, Executive
Director, and ODCMG senior
staff.

Principal stakeholders

Herman Miller company,
Holland Pediatrics, Fillmore
Township, Allegan County
Community Foundation,
Community
Foundation of the Holland-
Zeeland Area

Estimated construction cost

\$100,000–\$200,000

Actual construction cost

\$127,980
(including \$40,000 of donat-
ed materials)

Funding sources

ODCMG general operating
funds, private donations,
corporate donations, in-kind
donations.

Designers

Herman Miller company, pro
bono. ODCMG staff.

Design consultant:

Natural Learning Initiative.

Contactors

ODCMG acted as project
construction manager with
in-house construction crew
and volunteer building crew.

CASE STUDY 7

Fillmore Discovery Park

Community-built designated nature play area within an existing nature preserve. Phased development. Major Phase 2 implementation led by community service commitment of local corporation.



7.1 Aerial view (courtesy Google) shows the system of pathways and activity settings comprising the design intervention, in the existing, scrubby landscape and connection to the fishing pond. The woods to the left are also included within the project boundary. (See pages 67-68 details of design process.)

7.2 Welcoming entrance.

7.3 Tree trunks harvested on site create an attractive, ground level feature.

7.4 Central gazebo gathering place, constructed by volunteers, is located on higher ground giving caregivers an overview of the site.

7.5 Large scale, natural play structure constructed by volunteers.

7.6 Fishing pier and successful catch.

How initiated ODCMG began promoting nature playscapes through partnership with the Children and Nature Network. *No Child Left Inside* campaign prompted ODCMG to begin creating safe nature play areas. ODCMG was selected to participate in the Nature Play and Learning Places project as one of three nature centers receiving design assistance.

Mission To create a world class, family-friendly destination to help children get outside and explore nature, while assuring caregivers that their children are safe and comfortable as they explore the park, mature, use their imaginations, and solve problems.

Overall theme A safe, fun, state-of-the-art natural playscape family destination featuring dozens of unique age-appropriate play and learning areas, each with its own particular natural feature, which people of all ages enjoy.

Design goals Surround an outlook and picnic shelter with areas for infants, toddlers, and school aged children, each with age-appropriate interactive settings. Keep young children close to parents and allow older children to explore farther away as they mature.

Planning and design process Initial *conceptual design* completed by ODCMG staff with input from the local stakeholders. NLI team facilitated a stakeholder workshop with community members and produced a *schematic design*, which was used by volunteer groups to install trails and begin developing the park (Stage 1). Simultaneously, volunteer groups were expanded and corporate support pursued.

Herman Miller company selected the project as their 2013 Community Cares Project and committed monetary and staff resources. Design finalized by Herman





7.7 Volunteers clearing pathways in the woods.

7.8 Now the woods are accessible, forts begin to appear.

Miller volunteer teams for each area (infant, toddler, schoolaged) who worked on individual projects identified in the master plan with oversight from the ODCMG. Herman Miller volunteer engineers created *construction documents*. Local architect produced building plans required for permitting.

Primary settings Gravel parking area, gazebo with picnic tables, restroom facility, natural playground structures, sledding hill, benches, fishing dock, and accessible trails connecting with the rest of the ODCMG preserve.

How installed A community volunteer crew of over 200, including individuals and groups from local organizations and businesses. A 2-day push with 184 Herman Miller volunteers achieved a fully functional Stage 2. A 36-volunteer group from LG Chem cleared paths through the wooded area.

ODCMG provided oversight, strategic planning and project management to the entire development, including securing funding and in kind donations, community relations to ensure the park enhanced natural resources, programming opportunities recruiting of volunteers, and helped lead installation of trails and other construction. Herman Miller staff coordinated work group interaction with ODCMG. Other contributors included ODCMG Board of Directors; Ottawa County Parks; Permaloc; Jefferson School principal and PTO leader; local Landscape Architects; Laketown Parks; Lighthouse Early Learning Academy; and Benjamin's Hope.

Activity programming ODCMG.

Site management Yes.

Staff roles ODCMG conducts routine site maintenance (trail checks, trash emptying, etc.).

Source of staff support Included in regular ODCMG budget.

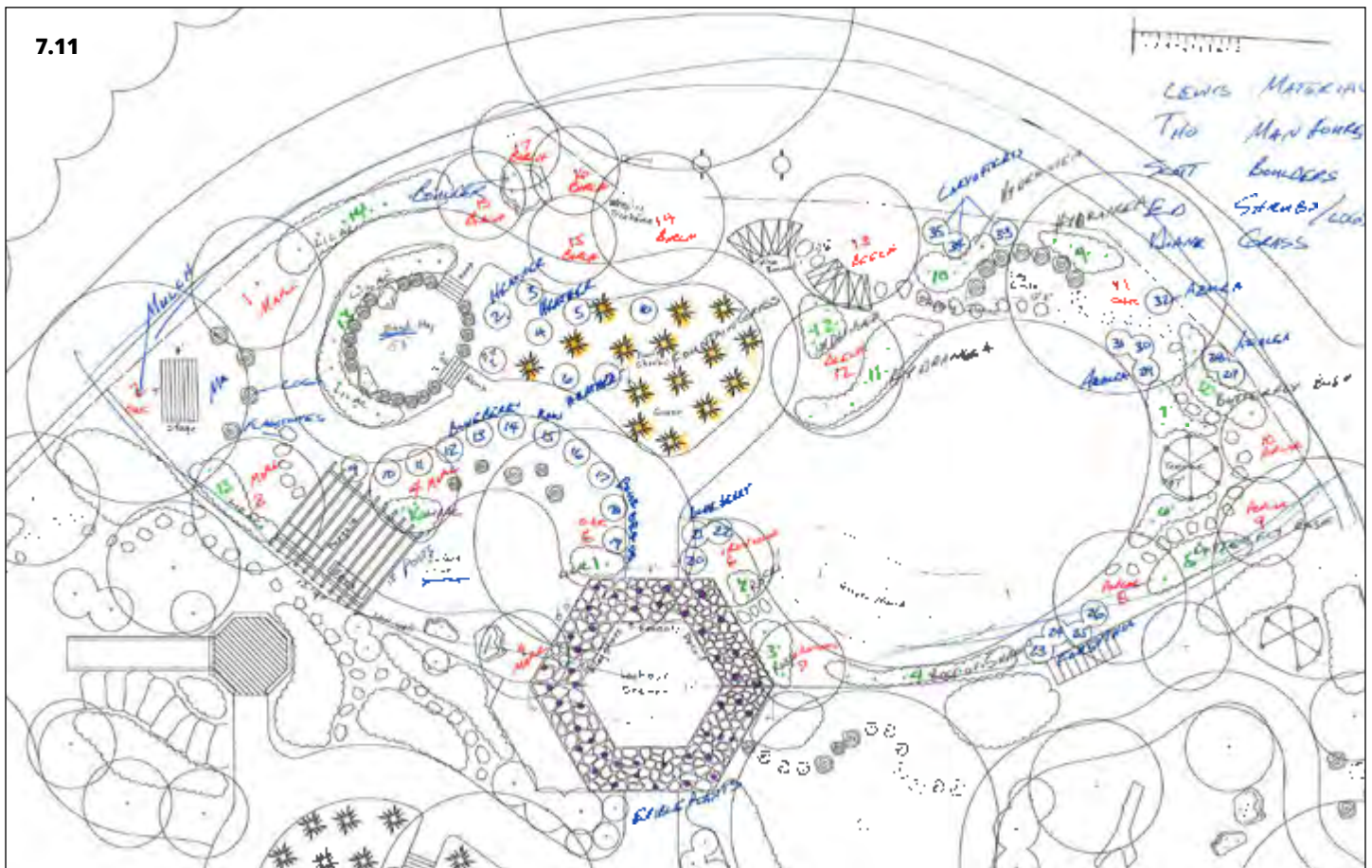
Volunteer upkeep Ad Hoc volunteer groups perform maintenance.

Evaluation The ODCMG reviews every project during and after construction to provide ongoing guidance and course correction.

Future development Stage 3, as part of the 5-year ODCMG construction plan, will provide a picnic shelter, a water play area, and restrooms (to replace portable restroom). Existing trail system also connects to public restrooms.

Unique aspects Substantial community-built project adopted as corporate community service, utilizing on-site natural resources, implemented in-house with existing staff.

Major project challenges Maintenance: ensuring that invasive plants do not overtake the park and that plants such as raspberries do not create an unsafe environment. Fundraising for Stage 3 using external contractors will require heavier funding effort.



7.9 Schematic design developed by NLI.

7.10 Construction document produced by volunteer Herman Miller engineers.

7.11 "Shop drawing" produced by Herman Miller as a guide to implementation on the ground.

CASE STUDY 8

Location

North Carolina Zoological Park (a state facility)

Context

Rural.

Site type

Zoological Gardens.

Opened

2014, after four years of prototyping.

Size

3 acres.

Age range

Children 2 to 10 years old.

Access

Auto only.

Who initiated

Joy Hamlin, NC Zoo Curator of Education, and Linda Kinney, NC Zoo Education Specialist. Originally known as Children's Nature Discovery Center; later renamed kidZone.

Principal stakeholders

Zoo Education and Horticultural Education Divisions; Design Section; Horticulture Section.

Estimated construction cost

\$250,000.

Actual construction cost

\$450,000.

Funding sources

NC Zoo Special Zoo Fund; NC Zoo Society Donations; Institute of Museums and Library Science (IMLS) grant.

Designers

In-house Design Section.

Contractors

Primarily in-house. Architect/engineer and contractor appointed to assist with grading, drainage, and plumbing. Beanstalk Builders executed design/build Tree Top Trail.

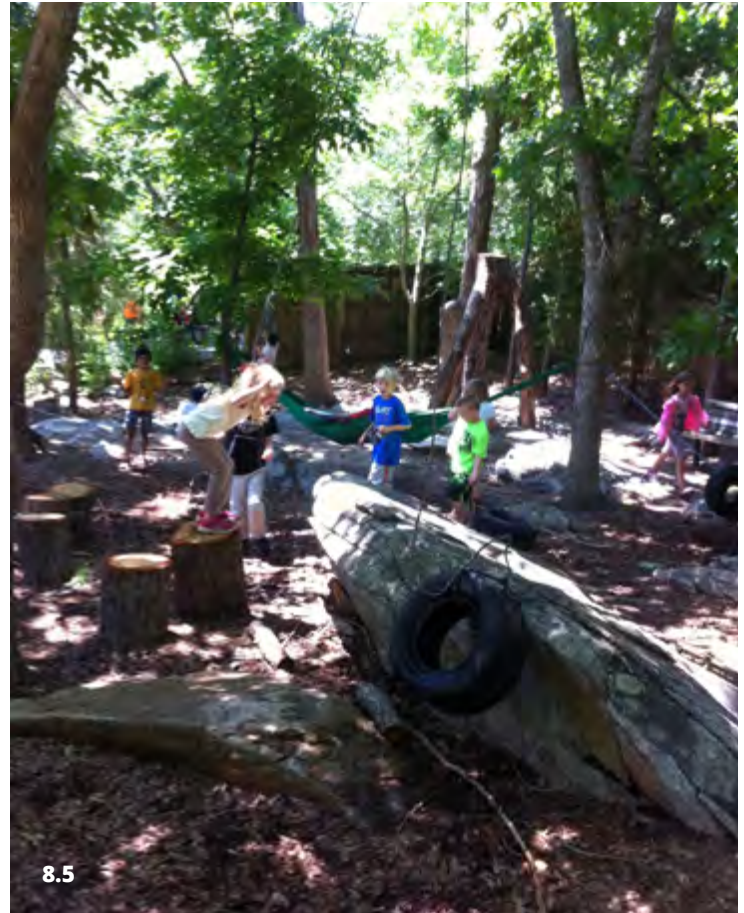
kidZone

Based on four years of prototyping, kidZone offers a range of designed settings and open woodland for unguided nature play. Learning-through-play programs led by zoo educators link to zoo-curated and regional animals, including migratory birds.



8.1 Dramatic entrance is a playful, nature sculpture by North Carolina Artist Patrick Dougherty.

8.2 Mother and son working on a natural construction project together.



How initiated Education Division discussed creation of a place within the Zoo where children could actively engage with nature. After a site was identified, Design and Horticulture Curators helped develop the concept and present to senior staff for approval.

Mission Fostering a love of nature through play.

Overall theme Free play in natural settings.

Design goals Provide affordance-rich, outdoor area for children to engage senses in nature play. Model “doable” nature play ideas (loose parts, building forts, digging in the dirt, dipping in the water) for individual families. Build on family relations. Provide opportunities for increased physical activity and quiet reflection. Support emotional and social development. Use staff engagement, including “animal ambassadors” to develop empathy between children and the natural world. Provide discovery-based learning opportunities for self-initiated exploration in immersive, multi-sensory, interactive, naturalistic environments.

Planning and design process In 2006 work started on a Children’s Nature Discovery Center with an external design team and Zoo stakeholders. Full design documents were produced but due to the recession, state funding was not approved. In 2007, kidZone was launched as an interim project to prototype and test different nature play and learning settings, using recycled objects and natural materials from the zoo grounds. Evaluation (see below) demonstrated the positive effect of natural affordances on science learning and helped secure funding to implement the permanent installation, which opened 2014.

Primary settings Entry (walk-through stick sculpture “Ready or Not” by artist, Patrick Dougherty), stream, sand/dirt play, mud café, campfire circle, treetop trail, woodland exploration, animal habitat/fort building, artist cove (chalk drawing/painting with water, project area), wildlife attraction pond, play house (dramatic play: be an animal, be a keeper, be a vet), grassy area (loose parts play), vegetable garden, music area.

8.3 Ravine—for some a place to RUN!

8.4 Dirt play setting.

8.5 Nature play and learning in the kidZone woods.



8.6 Rocky, recirculating stream is a central attraction year round—made more interesting with loose parts to experiment with.

8.7, 8.8 The “mud café.”

How installed Zoo crew, supervised by Design Section.

Activity programming In 2008, zoo educators launched Playful Pedagogy, a professional development program based on the playwork model of play-based learning. Zoo educators/playworkers facilitate Animal Encounters (using education program animals), Nature Play Days, preschool programs, and nature walks. Each day, kidZone staff sets the stage for building forts with natural materials, dipping the pond, making mud pies, and other opportunities for children’s active engagement with nature. Conservation education based on play has expanded opportunities for exploration, discovery and fun.

Site management One full-time educator position (state employee) dedicated to overseeing day-to-day operations; 3-4 seasonal, part-time staff. Two full-time and one part-time animal staff oversee the education animal collection.

Source of staff support State of North Carolina. Salaries depend on seasonal staff budget allocations, which can vary year to year. State funding applies to all Zoo seasonal staff.

Volunteer upkeep Volunteers occasionally help out at kidZone, primarily with vegetable and wildlife attraction gardens and special event programming.

Evaluation Behavior mapping, post-occupancy study conducted by the Natural Learning Initiative (NLI, 2008-2009). Findings demonstrate a strong association between dramatic play and science learning as well as an association between play with loose parts and dramatic play. Results suggest that children are more inclined to learn in settings they can manipulate at will.

Impact The Zoo attracts over 750,000 visitors annually, the majority being families and school groups. kidZone provides opportunities for children 2-12 to explore, play, climb, create and get up close to animal ambassadors. Positive feedback related to the stream

8.9

A group of children and an adult woman are gathered in a circle on a porch, playing large, colorful drums. The woman is standing and playing a drum, while the children are sitting on the floor and chairs, also playing drums. The background shows a green wall with two windows.

and mud café, two of the most popular areas, where young visitors actively engage with dirt, water, sand, etc. kidZone provides a hands-on, active experience for children, while parents enjoy a rest.

Future development Further expansion of “Into the Woods” by adding walking trails, activity areas and classroom space.

Unique aspects Re-designed area combined with natural site features and 3 acres of native woodland, providing a range of atmospheres from highly active to quietly contemplative. Four years of prototyping and post-occupancy evaluation helped staff understand links between science learning and environmental attributes.

Major challenges Fund raising. Convincing zoo leadership that a special area based on play and targeting children and families was a viable concept. Helping parents understand that nature is safe and that it is natural and important for kids to get dirty.

8.10

A hand-drawn map of a park area, likely a schoolyard or a small forest. The map is irregular in shape and features a variety of labeled areas and paths. At the top left, there is a 'TOILET' and a 'TOILET HOUSE'. Below these are 'TOILET HOUSE' and 'TOILET HOUSE'. In the center, there is a 'TOILET' and a 'TOILET'. To the right, there is a 'TOILET' and a 'TOILET'. At the bottom, there is a 'TOILET' and a 'TOILET'. The map also shows a 'TOILET' and a 'TOILET'. There are several paths and trails, including a 'TOILET' and a 'TOILET'. The map is drawn with simple lines and includes some decorative elements like trees and a small building.

8.9 Periodic drumming circle event tunes young visitors to the rhythms of life.

8.10 Layout shows complex interweaving of pathways and activity settings. Note plan does not include native woodland which is part of kidZone.

Location

Santa Barbara Museum of Natural History (SBMNH), 2559 Puerta del Sol, Santa Barbara, CA 93105

Context

Urban neighborhood of single family homes.

Site type

Museum campus extension into adjacent wooded Mission Creek corridor.

Opened

Backyard, 2008;
Nature Club House, 2012.

Size

0.5 acre.

Age range

All ages.

Access

Walk, bicycle, car, bus, tourist trolley.

Who initiated

Elaine Gibson, School and Teacher Services Education Specialist, Santa Barbara Museum of Natural History.

Principal stakeholders

Museum staff and later environmental education partners and visitors.

Estimated construction cost

\$150,000

Actual construction cost

\$200,000
(including \$30,000 Nature Club House renovations)

Funding sources

Local family foundations, Rotary Club, individuals.

Designers

Elaine Gibson, Education Specialist and Gary Robinson, Director of Facilities, SBMNH; Mark Frankavilla, Creative Landscape Design.

Contactors

General contractor, design/build contractor, in-house and volunteer crews. Boyd Hernandez Construction (Nature Club House renovation).

CASE STUDY 9

The Museum Backyard and Nature Club House

Community-based, nature play and learning area attached to a non-formal education institution, developed with designed additions to an already diverse, wooded site within a stream corridor. Renovated Nature Club House provides substantial added value, as a programming base, where children feel connected, can work with a knowledgeable adult, participate in organized programs and/or follow their own inclinations.



9.1 Childlike entry.

9.2 "Please climb on me" pathway leading to the "Backyard."

9.3 Community access to Backyard via creekside trail—all part of Santa Barbara's green infrastructure.



How initiated Outdoor school program experience in 2007 led to realization that the property could be an amazing nature-based teaching tool. Elaine Gibson and Director of Education & Exhibits, Heather Moffat, presented idea to Museum leadership and received Museum-wide support.

Mission To inspire a thirst for discovery and a passion for the natural world.

Overall theme Connecting to nature.

Design goal Reconnect visitors of all ages to the natural world, through real experiences in nature. Places for climbing, listening, building, searching, creating, imagining, socializing, and physically playing.

Planning and design process Visited other natural learning spaces in Minnesota, Nebraska, and California. Researched natural learning spaces, recognizing key elements unique to our regional ecology.

Primary settings Boulder pathway (climbing); near creek under trees (listening); bamboo poles (fort-building); compost pile (searching); mudpie place (creating); water course with hand pumps, stone plank bridge (water exploration); gathering on stumps (social play); fallen log (balance); stage (socializing, imaginative play with scarves, drums).

How installed Contractors and mixed crew of in-house facilities staff and volunteers.

Activity programming Outdoor Nature Explorations (school programs), Museum Backyard self-guided explorations, monthly Family Nature Days, festival components, Discovery Backpacks to motivate exploration.

Site management Nature Education Manager

Source of staff support Museum's operating budget (seek outside funding to cover).

9.4 Live Oak, rock-strewn landscape full of play and learning potential.

9.5 Classic multipurpose circle of stumps affords jumping/running around and animates the area in front of the Nature Clubhouse (visible in back).

9.6 The Nature Clubhouse is full of attractive science stuff and educational staff expert in getting youngsters engaged with nature.

9.7 Education staff act as "Play Partners" (inset) and use simple tools to get children engaged according to developmental levels.



9.8



9.9

9.8, 9.9 A scavenged, curved log has been scooped out and water plumbed, to be re-purposed as a water play setting including a collection of loose parts—manufactured and natural. Here, time stands still for children.

Volunteer upkeep VolunTeens, Quasars to Sea Stars (Museum program for teens), volunteer naturalists.

Evaluation Teacher evaluations, visitor comments & written/photographic documentation

Impact Professionally-conducted community survey rated the Backyard as the third favorite thing about the Museum. Word of mouth attracts young families and grandparents as regular visitors who come prepared to spend hours there. Visiting school children bring families on weekends with a free pass, which has increased low-income, Latino family visits. Preschool centers and playgroups meet regularly.

Future development Restore the oak woodland by removing non-native plants. Create areas for older children to explore. Develop an outdoor classroom for observing nature.

Unique aspects Part of a Museum of Natural History. Combination of nature play, learning, and education, facilitated by an on-site museum educator. Located in “green infrastructure” of stream corridor.

Major challenges Managing loose parts—“pick up and store” is constant. A full-time naturalist recruited to manage volunteers.



9.10 A recirculating stream and rocky surrounds implemented as a design-build project successfully recreates the feel of a foothills landscape.

9.11 Children can experiment with a water pump.

9.12 Or take a 100 inch hike upstream.

CASE STUDY 10

Location

Southern Pines Primary School, 1250 W. New York Avenue, Southern Pines, NC.

Context

Small, historic town, in the Sandhills Longleaf pine region.

Site type

School park.

Opened

1998.

Size

5 acres.

Age range

5-7 years during school hours.
All ages out of school hours.

Access

Foot, bicycle, car.

Who initiated

Parents, Bruce Cunningham and Ann Petersen with school PTA.

Principal stakeholders

Children, teachers, parents, and neighborhood residents. Moore County Schools, SouthernPines Department of Parks and Recreation.

Estimated construction cost

Not determined.

Actual construction cost

\$500,000, approximately in cash and in-kind.

Funding sources

Governmental and school sources, donations, and grants.

Designers

NLI, Michael Ortosky (aquatic elements—not implemented).

Contractors

Locally donated in-kind and at-cost services.

Blanchie Carter Discovery Park

Large elementary school site renovated through community engagement to serve both the school and surrounding neighborhood. Developed incrementally, in phases, over several years led by a group of parents. The best soccer field in town, encircled by a jogging track, used for practice. Named for highly revered, retired principal.



10.1



10.2



10.3

10.1 Creating a vision and culture of the school/park required going back to basics like camping overnight on the site and gathering around a campfire to sing and tell stories.

10.2 As part of the campout, newly-planted trees receive a Celtic blessing.

10.3 "Earth Buddy" (self-organized group of students) is interviewed by *New York Times* writer for a story about the Blanchie Carter Discovery Park.



10.4



How initiated Issue of the barren, boring playground raised by a group of parents committed to racial harmony in a campus that was once a high school, now converted into an integrated primary school.

Mission An inclusive place for healthy development, outdoor learning, and enjoyment for school and community.

Overall theme Increase play and learning opportunities by creating a diverse range of settings, emphasizing eco-restoration, installed over time as resources became available.

Design goals Restore barren site, formerly part of regional Longleaf Pine forest, to socially and ecologically productive use. Extend vegetated edges back on to the site, including replanting Longleaf Pine. Achieve water independence by drilling a well. Install pathway system to ensure easy access for children, teachers, and residents. Use internal railings to define settings and protect plants. Universal design approach.

Planning and design process Master plan developed by Robin Moore through interactive process with parent-teacher group, with addition of student ideas. Design presented to Moore County School Board for endorsement and follow through staff support.

10.4 Layout of the park with peripheral trail and extensive tree planting to restore the Longleaf tree cover (inset shows starting level).



10.5



10.6

10.6



10.7a



10.8



10.7b

10.5 Teachers, parents, and volunteers install birdblind.

10.6 Birdblind.

10.7 Edible Maze designed by students (inset).

10.8 Children studying the Edible Maze.

Primary settings Naturalized, equipment-based play areas (climbing and sliding, tire swings, too-and-fro swings). Pathway system, including “peripheral trail” (See Our Magical Journey). Multi-purpose field with running track. Vegetated hill. Two gazebo gathering areas (active, adjacent to track; quiet, back corner). Bird blind. Log cabin playhouse, council circle, and “village” vegetable garden. Orchard (blueberry maze, berry fence vines, apple and pear trees). Labyrinth. Sandpit. Picnic gathering setting. Multiple tree- and shrub-based settings, including one-acre Longleaf Pine reserve added to the site.

How installed School community engaged in incremental, phased development, beginning with fund-raising for play equipment installation and site grading for multipurpose field and hill as first phase. Early, key additions included turf laid for field (with expert help from Sandhills Turf Co.), installing a well and construction of well house for irrigation water (conservation objective and avoiding expense of local utility water). Sequence of setting installation described above. Local tree nursery provided technical advice on tree and shrub planting, sold stock at cost, and assisted

with transplanting small Longleaf pines harvested adjacent to and off-site. Local bulldozer owner excavated pathway alignments. “Impact” low-risk prisoner, community service program planted trees.

Activity programming Classroom activities during school day. Two UK playwork interns executed the student “labyrinth project.” Moore County Schools after-school care. Out of school use by organized community groups such as soccer and nature study. Community celebrations, such as birthdays. Special school events such as campfires and campouts, “sports days” and Play Daze. Informal use by local neighborhood for play and recreation.

Site management Part-time site manager/programmer from Sandhills Community College. School staff and parent volunteers.

Source of staff support Funds raised by parent support group. Now internalized in school budget.

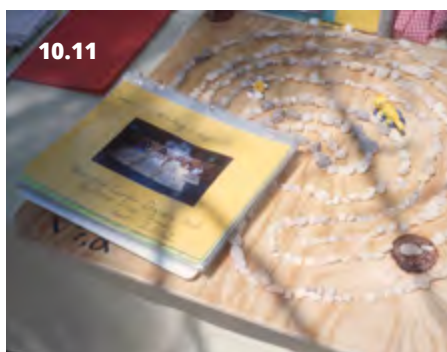
Volunteer upkeep Parents group 501c3.



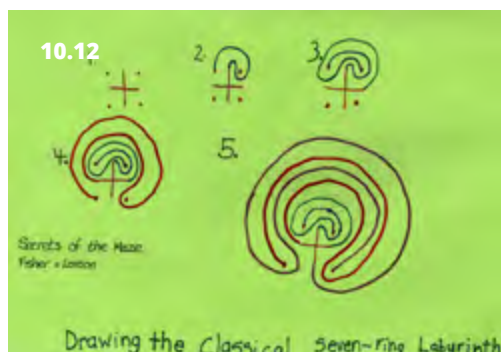
10.9



10.10



10.11



10.12



10.13



10.14

Evaluation No formal evaluation.

Impact Immediate transformation in student enjoyment of outdoor play. Drop in discipline referrals. Expanded learning opportunities to include the outdoors. Provided play activities for wide range of student personalities. Enhanced overall appeal of the school. Source of pride for the neighborhood. Article in the NY Times.

Future development None contemplated.

Unique aspects Developed from the beginning as a school park. Use by local conservation educators to provide environmental education. Link to North Carolina Sandhills Conservation Partnership (restoring the Longleaf Pine-Wiregrass Ecosystem). Periodic controlled burn of Longleaf Pine reserve with local fire department. Use by Play Daze North Carolina as a site for community creative, free play events

Major challenges Achieving buy-in from school site management staff and stable, longterm site management/maintenance support. Reintroducing main objectives to periodic turnover of Moore County Schools leadership. Encouraging use by classroom teachers during school day for curricular activities in support of the NC Standard Course of Study.

10.9 Parents, community volunteers, and children plant trees marking the entrance to the Labyrinth.

10.10 View across the Labyrinth from entrance.

10.11 Labyrinth class project conducted by two U.K. playwork interns. Children studied the ancient history of labyrinths and made models of different forms.

10.12 Labyrinth geometry.

10.13 The Labyrinth in action.

10.14 The "Breakfast Walking Club" using the peripheral trail.

Location

University of Cincinnati,
47 Corry Boulevard,
Cincinnati, OH.

Context

Urban.

Site type

University campus.

Opened

2012.

Size

0.3 acres.

Age range

Preschool. Open to the community when not in use.

Access

Walk, bike, car, bus.

Who initiated

Dr. Victoria Carr, Associate Professor and Director, University of Cincinnati (UC), Arlitt Child & Family Research and Education Center (Arlitt Center).

Principal stakeholders

Arlitt Center Head Start program and preschool; Office of the University Architect, UC; College of Education, Criminal Justice, and Human Services. Families from nearby communities.

Estimated construction cost

\$417,000

Actual construction cost

\$409,000

(\$351,000, construction;

\$32,000, design fees;

\$22,000, project administration;

\$4,000, misc.)

Funding sources

Ada Hart Arlitt Endowment; Proctor & Gamble; Harriet Williams Downey Fund; Cincinnati-Hamilton County Community Action; College of Education, Criminal Justice, and Human Services.

Designers

Rachel Robinson Design Landscape Architecture, LLC; Consultant: Robin C. Moore, Natural Learning Initiative, NC State University.

Contractors

General Contractor: Mark Spaulding; Fencing: ZSR Construction; Plumbing: Queen City Mechanicals.

CASE STUDY 11

The Arlitt Nature PlayScape

All-season, bounded space, located close the campus preschool, designed to support healthy early childhood development. Serves as a research site for investigations of the impact of nature play on child development and learning, including social development, self-efficacy, literacy, and STEM education.



11.1 View across site showing, well-established, diverse vegetation by year two. Campus buildings in background.

11.2 View across two-sided courtyard site, showing grove of existing maple trees with accessible "treehouse." Inset shows aerial view in campus context, courtesy Google.



How initiated Conceived in 2008 when Dr. Vicki Carr, co-founded the regional Nature PlayScape Initiative (NPI) led by Bill Hopple, CEO, Cincinnati Nature Center (CNC—Case Study #6). The Natural Learning Initiative (NLI), NC State University, was retained as consultant for Nature PlayScape design and as professional development provider at both institutions.

The UC Niehoff Urban Studio, collaborated with NLI (Director, Robin Moore, and Director of Programs, Dr. Nilda Cosco) to deliver a professional development program (PDP) on design for childhood and nature to a regional group of landscape architects. Dr. Carr and Len Thomas, Senior Planner, UC, identified a suitable campus space. A PDP “graduate” was appointed project landscape architect. NLI remained involved as consultant.

Mission Provide a safe, outdoor place for children’s exploration, discovery, play, learning, and positive social interactions, emphasizing the importance of the outdoor early childhood environment and serve as a research facility for the university community.

Overall theme Remind parents, teachers, administrators, students, and local residents of how playing in nature can stimulate curiosity and the joy of learning at all stages of life.

Design goals Convert an underused campus space into a place, where children can receive a “daily minimum dose” of natural experiences and acquire love and respect for the natural world. Create a research venue and co-learning lab beyond indoor classrooms, offering professional development for early childhood educators. Offer parents a backyard design model and a place to experience nature with children.

Planning and design process Possible sites were evaluated. A conceptual design was created by NLI. An online survey of parents and teachers demonstrated their enthusiasm for nature play and learning. A design charrette with campus stakeholders and project landscape architect was facilitated by NLI who developed a design program. Further meetings focused on appearance and technical issues. Rachel Robinson created design development and construction documentation. Robin Moore was named signature designer.

11.3 A small stream bordered with permanent, smooth stones, with a bed of loose small stones and pebbles, works well for pre-schoolers. Water is supplied on-demand from child-operated valve (inset).



11.4

11.4 Accessible treehouse constructed in existing grove of trees offers commanding view across the Nature PlayScape.



11.5

11.5 Ground-level view showing pathways, treehouse, and dirt play with loose parts.



11.6

11.6 View across site from overlook on grade with campus sidewalk. Provides a place to relax with comfortable seating and an opportunity to engage the campus community in understanding the research mission of the Nature PlayScape. University graphic sign describes each setting.

Primary settings Main entrance from campus sidewalk and overlook with seating and signage, vegetated edges, primary and secondary pathways, treehouse in existing “bosque,” multiuse lawn, grassy banks, decks, puppet-theater, tunnels, play niches, arbors, hammock, full body contact vegetation, gross motor settings, earth and sand play, loose parts, herb and butterfly garden, vegetable and flower garden, fruiting plants, child-activated stream, art projects, storage/program base, shady observation stations for researchers.

How installed Mary Beth McGrew, Associate Vice-President and Architect, and Len Thomas, Senior Planner, Office of the University Architect, provided direction and supervision for the general contractor. Landscape Architect, Rachel Robinson, Dr. Victoria Carr, and Robin Moore collaborated throughout the planning and installation phase.

Activity programming Arlitt Center teaching staff and faculty.

Site management Staff of UC campus and Arlitt Center

Source of staff support Financial support provided through private donations and grants.

Volunteer upkeep Yes.

Evaluation Teacher usability study. NSF-funded study, PlayScapes: Designed Nature Environments to Promote Informal Science Learning, directed by Dr. Carr (2011-2012).

Impact NSF study results demonstrate, 1) nature-based learning supports significant growth in preschool early science, 2) the Nature PlayScape fosters self-determination, mapping skills, problem-solving, and cooperation. Staff reported less behavioral issues, more sustained engagement, and positive learning outcomes in the Nature PlayScape, compared to indoor classrooms.



Future development Programs for university students and professional development for early childhood educators and caregivers planned for the future.

Unique aspects The Nature PlayScape has been instrumental in obtaining internal and external research and program funding, resulting in scholarly publications in support of the UC research mission. Demonstrates how an underused campus green space can be transformed into an aesthetically pleasing, academically relevant, programmatically interactive landscape. Families bring their children afterhours to Playdates in the PlayScape as part of the regional strategy to engage urban children in nature play.

Major challenges Meeting campus design standards, supporting building costs, seeking continued funds for upkeep.



11.7 The Nature PlayScape in action. Rear of Program Base/Storage is visible in background.

11.8 Close-up of front of Program Base/Storage. Note wide, double doors for ease of access.

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Another landscape architect, Marjory Allen of Hurtwood, imported the concept to London at the end of WWII, where the rubble of war was put to positive use as adventure play material. The model spread rapidly throughout London and other UK cities. As testament to the concept, adventure playgrounds are alive and well around the world, including still in the U.K. and Denmark; and also in Canada, Japan, Germany (the most interesting located in the corridor of the former Berlin Wall as an effort to reunite culture through children and families, led by landscape planner Oliver Ginsberg). Berkeley Parks and Recreation Department, California, has supported an adventure playground modeled on the Danish original since 1979.

The dramatic play typical on an adventure playground facilitates collaboration in problem solving, enhances social skills, and supports emotional development. The sense of collective achievement reinforces self-esteem and overall competence as children manage their own affairs. "Hide-outs" or "clubhouses" built by the children create community, offer space for rest and relaxation, and engage children from different families and cultures. Opportunities abound to build the socio-emotional skills essential for healthy, balanced development of individuals. Adventure playgrounds also focus on nonhuman life forms through gardening and animals, sometimes with an explicit therapeutic intent to engage children with special needs.
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Mudshute in London and Windmill Farm in Bristol are outstanding examples. St. Werburgh's City Farm, also in Bristol, founded more than 30 years ago, is a substantial enterprise comprising a four-acre working farm, two acres of community gardens, a three-acre educational woodland, adventure playground, and City Farm Café.

St. Werburgh's exemplifies the power of community synergy around themes of nature, health, food, and the arts, in this case between a children's garden, city farm, and neighborhood organic restaurant serving local food (including pork raised adjacent to the restaurant). St. Werburgh's organizes an annual summer fair fund-raiser with a huge street parade, musicians, and performances. <http://www.swcityfarm.co.uk>

There are more than 60 City Farms and over 1000 community gardens in the UK. For more information, see <https://www.farmgarden.org.uk>

In these examples, hands-on nature play, informal learning, the healthy living philosophy of urban farms, and the adventure playground sense of freedom, offer a unique environment for child and community development. Associated

cafés and restaurants support the local economy and create employment opportunities. As a form of social enterprise, these well-established models have stood the test of time and cross-cultural transfer because they share commonalities of the human condition: children, family, and community—framed by a philosophy of nature-based, dynamic, expressive culture through community arts. Community synergy creates a place for people to meet and build social capital, an attribute of all the models profiled here.

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What leaders in the field of children and nature, policy, landscape design, child development, and parks and recreation are saying about

Nature Play & Learning Places

"Robin Moore, a leader in the children and nature movement, long praised for his design of natural play spaces, offers a distillation of years of research and practice to prescribe a new American landscape—no, make that an international landscape—for children's nature play and learning. This pivotal book provides every educator, mayor and pediatrician with an inspiring blueprint for a long-overdue revolution."

— **Richard Louv**, author of *The Nature Principle* and *Last Child in the Woods*;
Chairman Emeritus, Children & Nature Network.

"These innovative guidelines will help improve children's health by connecting families with our public lands and at the same time encourage learning about natural systems."

— **Fran Mainella**, Chair, Children & Nature Network; former Director, U.S. National Parks Service.

"It is more important than ever that we work in every community to reconnect people with wildlife and nature. *Nature Play & Learning Places* will help conservationists, educators, and recreation professionals work on that shared goal."

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"For landscape professionals, Robin Moore provides a vital tool and meticulously organized guidelines to help communities implement healthy living environments through urban park investments and cost-effective grassroots interventions."

— **Paul Morris**, former President, ASLA; President and CEO of Atlanta Beltline.

"This well-written, compelling, comprehensive book eliminates for advocates any excuse for not knowing what to do or how to start a nature play and learning project. All the steps are there, supported by lovely photographs and architectural renderings."

— **Marcy Guddemi**, PhD, Executive Director, Gesell Institute of Child Development.

"With these guidelines in hand, park and recreation departments can design, build and maintain successful nature play areas in any type of community for all people to enjoy."

— **Barbara Tulipane**, President and CEO, National Recreation and Park Association.

"Bridging the growing divide between children and the natural world is crucial so that communities and our nation can gain from the positive environmental values shaped by these early experiences. *Nature Play & Learning Places* is a must-have, pragmatic guide for those dedicated to making a difference in how children relate to the natural world."

— **Tom Underwood**, Executive Director, American Horticultural Society.