Chapter 3

Children and Nature Design Principles

Design Principles

My overarching goal over the past thirty years has been to look at the relationship between children and nature from the bottom up. This is the opposite of the logic sequence that starts from a problem or a concept in the adult world and then moves downward to impose something on children. The classic example of this top-down mind-set in the past decade of environmental concern has been: The rain forests are disappearing; therefore let's teach children about the horrors of rain-forest destruction so they will act to save them! Instead, I'm more interested in figuring out how to cultivate relationships between children and trees in their own backyards as a precursor to their working to save rain forests as they get older, when they can actually do something about it. Talking to trees and hiding in trees precedes saving trees.

I learn about children-tree relationships through phenomenological observations of children interacting with trees naturalistically. What is it that children actually do with and in trees? Well, they climb them, build forts in them, read in them, hug them, make nests with their leaves, create carnival rides on their branches, play with dolls in their shade, gaze at the sky through their leaves, smell them, become friends with them. Through conducting similar natural-history observations of children in the out-of-doors in all kinds of settings, with children of all ages and in a number of different cultures, certain recurrent patterns emerge. Just as Howard Gardner has identified a set of intelligences in children, I have identified seven play motifs. Regardless of socioeconomic status, ethnicity, or ecosystem, children play in similar ways when they have safe free time in nature.

Now there's really nothing magical about seven. There might actually be five or eleven, but because seven appears to be the set size the mind can easily handle (for instance, traditional seven-digit telephone numbers), I've settled on the lucky number. Spend time at a safe, woodsy playground and you'll find children (1) making forts and special places; (2) playing hunting and gathering games; (3) shaping small worlds; (4) developing friendships with animals; (5) constructing adventures; (6) descending into fantasies; (7) and following paths and figuring out shortcuts. I think there are evolutionary reasons why children do all these things, but regardless of these explanations, it's important to recognize that these activities occur over and over.

To speculate further, it is often in the midst of these kinds of play that the transcendent experiences occur. Look at the experiences described in the previous chapter and you'll see special places in trees, adventures along streams, fantasy conversations, and gathering of flowers. To encourage transcendent experiences or, more simply, just to follow the child's lead in building nature relationships, we can translate these motifs into design principles. In other words, we can use the principles of special places, hunting and gathering, creating small worlds, and the others as design components for family outings, curriculum projects, and environmental field trips.

I'll explore each of the design principles by giving examples of how educators have used these motifs to structure learning experiences for children. In doing so, educators both provide powerful vehicles for curricular knowledge and court the possibility of transcendent experiences. Serendipity rules when the muse will actually show up, but we can invite her.

The design principles are not developmental and, as a result, function at right angles to the developmental stages. The developmental stages of empathy in early childhood, exploration in middle childhood, and personal definition and social responsibility in adolescence provide the warp of the fabric. (These are articulated in *Beyond Ecophobia* [Sobel 1996].) The design principles are the weft of the fabric; they run through all the developmental stages. To take special places as an example, in early childhood, special places are constructed out of couch pillows in the living room and then move to under the porch. In middle childhood, special places are forts out in the woods or up in a tree. In adolescence, the special place might be an electrified clubhouse, or it might become the coffeehouse downtown. Each design principle manifests in a different way in each developmental stage.

I'll spend more time on some design principles, less on others, but they're all equally potent. In *Children's Special Places* (1992) and *Mapmaking with Children* (1998) I explore two of these principles in depth. Also keep in mind that there are no sharp boundaries

between one principle and another. They interweave and overlap. In fact, integrating two or three is even more powerful. Here they're separated for ease of presentation.

PRINCIPLE 1: ADVENTURE

Environmental education needs to be kinesthetic, in the body. Children should stalk, balance, jump, and scamper through the natural world. Activities with a physical challenge component speak directly to children via the mind/body link.

It was a simple transformation. If I suggested to my children that we were going on a walk, they complained. However, if I opened with, "Let's go on an adventure," they were much more recruitable. Walks are for adults. You staidly put one foot in front of the other, you chat about boring things with your friends, you wind up at outlooks and say, "Oh what a beautiful view." Snoresville. Adventures mean you don't know what's going to happen when you start out. You're going to get off the trail, do some sneaking around, surprise someone or get surprised, and you're going to take a few risks. Surprisingly enough, you can cover exactly the same terrain as you would on a walk, but the experience can be completely different.

Taking children into caves, going on blindfold walks, exploring alleyways and dark basements, calling up people you don't know on the telephone—adventures can take lots of forms. I have a preference for the Narnia version, where you start in the everyday and wind up in the exotic. David Millstone (1989), a fifth-grade teacher at the Marion Cross School in Norwich, Vermont, conducted an adventure that integrated mapmaking, writing, vocabulary development, and local history. The accounts of the adventure, published in a school newsletter and excerpted here, illustrate how the true exploratory nature of the event fueled curricular fires.

Predicting Our Path

We were explorers. We set out from the school to solve a mystery. A stream runs by the entrance to the nature area—where does it go? Last week, there were many theories. Fritz drew a map and said it ended in a swampy area in a corner by Route 5 and the interstate. Laura said she wasn't sure where, but she thought it just stopped somewhere. Molly, Lucas and Jake… drew two rough drafts (of a map) before finally agreeing that the stream ended up going into Blood Brook.

I started out thinking it went under Main Street into Blood Brook. But as I drove that way each day to and from school, I couldn't see any likely culverts, and the stream vegetation sloped away to the north. Was there another stream? How did it get past the interstate?

Within the first five minutes, I felt everything going well. "This is great!" someone shouted, and I could hear eager cries and yelling as we moved through the first of many swamps… The stream took a turn north and we followed, twisting and turning with the water, and hesitating only briefly before gingerly entering the culvert—the longest and wettest and darkest culvert I've ever been in. We emerged into the sunlight on the other side of the highway, warm sun and the welcoming face of Ms. Jenks, who opted for the daylight route…

The following two student accounts portray the range of student experience, from poetic to geographic, from Wordsworth to Shackleton.

Shadows, by Molly Witters

Shadows cast on fallen trees covered in soft green moss. It was like a fairy tale, a valley deserted except for the stream running under and over the obstacles of nature…

The hillsides had trees of strange variety from rich green pine trees, to bare and eerie dead trees. There were pools of water where the light hit just right and it looked like a mirror that needed dusting.

We walked along anxiously hoping to see where the stream came to an end. As we approached the spot, five ducks flew off into the piney woods, never to be seen again. I will not go on for the rest of my story would be about mud and noisy highways. I would like to leave my thoughts just where they are, for mud and highways do not come anywhere near to interesting me as much as beauty and imagination do.

The Stream, by Maria McCormick

"We are about to journey into an unknown land," said Mr. Millstone. "No class ever that I know of has been daring enough to do this. If you come to any dangers, monsters or beasts, call for Courtney and she will help you." When we got to the stream we started walking along the side of it. For a short time, we were in the woods, but then we had to cross a barbed wire fence in a place where it was crushed and we came to a field which I think was the back of the apple orchard. The stream ran through here for a little while until we came to a huge culvert that went under the interstate highway… In the middle there was water dripping down so we had to walk to the side which was hard because it was slippery. (On the bank on the other side), we had our snacks.

Soon we came to a tall fence with a gap at the bottom we had to go under. A little while after that we came to another culvert, smaller than the first one, but still big enough that I could go through it without ducking. This culvert didn't go under any road. Soon after that we came to a very muddy part of the Connecticut River. THIS IS WHERE THE STREAM WENT TO.

Though I have shared only two examples of student work here, you would be amazed at the quality and diversity of the writing and mapmaking. Real adventure provokes real writing. In fact, research indicates that writing that emerges from field explorations of the nearby environment is consistently of higher quality than other writing. This is determined by independent assessments of student writing on the basis of agreed-upon evaluative rubrics.

These student writings illustrate the process of using the design principle as an avenue into inspired learning. At around the ages of nine and ten, children are compelled to push back their geographic horizons, find out what's beyond the next field, make it to the Irish neighborhood beyond Thomas Boulevard. There's an inherent developmental thirst for exploration. By using the adventure and exploration form, the teacher captivates his audience and propels them into deeper learning. In reflecting on this experience, Millstone summarizes.

About Our Hike, by David Millstone

We went for the Great Hike Downstream for many reasons. I was curious about the stream myself, and found in conversations with others that no one really seemed to know where the stream went. The trip expanded our recent emphasis on mapping Norwich neighborhoods. The search would challenge the class's mapmaking skills. Similarly, an adventure into the unknown would stimulate children's creative writing… The experience of following a stream would reinforce a fundamental concept in topographic maps—water flows downhill. The stream flows directly under the new playground, the area we will be surveying for our contour map. I wanted children to experience the thrill of posing a question and working directly to find the answer.

Like any true adventure, what started out as a simple idea grew more complex as we trudged along. We ended up doing things I had not anticipated, and going where I had not planned to go. There was valuable learning for both children and adults in dealing with the unexpected.

Computer simulations like the Oregon Trail have become all the rage in classrooms over the past decade. Students follow the Iditarod, round-the-world sailing expeditions, and the migration of monarchs north, all via the Web. These virtual adventures would be greatly enhanced by real adventure experiences on the schoolgrounds.

To concretize the study of trade along the historic Silk Route, one teacher in Putney, Vermont, had two groups travel from opposite ends of the school forest and meet in the center to trade commodities. By figuring out how long it took them to travel the route in the school forest, the teachers and students figured out how long it would take to travel the thousands of miles on the Silk Route. The real adventure in the backyard provided the basis for understanding the historical adventure in Asia. These kinds of *transitional metaphors* help to bridge the gap from experience to abstraction. Virtual adventure can't hold a candle to kinesthetic adventure.

FANTASY & IMAGINATION

PRINCIPLE 2: FANTASY AND IMAGINATION

Young children live in their imaginations. Stories, plays, puppet shows, and dreams are preferred media for early childhood. We need to structure programs like dramatic play; we need to create simulations in which students can live the challenges rather than just study them.

In preparation for a trip to southwestern England about a decade ago, I immersed my ten-year-old son and twelve-year-old daughter in Arthurian legends, Celtic mythology, and Susan Cooper books for a couple of years. One of the trip's goals was to visit lots of variations on castles—ruins, well-preserved medieval residences, military fortifications, baronial homes transformed into country inns. After we arrived at our friend's house in Devon, I proposed the day's agenda.

Daddy: Today we're going to Berry Pomeroy. It's a haunted castle ruins and a historical site. They have a little museum, there's a storytelling program today, and we can have a Devonshire cream tea at the tearoom.

Tara and Eli: Do we have to? (whining with that desultory look on their faces that strikes fear into all parents' hearts)

Daddy: What's the matter? I thought you wanted to go to castles. We've been planning this for years. It should be fantastic.

They looked at each other knowingly, then my son sheepishly turned to me and mumbled,

Eli: Will we have to go on a tour?

Right away, I understood the problem. We do lots of free-form adventuring as a family, but every now and then we do the packaged interpretive experience at a national park or historical site. Most of the time, it drives the kids crazy. Luckily, this day there was no tour. The castle had creepy dungeons and twisty, narrow stone stairways and a storyteller with an old-time ploughman's lunch—a chunk of bread, a slab of cheese, and a raw onion that he ate like an apple—telling local ghost tales. In one of the stories, the key to a cedar chest where the family wealth was hidden played a prominent role. The storyteller shared bits of history and lore, had us creep inside old meat-smoking chambers, led us in singing resonant songs in the chapel, tried to call forth the bats; we played the history of this place for three or four hours.

Months later Eli proudly showed me a rusty key he had found while digging around in an old fireplace. He hadn't told me he found it—sure that I wouldn't let him take it with him. He had actually taken a potential artifact. "I think it might be the key from that story," he speculated. The mystery and history of that misty afternoon were wrapped up in his personal discovery. The moral of this story is that our role as storytellers and world creators precedes our role as imparters of knowledge and cultural heritage.

I ran across a British study a few years ago that further clarified this issue for me. *The Development of Imagination: The Private Worlds of Childhood* by David Cohen and Stephen MacKeith (1991) describes children's private imaginary worlds, which the authors call "paracosms." Paracosms are elaborate fantasy creations—imaginary worlds created by individuals or small groups of children. They tend to emerge around age seven or eight, flourish up through age thirteen or fourteen, and then gradually subside.

One of the originators of the study had a paracosm of his own in childhood and was intrigued to find out whether other adults recalled similar experiences. He solicited accounts via the newspaper (evidently a popular research methodology in England) and lo and behold, he was treated to a wide variety of remembered worlds.

The researchers sifted through the descriptions and decided that in order for a fabrication to be a paracosm, it had to have four key characteristics: "First, children must be able to distinguish between what they have imagined and what is real. Second, interest in the fantasy world must last for months or years...Third, children had to be proud of the world and consistent about it...Lastly, children had to feel that the world mattered to them" (Cohen and MacKeith 1991).

It seems that well-known novelists often created paracosms in childhood. Charlotte and Emily Brontë, authors of *Jane Eyre* and *Wuthering Heights*, respectively, created these worlds with their siblings in their isolated home on the edge of the Yorkshire Moors in the nineteenth century.

> *In June, 1826 their father gave them a set of toy soldiers and this gift sparked into being Verdopolis, the great Glass Town, which later blossomed into the country of Angria. They introduced into it contemporary characters, politicians, soldiers, and writers. They produced a never-ending stream of relevant miniature writings; there were poems and documents, fables and chronicles… Charlotte planned to give up Verdopolis when she went to boarding school and even wrote a poem about its deliberate destruction, but when she came back from school at 16, she soon went back to her imaginary world. In her early 20's, she wrote five little novels about Angria, but these were never published in her lifetime.* (Cohen and MacKeith 1991)

Narnia similarly has its roots in a paracosmic world created by C. S. Lewis and his brother during their childhoods. And lots of nonwriters create them as well. Some worlds are based on toys, some are fairy worlds, others elaborate history, some are reconstructions of existing worlds—like the creation of an optimal boarding school to

counterbalance the dreary aspects of a child's current situation. Many of the worlds are independent countries or islands, with a primary focus on geography. One of the subjects of their study, Beryl, created an island world that expanded as she grew between the ages of nine and sixteen.

> *The west coast is rather like Orkney, with high cliffs which tail off to the south where the coastline remains rocky. There are one or two tall stacks like the Old Man of Hoy, palm trees and an abundance of excellent seafood. The south coast was almost tropical, with gorgeous beaches of white sand where turtles came to lay their eggs. On the east coast, a splendidly wide estuary teemed with seabirds and waders… there was a tract called Mohawk Country where there were Indians and herds of wild horses. There were rolling grassy foothills to the north, and beyond them, a phantasy land, peopled by fauns and dryads and the Great God Pan (down in the reeds by the river). I have also seen and stroked a unicorn there.* (Cohen and MacKeith 1991)

Her stories about her explorations and adventures go on and on. As the authors portray, these are not illusory afternoon imaginings, but places in their minds that children return to over and over. And though not all children create lavishly elaborated paracosms, all children create smaller-scale fantasy worlds, and they all get wrapped up in well-crafted stories and opportunities to walk through the wardrobe.

Cohen and MacKeith claim to describe a recurrent childhood truism that we should attend to. Furthermore, I have found that truly inspired teachers (at least all the teachers on my secret Top Ten Greatest Teachers in New England list) create paracosmic worlds in their classrooms through the use of historical simulations, play production, class creation of an evolving story, or involvement in addressing real-life community issues. Families do this through the creation of vernacular family stories with characters and settings that are used over and over for years. (In my family, one of the stories was The Adventures of Princess Quartz and Prince Mica versus the Dragon with the Emerald Chandelier.) Herein lies the design challenge. How can we use elaborated stories and the creation of imagined worlds as a structure for learning experiences for children?

The Forest of Mystery, an annual Halloween event of the Bonneyvale Environmental Education Center in Brattleboro, Vermont, is the perfect manifestation of this concept. Many environmental centers conduct spooky nature programs as fund-raisers during the autumn season, but the Forest of Mystery is a fantastic story in itself that

includes a groundswell of community participation. Each year a new story unfolds. Families arrive at a rambly hill farm with old pastures intergrading into hardwood forests as they rise up the hills. In a weathered barn, around the woodstove, a wizened storyteller lays out the problem and the challenge. Failing crops, strange weather, animals disappearing from the forest, the loss of magic, birds not being able to learn their own songs. As a group of travelers, participants must go into the forest, confront evil, and aid in the village's resurrection.

As you travel the luminaria-strewn path, the story unfolds. Peasants clothed in rags try to unearth meager potatoes from their infertile gardens. Exotic gypsies sing and chant in rhymes, unsure that you have the courage and gumption to confront the forces of darkness. We eavesdrop on the conversation of shrouded spirits as they dine at a formal table set in an oak grove fit for druids. Their crystal goblets clink and their silverware tinkles as their diabolical schemes unfold. Creatures lurk behind trees; sirens attempt to seduce you. But with cunning and courage, we uncage the princess, slay the dragon, and free the villagers in a bonfire ceremony in a high mowing.

The underlying messages of the quest are the fare of the science curriculum standards—wise use of resources, nutrient recycling, concentration of toxins in the food chain, water quality—but the vehicle is story and enchantment. I've been both actor and audience in this experience and each has its own pleasures. As an audience member, I relish the suspension of disbelief, being swept away by eerie lighting that fills the forest with magic and secrets. For just a bit, it feels as mysterious as visiting the graveyard at midnight on Halloween when I was nine. And I appreciate the framing of ecological issues in metaphoric fashion.

In between scenes as a cast member, I covered myself with recently fallen leaves and appreciated having an excuse for being in the woods alone in pitch blackness. In my scene, I enjoyed improvising, figuring out ways to make concepts come alive with that kind of free-form play that happens only in darkened forests.

The Forest of Mystery has many trophic levels of influence. At one level, it remystifies the landscape. "That's one of the most beautiful forests I've ever been in," said my daughter one year. Yes, it's a well-managed forest, but what she's experiencing is the intrigue of the story enhancing her aesthetic appreciation of the place. When children come back here for school-based programs, some of the magic adheres to the place and inspires their learning. At another level, as ecological parable, the stories resonate in children's imaginations, creating visual images for complex concepts. At the community level, it's a social capital–building experience. As cast members, children and adults reacquaint themselves with old friends, forge new relationships, and get to play together through helping to protect the land. As audience, community members get to celebrate Halloween in a ritual that feels more like celebrating the traditional cross-quarter day of All Hallow's Eve (the halfway point between an equinox and solstice) and less like another trip to Kmart.

In schools, teachers construct paracosms often through the creation of classroom plays. Though it's not about children and nature, I heartily recommend David Millstone's (1995) *Elementary Odyssey*, about submerging fifth-grade students in Greek history through a classroom production. Or Steven Levy's (1996) *Starting from Scratch*, in which students enter an empty classroom, devoid of furniture, and literally have to create their own world. Edith Cobb (1959) said that what children want most is "to make a world in which to find a place to discover a self." Our task is to provide the safe place, the tools and materials, and the right stories.

PRINCIPLE 3: ANIMAL ALLIES

Brenda Petersen said, "In our environmental wars, the emphasis has been on saving species, not becoming them" (1993). *If we aspire to developmentally appropriate science education, then the first task is to become animals, to understand them from the inside out, before asking children to study them or save them.*

Browse through a collection of children's books. Ever notice how frequently animals play a central role? Whether it's *Winnie the Pooh* or *Runaway Bunny* or the Francis books or *Owl Moon*, more often than not either the characters are animals or the people are interacting with animals. It used to be true of cartoons as well, such as Bugs Bunny, Roadrunner, or Rocky and Bullwinkle. No coincidence. Animals play a significant role in the evolution of children's care about the natural world and in their own emotional development. Joseph Chilton Pearce, author of *The Crack in the Cosmic Egg* and *Magical Child*, even contends that a majority of children's dreams are populated with animal characters.

Children feel an inherent empathy with wild and domestic animals. Children's first impulse with some animals is to pick them up, hold them close, take care of them, and become them. Other animals inspire fear and avoidance. Eventually, children may want to hunt such animals, cut them open, and eat them, but that comes a bit later. Just as traditional cultures identified with certain totem animals, children often identify

themselves as a specific animal. Need an icebreaker when trying to get a conversation going with a child? Ask, "What's your favorite animal?"

Paul Shepard suggests that these strong feelings toward animals in early and middle childhood are indicative of our evolutionary heritage. More than 95 percent of our evolution as a species occurred during the preagrarian period when our ancestors were hunters and gatherers. These traditional cultures depended on men's knowledge of animals and hunting skills and women's knowledge of plants and gathering skills. As a result, many of the patterns of our early learning are rooted in learning about animals and plants, what Shepard refers to as "loading the ark of the mind." Early relationships with flora and fauna are an integral part of feeling bonded to the matrix of the earth.

> *A decade, from the beginnings of speech to the onset of puberty, is all we have to load the ark. The zoology of this period must be unequivocal, without recondite allusions. Poetry and song must mean what they say; games must be nothing but play, as unmistakable as a cat chasing a ball. It is right for the child to mimic fox and goose in a game of pretended capture, or speak the lines of the little pig or Chicken Little. By identifying with a number of animals in turn, the child discovers a common ground with other beings despite external differences between himself and them. Anthropomorphism at this stage is essential.... By pretending that animals speak to one another, he imposed on them a pseudo-humanity which, although illusory, is the glue of real kinship.* (1983)

This notion of constructive anthropomorphizing flies in the face of the prevailing scientific mind-set that anthropomorphizing is unhealthy because it imposes a human face on animals. Rather, I agree with Shepard that projecting feelings and human characteristics onto animals facilitates relationships. It makes animals and people part of one larger family, with kinship relationships and rules for sharing and caretaking that weave the clans together. This tendency to anthropomorphize probably grows out of that merged experience of subjective and objective worlds in early childhood, an inability to differentiate between what happens to you and what happens to someone or something else. But rather than consider this as immature or undeveloped, we can consider it advantageous as an opportunity to create empathy, a feeling for other creatures that can develop into a willingness to care for other creatures.

Stephen Kellert, one of the editors of *The Biophilia Hypothesis*, conducted developmental research on urban and rural children's attitudes toward animals that has similar implications. Kellert found that

> *The period from second to fifth grade was most significantly characterized by a major increase in emotional concern and affection for animals. The years between fifth and eighth grades witnessed a dramatic improvement in factual knowledge and cognitive understanding of animals. Finally, the change from eighth to eleventh grade was marked most of all by a major expansion in ethical and ecological concern for animals and the natural environment... These results suggest educational efforts among children six to ten years of age might best focus on the affective realm, mainly emphasizing emotional concern and sympathy for animals.* (Kellert, quoted in Chawla 1988)

Look at the biographies of prominent naturalists and you'll find more support for this emphasis on affective relationships rather than facts during the first half of the elementary school years. In his memoir, *The Naturalist*, Harvard entomologist E. O. Wilson describes his fascination with capturing animals in childhood. He kept a jar of harvester ants under his bed, caught butterflies in homemade cheesecloth nets, made a secret shelter out of poison oak stems that caused a fearful rash, and walked into the house one day with a coachwhip snake wrapped around his neck. Commenting on these early days, he claims,

> *Hands-on experience at the critical time, not systematic knowledge, is what counts in the making of a naturalist. Better to be an untutored savage for a while, not to know the names or anatomical detail. Better to spend long stretches of time just searching and dreaming.* (Wilson 1994)

Instead, in schools and at nature centers, we see just the opposite: science units on animal taxonomy in the third grade where students never go outside; young students being charged with the responsibility of saving endangered species; and a prevailing, Don't touch! attitude when children actually get outside. "Nature is fragile and we have to make sure not to harm her," you'll hear the naturalist caution, advocating for a kind of environmental puritanicalism. We wind up discouraging exactly the behavior that Wilson

says was crucial to his becoming a natural scientist. Our goal, especially through ages nine and ten, should be to foster close allegiances between children and animals. This means playing at being animals, interacting with animals, and taking care of animals. As Brenda Petersen implies, we have to become animals before we can save them.

This is exactly what the Brookfield Zoo near Chicago is trying to do. Brookfield is known as an innovator in the zoo community. Zoo managers have led the way in endangered species protection, in replacing cages with simulated natural habitats for animals, and in thinking seriously about developmental psychology in their exhibit design and education for children. When beginning the process of creating a new children's zoo, administrators agreed that their primary goal was to foster an ethic of care about the natural world in children. Note that this is quite different from educating children about animals. Their literature about the new Hamill Family Play Zoo, aimed at families with children up to ten years old, is clear about their new approach.

> *Wanna come play in the dirt? Pet a boa? Find some worms? Be a veterinarian? Build a nest? Play with bunnies? Groom a dog? Be a monkey?*
>
> *On June 14, 2001, Brookfield Zoo opened the Hamill Family Play Zoo, a revolutionary new concept in zoo experiences for families. The Play Zoo is a unique adventure where children and their families can play and interact with animals, plants, and people to help develop caring attitudes toward the natural world. In this technological age, where children have frequent exposure to computers and television, the Play Zoo is an effort to bring them back to a simpler world and help parents and other caregivers rediscover the magic and importance of playing in nature.*
>
> *This is not your father's Children's Zoo. This is an entirely new concept in zoo experiences for children. Children need to touch, explore, build, do...**The idea is not primarily to educate or inform, but to foster love and caring.** Brookfield Zoo wants kids to feel connected with nature. Letting them be in it and care for animals and nature is the best way to do that.* (Brookfield Zoo 2001)

Walking into the Play Zoo is like taking a deep breath of sweet mountain air. It's like slipping on a shoe and having it fit perfectly and comfortably. With deep consciousness and conviction, the zoo staff has integrated a developmental understanding of early childhood with their concerns for animal protection. The result is a unique haven for children and animals. A poster in the bathroom informs parents that "You won't find information about endangered animals in the Family Play Zoo."

In ZooScape Mountain, children explore nooks and crannies that bring them face to face with a variety of animals or lead to places where they can put on animal costumes and become a woodpecker or a lemur. The Animal Hospital is a child-scaled veterinarian's office where children can listen to the pulse of animal puppets, pretend to take X-rays, bandage up injured teddy bears. Sometimes they get to observe real veterinary checkups.

At the Keeper Kitchen, children follow along as the keeper prepares meals for Play Zoo animals. As the Keeper cuts real carrots and bananas, children slice simulated salt dough fruits and vegetables, listening to the Keeper's explanation of what makes good diets for bunnies and monkeys. Then the children accompany the Keeper as she delivers meals. The Play Zoo brochure states, "Dramatic play is not only one of the great joys of childhood, it's also how kids learn to make sense of the world around them. They observe, imitate, and use their imagination to express how animals move, eat, sleep and interact."

As I was strolling through the Workshop where children help to build exhibit trees and boulders and paint signs to be posted throughout the exhibits, one mother commented, "I can't tell you how happy this place makes me. It works for my three-year-old and my ten-year-old. It's just exactly right."

Outside are all the play environments that have disappeared from too many children's lives. There's a playable stream that feels like the Garden of Eden where children can wade, rock-hop, play Pooh sticks, and catch bugs and frogs. In copses of trees you can get up and away into tree forts where you can secretly peer out at birds in the branches around you. My favorite spot is the Animal Homes Adventure Play area, which is the closest thing to European adventure playgrounds that I have seen in this country. With a variety of tools and natural materials (loose parts, in landscape architecture terms) such as branches, leaves, mud, bamboo, straw, and animal hides, children can build their own versions of animal homes. Play Partners, zoo staff committed to playing with children and getting parents to play with their kids, are there with animal puppets to explore the spaces that children create.

Katie Slivovsky, a past senior educator at the zoo, clarifies that the Play Zoo represents a distinct change in approach for the zoo. She recalls a scene from the Elephant House a few years earlier:

> *A female interpreter was in the Elephant House at the zoo talking with a man and his five-year-old son. The boy remarked that the elephants sure have big tusks. The interpreter replied, "Yes, and did you know that elephants are being killed for*

their tusks? The males have the biggest tusks so they're targeted first, then the oldest females are shot, which can really mess things up because the females are in charge and without them, the herds don't know what to do. Killing elephants for their tusks is a huge problem for elephant families."

I wonder what the interpreter really accomplished by talking about elephant poaching with a five-year-old. Though her language was developmentally appropriate, her message was not. How does a child reconcile their feelings of awe and wonder about an animal they're looking at while hearing how its relatives are being shot right and left?

It's not a cop-out to save big, complex issues like poaching, mass habitat destruction and cultural genocide for middle schoolers who are better equipped to handle them. Early and middle childhood is the time to lay the foundation for future caring by providing lots of positive, meaningful, joyful experiences. (2001)

The Brookfield Zoo is successfully loading the ark of the child's mind. By becoming a lemur, a fawn, or a prairie dog, the child internalizes the spirit of each creature. By becoming an animal doctor, a zookeeper, a gardener, the child roughs in an ethic of caring for our animal and plant compatriots. Knowledge is sure to follow.

MAPS & PATHS

PRINCIPLE 4: MAPS AND PATHS

Finding shortcuts, figuring out what's around the next bend, following a map to a secret event. Children have an inborn desire to explore local geographies. Developing a local sense of place leads organically to a bioregional sense of place and hopefully to biospheric consciousness.

Local and state geography is one of the themes for the fourth-grade curriculum in Waldorf schools. The students go on long walks exploring the neighborhoods around the school and they draw pictorial and panoramic-view maps of this area. At the Monadnock Waldorf School in Keene, New Hampshire, students study the plants and animals of New Hampshire, and each child makes their own raised relief map of the state in preparation for a three-day hiking trip in the White Mountains.

As a parent chaperone for the outing, I drove three of the children up to the mountains. The valley of the Pemigewasset River narrowed as we approached Franconia Notch, and I started to point out some of the mountains they had learned about when they made their maps. Melinda gazed at the sinuous green peaks, got a faraway look in her eyes, and exclaimed, "I know where we are! Remember where the mountains smush in close to the river between two long, low mountains and then the big mountains are just beyond. We're between those low mountains and there's Cannon Mountain and the Franconia Range up there." As she spoke she gestured to show the river valley and ridge forms that she had meticulously shaped with her hands while making her raised relief map. It was fascinating to watch the mapmaking images stored in her hands and mind snap into resolution with the mountain landscape spread out before us. Inner world met outer world in this aha moment of well-crafted curricular experience.

The arduous backpacking, group food preparation, inky night walks, autumnal swims, and wind-whipped view from the top of Cannon Mountain bound everyone together in a spirit of hard-won collaboration. The most awesome experience, however, came in our exploration of a network of boulder caves at the base of the cliffs on the west side of the mountain. For almost an hour the children were like moles on a reconnaissance mission, ferreting out tunnel after tunnel, finding shortcuts from one chamber to another. I encouraged this slightly risky activity because of my conviction that it's this literal immersion and submersion in the rocks, soil, moss, and spruce of the real world that helps root children in their native landscapes. On the other side of the mountain, the stone face of the Old Man of the Mountain used to gaze over the jumbly peaks and valleys of northern New Hampshire. In this rock labyrinth, these students were becoming Children of the Mountains. Getting ready to move on, I gathered everyone beneath one massive boulder and had the children describe their mental maps of this three-dimensional terrain. Again, combining sketches in the soil and convoluted hand and arm gesticulations, they portrayed the multilayered web of passageways.

Although these two examples of mapping are developmentally reversed, they represent just the right scale of pathfinding and mapmaking experiences for upper-elementary-age children. The boulder cave explorations symbolize the "getting to know the neighborhood" phase that should unfold around age nine. This is the beginning of the prime age for path making, and it corresponds with the kinds of challenges experienced by children at this age in hunting and gathering cultures. As young hunters and gatherers moved behind the confines of the camp or village into the bush, their mastery of geographic knowledge was crucial to their survival. Thus, a biologically programmed

fascination with identifying animal signs, tracking animals, understanding trail and drainage networks, and calculating shortcuts comes down to even modern-day children. Our fascination with treasure maps is, I suspect, rooted in the internal maps we developed as hunters and gatherers that led to the true treasure—sustenance.

Beyond the neighborhood, making maps of the community and the wider region happens in incremental steps. The salt-dough maps of New Hampshire prepared the children with anticipatory images of the backpacking trip they were about to go on. And the view from the top of the mountain looked not unlike the crenulated landscapes they'd created with their own hands. By honoring the developmental unfolding of geographic understanding, this teacher rooted the children's learning in the local landscape.

One of my favorite examples of developing a sense of place through mapmaking was a yearlong project in Steve Moore's fourth-grade classroom in Springfield, Vermont. Realizing that the study of "Vermont history and geography" as required in the curriculum frameworks was too tall an order for his fourth graders, Steve instead decided to focus on the Black River watershed. The river runs through the center of Springfield on its way from the Green Mountains to the Connecticut River. Springfield was home to a machine-tools industry, and the river was dammed and harnessed for hydropower, making for lots of industrial buildings, alleyways, raging torrents, and other explorable nooks and crannies just a couple of minutes from Steve's classroom.

Over the course of the year, he took the students on numerous walking field trips to explore the banks of the river, the architecture, and the industrial heritage of the city. They mapped their playgrounds and made sketch maps of walks from their school to the river. One field trip took them to the beginnings of the river, where the students could hop across the headwaters in a single bound. Another trip worked students down to the mouth of the river. Here, the students could toss a stone only a tiny fraction of the way across the river. These mapmaking and kinesthetic experiences ingrained the concept of watershed structure in their muscles as well as their minds.

Steve discovered a book containing the journal of a ten-year-old boy growing up in Springfield in the 1920s. Excerpts from this journal became part of the literature base of the project. During this long-ago fourth-grade experience, one of the major bridges across the river was under construction so children had to turn off Main Street down a narrow dark alley and pass over the spring-flood waterfall turbulence of the river on a rickety pedestrian footbridge. What fun it was for these fourth-graders to slink down the same alleyway and imagine this harrowing crossing.

In the spring, after getting to know the river and city on foot, the students came back to class one day to find two doors lined up horizontally on a frame in the center of the classroom. Each child received an eleven-by-seven-inch black and white photo enlargement of the buildings along the river. "Imagine these doors are the river flowing through the city," Steve explained. "Where there's a gap between the doors is the waterfall in the center of the city. Line yourselves up along the banks of the river according to where the building you have in your hands should be."

The students had explored this area enough so they could re-create the structures along both banks of the river. Two girls commented, "You forgot the bridge!" so they held hands across the waterfall where the bridge was located. Steve then gave them their task. "Our job is to make a model of the river and the center of Springfield, from the upper dam, past the waterfall to the lower dam. Each of you will be responsible for re-creating your own building and then we'll all have jobs helping to create the river and its banks."

Over the next three weeks, the classroom was an active construction site. To build the bridge, Steve helped the two girls build a form, laying wire to simulate reinforcing bar, and then mixed up a batch of cement to pour into the form. It was the ultimate manifestation of the progressive education dictum to make the curriculum concrete. Each child researched and built her own industrial building out of cardboard and other suitable materials. These were constructed along the edges of the doors, which became the banks of the river. Steve took the students on a field trip to a tiny stream where he had built a little dam to power a miniature water turbine. Here he could simulate the hydropower facilities inside many of the buildings being reconstructed by the students. On the way back, students collected slate from the edge of the river, which they split once back in the classroom to line the banks of the model. Whenever there was a question about the number of windows, or the location of a trail, it went onto a list, to be answered during the next walking field trip.

When they were done, the students had created a fifteen-foot-long, attractively painted miniature world in their classroom. (Think back to Cobb's notion that what children want most is to make a world in which to find a place to discover a self.) The creation of the model was the culminating project for the yearlong study of the watershed. Through reading local literature, making scale models, understanding why the mills closed down, and studying the physics of waterpower, the project integrated reading, math, social studies, and science, and could be seen as a metaphor for their learning: All that developmentally appropriate activity—path following, stream jumping, and poking around in industrial basements—was the waterpower. The model making

(essentially, a three-dimensional map) was a turbine that transformed the waterpower into usable energy—learning about Vermont history and geography.

In Colorado, high school students have mapped car accident sites for use by emergency rescue teams. In Vermont, Rivendell High School students are mapping and building a hiking trail to connect four towns in a newly created interstate school district. In Brooklyn, New York, students produced a map of local toxic waste sites as part of a community initiative to reduce asthma in children. When harnessed appropriately, children's fascination with mapmaking can be a powerful learning tool.

SPECIAL PLACES

PRINCIPLE 5: SPECIAL PLACES

Almost everyone remembers a fort, den, tree house, or hidden corner in the back of a closet. Especially between ages eight and eleven, children like to find and create places where they can hide away and retreat into their own found or constructed spaces.

My family and friends all know that I'm always looking for the perfect place. The best picnic spot with a mondo view of the mountain in the shade of a big white pine with easily pickable blueberries and no bugs. The swimming hole that not many people know about with a gravelly beach and a fifteen-foot ledge jump into deep, green water. The little Italian place in the North End of Boston that seats only thirty people and serves the best parmigiana. The restored saltwater farm all alone at the end of a dirt road on an island off the coast of Maine that puts the glisten on summer family vacations. Each place sits at the optimal intersection of a set of variables.

My favorite fort-building place is a wild coastline with big piles of storm-driven driftwood and nobody in sight for miles. A true Robinson Crusoe setting. My children and their friends and I have found these places on Drakes Beach on Pt. Reyes National Seashore north of San Francisco, in Tamarindo on the Pacific Coast of Costa Rica, on Frenchboro on the outer reaches of Penobscot Bay in Maine. The jumbo piles of broken lobster traps, weathered boat siding, dock pilings, shed roofs, plastic buoy line, and dismembered beach stairs provide just the right raw materials for crafting driftwood cottages. In describing optimal play spaces for children, landscape architect Samuel Nicholson articulated the theory of "loose parts" indicating that, "In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables

in it" (1971). In other words, children like play settings where there are lots of things to do and lots of "loose parts" to use to create new structures or be transformed into horses, swords, kitchenware, or furniture. The flotsam and jetsam of driftwood piles are to fort building as Legos are to futuristic space jets.

On the outer beach at Cape Cod we crafted the perfect shelter with driftwood boards to protect us from the wind-driven sand one breezy May day. On Frenchboro, my son and I remodeled a cottage with a great picture window and a crow's nest roof perch. He worked on the walkway while I rebuilt the front wall with thick, flat slabs of granite. A friend of mine, knowing my appreciation of children's special places, sent me an article about the beach forts of Cuttyhunk, off the coast of Massachusetts. This colony of forts had become a permanent fixture of the island's summer population. They were multiroomed shelters with porches, dining rooms, and bedrooms, where legions of eight- to thirteen-year-old boys spent the night playing cards and giggling. Their ownership passed from older to younger boys as social interests emerged in adolescence. They were a testimony to the creative place-making spirit of indigenous young architects making do with the *loose parts* provided by the sea.

In *Children's Special Places*, published in 1992, I described what appears to be a universal tendency for children to create or find their own private places, especially between the ages of approximately seven and twelve. I believe the creation of these places serves many developmental purposes for children. The fort is a home away from home in nature; it provides a bridge between the safe, protected world of the family and the independent self in the wider world of adolescence. These places also serve as vehicles of bonding with the natural world, allowing children to feel comfortable in the landscape, connected to it, and eventually committed to acting as stewards of it. At that time, I focused mostly on individually and group-created places in children's neighborhoods, and somewhat less on schoolground forts. (See *Children's Special Places* [1992] and *Mapmaking with Children* [1998] for numerous examples of special-place-inspired curriculum ideas.) Since then, many child-savvy teachers and psychologists have provided opportunities for children to construct and maintain villages of schoolground forts. Their experiences point the way to understanding the learning potential of allowing children to act out their innermost desires.

SCHOOLYARD FORTS

Over the past decade, outdoor play has continued to disappear from the landscape of childhood. Increased emphasis on youth sports means there's little unstructured time

after school for backyard play. The increased frequency of two working parents also means that when there is unstructured time, children are required to stay inside or in a supervised child-care situation. In urban areas, pollution, inadequate waste management, drug trafficking, and street violence make parents hesitant to let children engage in neighborhood play. Highly publicized abductions of children also make parents fearful. "I don't dare let them out of my sight," many parents confess.

Thus, schoolyards, where there's adequate supervision and sometimes the right resources, provide one of the few opportunities for children to make special places and build forts. I've been fascinated to observe that when the right ingredients exist, schoolyard villages will spontaneously pop into existence. It's like making fire: when you've got some nice dry leaves, the sun is high in the sky, and you hold the magnifying glass at just the right angle, just the right distance from the leaf surface, poof—a little flame appears.

What are the just-right elements for schoolyard forts?

- twenty or more children aged seven to twelve
- a wooded area adjacent to the school building or playground that is accessible to the children (if the woods are off limits, nothing happens)
- enough "loose parts" to be used in construction (this is usually branches, fallen trees, or old brush piles, but can also be scrap wood from a construction project)
- an open-minded faculty and administration who understand the value of children's exploratory play in the woods

All these ingredients have to be present for schoolyard forts to materialize. More often, these conditions occur at independent elementary schools, but I have seen forts arise on the grounds of public schools where there's a deep appreciation of outdoor play.

In the past ten years in the Monadnock region of southwestern New Hampshire, a number of public school teachers have used the special places impulse to structure curriculum. When she taught at the Temple Elementary School, Mickey Johnson had her third graders create a class-sized special place out in the woods behind the school. This became a gathering spot for special class meetings, storytelling, and some science classes. From here, the children were encouraged to make their own individual special places, not far from the class place, where they would go for journal-writing assignments. Other teachers have followed this model, having their children create special

places that they visit recurrently for quiet work. I can't tell you how many teachers have said, "At the end of the year, when I ask the children what they liked best in the curriculum, many of them commented that they loved reading, writing, or being alone in their special place." Through recognizing children's deep impulses and building on them, the curriculum can be enhanced.

Schoolyard villages, however, come completely from the children. If they are allowed to flourish, they can become a major component in the life of the school. Mark Powell (2001), an elementary teacher at the Lexington Montessori School in Lexington, Massachusetts, conducted one of the most comprehensive studies of this phenomenon. His findings suggest some of the potential values and pitfalls of schoolyard villages.

> *Fort play at Lexington Montessori School (LMS) is a primarily social activity that is collectively constructed, owned and negotiated at recess and beyond through a culture generated entirely from the spontaneous interests of children. This peer culture of fort play, with its rules and roles, has been passed down to succeeding generations of students as they enter the elementary program since it began at its present site in 1990. From interviews with and surveys of both alumni and current students, it is clear that for the majority of children at LMS, the culture of fort play available at recess has been a significant part of their overall learning experience at the school. For these children, recess was not simply a break from the "real" learning that took place in the classroom. For many former students, fort play was one of the most prominent and positive memories of all their years at the school. The appeal of this activity for children derives in general from its free-ranging nature, from the control it gives them over their interactions with each other and with the natural environment.*

The fort area at LMS is adjacent to the soccer field and the large-play and climbing structure. As many as a dozen stick forts exist at any one time. They are either built or maintained by members of the fort, generally ranging from two to five children. Ownership of the fort, the materials it is made of, and the territory surrounding the fort are crucial elements of fort culture. The difference between individual backyard forts and schoolyard forts is the complex social dynamic that emerges around social hierarchy, in-group differentiation, and shared resources. It's like the difference between living in an isolated summer place on the lake and living in an apartment building. At the forts at LMS, life was not always a bowl of cherries. "Arguments between and within fort groups over rules, roles, resources such as sticks, and the right to exclude 'non-members'

were for many years the major source of conflict between children at the school" (Powell 2001). As a limited resource, sticks were often stolen by members of one fort to be used on other forts. Bickering would often emerge over who could be a member of the fort, what the responsibilities of membership were, and under what conditions someone could be kicked out of the fort.

In order to deal with the ongoing petty conflicts regarding the forts, the faculty stepped in and helped the children create a set of rules to govern fort behavior in 1995. I have seen this happen in a variety of settings: it parallels the history of civilization. Like the emergence of the Magna Carta in England, or the framing of the Constitution, cultures, as they evolve, recognize the need to codify behavior and create a legal system. In the evolution of schoolyard villages, if children can't do this on their own, it's contingent upon the faculty to step in and use this as a learning opportunity. (In many schoolyard villages, a currency spontaneously arises as well and is used for transactions that were previously conducted through a barter system. What a great opportunity for economics education!) Out of this faculty-student convocation came The Ultimate, Absolute Fort Rules (Powell 2001). Excerpts from some of the rules follow:

- It is okay to keep a fort, materials, or a location from year to year, but you must identify the fort, materials, or location (by initials, neat piles of materials, a flag or another symbol).
- If materials are traded, both forts must be involved and at the trading session. If a fort wants to use another fort's sticks, they must ask and be friendly.
- Forts need to tell kids what the rules are before they join. They should also find out what fort a person wanting to join was in before in case s/he is a spy.
- A person can be fired from a fort after a day if s/he has not obeyed the rules of the fort, if s/he understands why s/he is being asked to leave and if all members of the fort agree. Fort wreckers can be fired right away under the same conditions.
- Fort land must be limited to up to twenty feet all around the fort when there is that much space available. This limit should be from the main part of the fort rather than from individual sticks which are placed outside of the main walls. Treaties can be made between forts for more land.

I have quoted extensively from The Ultimate, Absolute Fort Rules to indicate the richness of the potential social learning inherent in the fort culture. Piaget considers cognitive disequilibrium as a precondition for learning. The tensions inherent in

competition for resources, and questions regarding inclusion and exclusion are rife with cognitive disequilibrium and offer rich learning opportunities. Clearly, the creation of the rules modeled the process of policy development or of writing legislation. Is there any better way for children to learn about state government (often part of mandated fourth-grade curriculum) than to deal with a comparable challenge of developing rules that will shape how citizens of the community will behave?

Similarly, the study of United States and European history would be enriched with these issues used as prototypes. The rule regarding land owned around the fort can be used as an analogy for understanding the territorial claims of countries regarding fishing rights within specified distances from the shore of that country. Guidelines for trading of sticks can be used to illustrate the problems of European imperialism and the practice of claiming "unclaimed" land from indigenous cultures in the Americas and Africa. And the spontaneous evolution of currencies provides the opportunity to discuss why cultures evolved from barter to hard currency systems and to get at that enduring puzzle of What is money, anyway? Why does money have value?

In his study at LMS, Mark Powell (2001) also recommends that the school "Implement conflict resolution instruction and peer mediation." He explains,

> *Open hostility between fort groups at LMS has probably declined since its height in the mid-1990s. Over the last few years there appears to have been a cultural shift in fort play away from its previous focus on interfort "war" and the accumulation of sticks at the expense of other groups toward more peaceful and social activities. However, there remains considerable frustration among fort players over how to negotiate the rules and roles of fort play both between and within forts.*

Here's a ready-made opportunity for peer mediation training in schools. I have often been skeptical about the peer-mediation craze and the training of fifth- and sixth-grade mediators in schools. Sometimes, it feels like teachers are abnegating their responsibilities and dumping an adult burden on children's shoulders. And the problems that children are expected to mediate often emerge out of abusive family interactions, socioeconomic and cultural differences, and emotional problems that are far beyond the student mediator's understanding. In this case, however, the resource and territory problems are concrete and tangible, and the social dynamics tend to be more limited in scope, so it's an appropriate scale and context for student mediation. This would also be a great way to understand the whole idea behind a U.N. Peacekeeping Force.

SPECIAL PLACES AND SUSTAINABILITY

An innovative school in Costa Rica has pioneered a way to connect the special places impulse with ecological stewardship behavior. The Cloud Forest School is a K through 12 bilingual school mostly serving the native Costa Rican families in Santa Elena and Monteverde, high montane agricultural communities bordering a large tropical forest reserve. In the last fifty years, Monteverde has developed a substantial ecotourism economy based on scientific research, ornithology, and natural history recreation. One of the core goals of the school is to develop students who are committed to sustainably preserving the cultural and ecological integrity of their communities. Through a relationship with the Nature Conservancy, the school acquired more than one hundred acres of agricultural land bordering the forest reserve, with the understanding that the land would be restored with ecological integrity.

In 2004, the school's land manager, Milton Brenes, and environmental education co-coordinator Karen Gordon established a Special Places project on a section of the school property designated for reforestation. The idea was to reforest the pastureland to create corridors of forest, thereby expanding wildlife habitat and converting the land back to its native ecology.

To get the project rolling, each third- and fourth-grade student was gifted a five-by-ten-meter plot of pastureland. In August, students spent an hour a week getting to know the unique features of their Special Place through mapping and creative writing exercises. The school newsletter describes:

> *Niko Walker, a 3rd grader, had an exciting moment when he came upon an emerald toucanet bill in his plot. As he shared his discovery with his classmates, questions arose such as, "Why do you think it was found in this area and not in another? What do you think happened to the toucanet?" Using this teachable moment in Niko's special place, the students entered into a truly engaged conversation with one another, sharing their hypotheses, knowledge, and appreciation for the emerald toucanet.* (Gordon and Brenes 2005)

Next, the children prepared their plots for tree planting by removing African stargrass and other invasive plants—lots of sweaty spadework in rootbound soil with shovels that were as tall as the students. Once the ground was cleared and cultivated, the plots were planted with fourteen species of native trees. The students had learned the distinctive natural history of each of the species. By November, over 300 trees had been planted.

From January through March the curriculum focused on studying the cloud-forest ecosystem, with academic subjects concretized through observations and activities in the special places. Teachers led math lessons that required students to monitor the growth of their trees. Science and language arts journaling activities in adjacent forested land provided images of the habitat they were trying to create. The teachers claim, "Perhaps the most valuable lesson being ingrained is that the forest can come back—in this case because the students have been there and have done the work" (Gordon and Brenes 2005).

In a world where tropical rain forest is being cut down at the rate of an acre a minute, it's heartening to see students involved in reforestation in their backyards. And the intriguing aspect here is the special places starting point. Through using children's native tendency to bond with a small piece of land, the teachers build a sense of connectedness that starts small and gradually, hopefully, expands to the whole of the montane cloud forest and eventually to all of Costa Rica. Just think what could happen if this was an integral aspect of all schooling.

The special places impulse in a school setting invites children to relive the history of the species. They create primitive shelters, form tribes, battle over resources, learn to barter, create legal systems, invent currency, learn to monitor their own behavior, recognize the impact of the built environment on the natural environment, learn to restore changed ecosystems. This could be the basis of the whole social studies curriculum for the upper elementary school. If your students start to build stick forts on the edge of the playground, don't discourage them.

PRINCIPLE 6: SMALL WORLDS

From sand boxes to doll houses to model train sets, children love to create miniature worlds that they can play inside of. Through creating miniature representations of ecosystems, or neighborhoods, we help children conceptually grasp the big picture. The creation of small worlds provides a concrete vehicle for understanding abstract ideas.

Drive up Route 1, heading Down East, and then turn south down one of those long fingers of rock that stick out into the drowned coastline of the Gulf of Maine. In Port Clyde, catch the mailboat for the hour-and-a-half ride out to Monhegan Island. Take Dramamine an hour before departure if you have any tendency toward seasickness. It's often rough. Once you're off the boat, ask anyone, really anyone, how to get to Fairyland in the Cathedral Woods. Then keep your eyes open. Fairies are good at integrated architecture, making sure their structures blend effortlessly into the hummocky spruce and fir forest floor. The cottages, cabins, gardens, walkways, tree lookouts, and elevated walkways are always there and always changing. Fairyland has become such an accepted part of the island culture that someone is always creating a new hideout, or repairing storm damage to existing castles.

Fairyland is a testimony to the widespread appeal of miniature worlds. Think of the lavish train layout at the Germany exhibit in Epcot at Disney World, or the fastidiously to-scale version of the Netherlands at Madurodam, or Bradford Washburn's elegant model of Mt. Everest at the Boston Museum of Science. On vacation on a historically intact island off the coast of New England one summer, my daughter commented that it felt like living inside one of those museum dioramas of what the village looked like in the nineteenth century. Which is, of course, exactly what we would all like to do—take the Eat Me cookie from *Alice in Wonderland* and shrink ourselves down so we can go inside the model.

Small worlds work wonders for children. They provide the same kind of emotional security that islands provide for vacationers. The world is simplified and knowable. They provide cognitive accessibility because all the disparate elements of a place are brought into one view. It's like the one-page organizational chart for the organization, the site map for the website, the logic model that describes the underlying assumptions for a project. You look at the chart and think, "Oh, now I see how it all fits together."

The problem with lots of nature education, or really with lots of any kind of education, is that it gets too big, or too abstract, too fast. If we could just abide by the turtle's guiding wisdom that slow and steady wins the race, we'd be doing much better on those international tests of science and math aptitude. Steve Moore's model of the center of Springfield was both a mapping project and a small-world project, allowing the students to see the structure of the city all at a glance. This all-at-a-glance principle works at each developmental level. Therefore, let me share examples of using small worlds to teach plant communities with fifth graders and to teach sustainable design with teachers.

ON THE BEACH

The year after my daughter's class went to the White Mountains, they headed to the Rhode Island coast for a week. One of the topics in the fifth-grade curriculum is botany and plant communities, so as a contributing parent I took on the challenge of teaching the children seaside botany and barrier-beach plant communities. My goal was to get children to be able to see that as you move from the beach to the foredune to the back dune to the swale to the salt marsh edge, there are different constellations of plants adapted to different amounts of wind, salt exposure, sunlight, and fresh water availability.

First, we learned about poison ivy. It grows rampantly and prolifically in sandy soil on the southern New England coast, and since we were going to do lots of poking around in the dunes collecting plants, it was important for them to recognize poison ivy in all its guises. That done, everyone went out and collected six sprigs of the most common plants they could find in different areas. We gathered back together, sorted them into groups of things that were alike, and then I identified what we had and the unique character of each plant. Pioneering beach grass grows on the foredune, its long rhizome roots stabilizing the dunes. Seaside rose, with those gigantic sweet rose hips, is a bit less adventurous, growing in the back dune where there's a bit of protection from the wind. In the swale, where there's even more protection and fresh water, there's bayberry, an early source of candle wax for salt marsh farmers. To create a limited universe, I decided that we would focus on the fifteen most prominent plants, one plant for each child in the class. Each child had to do a detailed botanical drawing of their plant, and everyone was responsible for being able to identify and learn the names of all fifteen plants. It took us a couple of days of botanizing, drawing, and diverse name games to get them all straight.

The next morning, we found a copse of pitch pines and I portrayed the challenge. We had been botanizing a section of dunes and salt marsh that stretched about two hundred meters from ocean beach to salt marsh edge. From any one place, it was hard to see the whole stretch, but we had rambled through all the plant communities.

Your mission, should you choose to accept it, is to create a small world showing the different plants that grow in different places from beach to salt marsh edge. The idea is to show the handful of plants that are most particular to the different places we've been exploring. Your little world or model should be no more than six feet from one

end to the other and you should represent the plants so that they are approximately in scale with your landscape. In other words, the beach grass shouldn't tower over the dunes, and since beach grass is about three feet tall and pine trees are about fifteen feet tall, the pine trees should be about five times bigger than the beach grass.

With little hesitation, they set to work creating miniature dunes, wooden walkways, copses of trees that the fairies on Monhegan would die for. I loved watching them look down on their models, then look out to survey the back dune or the swale, and then reach down to adjust the shape of the dune or move some plants. With little prior conversation about which plants belonged where, they all re-created fairly accurate groupings of representative plants. They were the kinds of dioramas you wanted to shrink into and explore. Presenting their models, they could all articulate why they located different constellations of plants in different locations. To assess their understanding of the character of different plants, I asked them each to choose the plant they would want to be and explain how the personality of the plant is similar to some aspect of their personality. "I'd be a cranberry because I like to stay a little hidden and I can be kind of sour." "I'd be Pearly Everlasting because I like to bake in the sun and get lots of fresh air." I was amazed at both their plant knowledge and their ability to project themselves into this habitat. That evening, I drew a very sketchy diagram on the board and assigned them to do colorful diagrams of the plants in each of the four major zones. Their elegant illustrations demonstrated the depth of their learning.

I attribute the success of this learning sequence to the sequence of the activities and the cognitive appropriateness of the final small-world construction challenge. The challenge of miniaturizing a two-hundred-meter chunk of landscape down to two meters was just right. The two hundred meters had just enough diversity, and the two meters was big enough to give them space to be creative. Then, with the small-world models as a transitional metaphor, it worked to go the next step onto paper. We translated a large three-dimensional space into a small three-dimensional model and then into a two-dimensional abstracted form. Later in the year, the teacher could use this concept of plant zonation to talk about changing plant communities as you climb up a mountain or as you travel from New England to the North Pole.

SMALL WORLDS AND SUSTAINABILITY

I used the same principle for a teacher workshop at the Islandwood Environmental Learning Center on Bainbridge Island, near Seattle, Washington. Islandwood is

one of the most sensitively designed residential environmental education facilities in the country. The siting of the residential buildings, dormitories, trails, study areas, and stream restoration projects was the result of a very sophisticated land-use planning process. Using a system pioneered by Ian McHarg, planners created separate overlay transparency maps that identified wildlife distributions, slope, soil permeability, floristic communities, forest health and age, and other parameters. By laying the transparencies on top of each other it became clear where the buildings should be located (mild slopes, good soil permeability, recently logged sections) and which areas should be preserved in their current state (intact ecological communities, resident wildlife). This process gives the land a voice so it can tell us how best to work with it.

This process is emblematic of Islandwood's goal to model sustainable development, systems thinking, and the development of ecological literacy in students and teachers. I was asked to do a teacher workshop before any facilities were developed, just as the initial land clearing and road construction were going on. Since designing with nature was such an integral part of the center's ethic, I decided to translate this process into a teacher-workshop activity using the small-worlds design principle.

Prior to the teachers' arrival, I chose an area of forest with interesting microtopography and only small amounts of herbs and shrubs. I laid out study plots that measured four feet by six feet. Each plot had some flat spots and some steep slopes, vegetated areas, and open areas. I provided a base map with the boundaries of their plots identified and asked them to create overlay maps that identified soil permeability, slope, and vegetation. I provided spoons and stop watches to dig test pits and measure water percolation rates, meter sticks and levels to measure slopes, and identification guides of local flora. Once the three transparencies were complete, the maps were overlaid and then the teachers had to decide where to site the educational facilities, where to install a septic system, and where to locate an interpretive trail. Wooden blocks to represent buildings and signage materials amplified the small-worlds opportunities.

The teachers had a ball and they learned a lot about sustainable design. Many had no idea what a percolation test was, nor what the issues were regarding siting septic systems. Our discussions about not siting structures on steep slopes led to conversations about land-use planning-code restrictions in erosion-prone areas. Everyone had a deepened appreciation of the ecological thoughtfulness that went into the center's decision-making. Through using a small-worlds approach, we took the abstract ideas of sustainability and ecological design and made them accessible to classroom teachers. Whereas the Rhode Island example focused on geographic and botanical learning, here I was aspiring to make visible a much more conceptually abstract way

of thinking. The same children and nature design principle can be used effectively at different developmental levels.

HUNTING & GATHERING

PRINCIPLE 7: HUNTING AND GATHERING

From a genetic perspective, we are still hunting and gathering organisms. Gathering and collecting anything compels us; searching for hidden treasure or the Holy Grail is a recurrent mythic form. Look at the success of Where's Waldo. How do we design learning opportunities like treasure hunts?

Try this test. Read the following passage and try to predict the character of this boy as an adult. Would he be someone you would want your child playing with after school?

> *One of our amusements was hunting cats without seriously hurting them...One time in particular I remember, when we began throwing stones at an experienced old Tom, not wishing to hurt him much, though he was a tempting mark...I happened to strike him pretty hard with a good-sized pebble, but he still blinked and sat still as if without feeling. "He must be mortally wounded," I said, "and now we must kill him to put him out of his pain," the savage in us rapidly growing with indulgence. All took heartily to this sort of cat mercy and began throwing the heaviest stones we could manage, but that old fellow knew what characters we were, and suddenly with a wild whirr and gurr of energy, he launched himself over our heads… and over the garden wall.*
>
> *Our most exciting sport, however, was playing with gunpowder. We made guns out of gas-pipe, mounted them on sticks of any shape, clubbed our pennies together for powder, gleaned pieces of lead here and there and cut them into slugs, and, while one aimed, another applied a match to the touch-hole. With these awful weapons, we wandered along the beach and fired at the gulls and solan-geese as they passed us. Fortunately we never hurt any of them that we knew of. We also dug holes in the ground, put in a handful or two of powder, tamped it well around a fuse made of a wheat-stalk, and, reaching cautiously forward, touched a match to the straw. This we called making earthquakes. Oftentimes we went home with singed hair and faces well peppered with powder-grains that could not be washed out.*

This boy secretively crept around on steep, slate roofs after being put to bed, regularly got into fights, stole young skylarks from their nests to hand raise them, and got into all kinds of trouble. Sound like just the kind of ruffian you'd rather not have your son associate with? Then he would have missed hunting and adventuring with John Muir, who describes these escapades in *The Story of My Boyhood and Youth* (1913).

Look back at Bob Pyle's and E. O. Wilson's accounts of their boyhoods. Remember that John James Audubon was an avid bird collector, Aldo Leopold a thoughtful hunter. Many great naturalists and environmentalists enjoyed boyhoods that included a substantial amount of hunting. In light of the fact that we still retain the genetic structure of our hunting and gathering ancestors, it's not surprising that young boys and girls intuitively play at games that were an integral part of preagrarian lifestyles for thousands and thousands of years.

On the island of Carriacou, just north of Grenada in the Caribbean, I stumbled into a children's culture that still preserved many of these elements about twenty years ago. I was taking a year's leave of absence from my teaching job to enjoy family time and research children's relationships with their environments. We spent half of the year in Devon, England, and the other half on Carriacou, an undeveloped, untouristed, back-of-beyond kind of place. My research approach was to ask children to make maps of their neighborhoods and then have some of those children take me on field trips to the important places in their nearby geographic territory.

When the field trips started, it was like stepping back in time. The boys took me on hunting expeditions. On the way home from school with the girls, I collected wild cherries or the seedpods of tamarinds. In a mixed group of boys and girls one Saturday morning, we collected sea urchins and ate their roe, tried to spear crayfish and moray eels, shook palm trees to loosen the ripe coconuts so we could drink their milk, and climbed way out on scraggly branches to collect star fruit. Along the way we also sang, played jump rope games, rolled hoops. Their conventional childhood play was interspersed with hunting and gathering activities that were both functional and recreational. Functional because the fish and animals they caught and the fruit they collected served to amplify their meager diets.

Three different hunting expeditions with boys illustrate how hunting was central to their everyday lives. One day after school, two boys decided to take me bird hunting. After dropping off their book bags at home, Matthew grabbed a piece of twine and his pocketknife and led us into the backyard. Here, Josiah and Matthew cut straight branches off an acacia shrub and quickly fabricated bows with the twine. Next, they cut shorter branches, sliced stout thorns from an ocotillo cactus, notched the tips of

the branches and adhered the thorns with a sticky sap, and, voilà! we had arrows. We stalked quietly through the bush, watching the ground for recent bird scratchings, pausing to listen attentively for wing flutter and distant cooing. Within an hour, we had two ground doves. Matthew's mother was happy to add them to their pigeon peas and rice dinner that night.

Two weeks later, I went with a group of boys, age five to twelve, to trap birds. Hollie, the oldest boy, performed like he had his Eagle Scout badge in indigenous hunting techniques. Again, using only twine and a pocketknife and twigs of various shapes and thickness, he and the other boys fabricated delicate snares. When the bird approached the seed left as bait, its pecking dislodged the carefully frictioned trigger, the flying stick snapped skyward, and the bird's leg was snatched up in the loop of twine that encircled its leg. Each boy made his own snare, even five-year-old Boyd. His snare didn't really work, but it was fascinating to watch the older boys patiently help him learn each step of the process. The technique had clearly been passed down from older boys to younger boys over many generations.

One Saturday morning, I climbed Cabesair, an eight-hundred-foot haughty promontory that loomed over the village, like the mountain in *Fantasia*, with another group of boys. From the top, we dropped down a steep cactus and acacia talus slope to a grove of large juniper and mapoo trees. "We find iguana here," Hollie whispered as we got close. Once they sighted one high in the tree, they became a well-organized team with differentiated roles and responsibilities—a scout, a climber, stone throwers stationed on the ground. The climber had to balance his way out a skinny branch, probably thirty feet above the ground, to strike the lizard with a club. Meanwhile the stone throwers distracted it, peppering it from below. It was no match for their organized efficiency.

As it lay dead on the ground, they inspected it with reverence, examining its bleached scales, the ticks attached to its underparts, its fearsome demeanor. Kenroy imitated the imperial glare of the iguana as he stared down from the tree. He rolled his eyes back in his head and you could almost see the row of sawlike prickers rise on his sweaty black back as he arched like the iguana. He pawed the air with his arms to show the way the iguana tried to swim out of the tree before he succumbed. They were proud of their hunting prowess. Their families ate the iguana for dinner that evening.

On a walk up a dry wash in the bush one afternoon with three girls we came upon a massive tamarind tree. Its palm-sized seedpods littered the ground. Placing one on a flat stone and using another round stone as a pounder, Monica cracked one open and the girls hungrily stuffed the yellow-green peanut-buttery pulp into their mouths. Then, as if someone else might show up any minute and steal their discovery,

the girls excitedly stuffed their pockets with their prize and made pouches with their dresses to carry home as many as possible. At school they next day they ruled over the playground as they dispensed their riches to the fawning crowds or traded for other valuables.

What's the point of these stories? Am I trying to get published in *Field and Stream*? Am I organizing a Euell Gibbons retrospective? Perhaps both. The impulse to hunt and gather is still very alive in children's psyches. Capture the Flag, Hide-and-Seek, and Kick the Can are all essentially predator/prey games. Sea-glass collections adorn many children's bedrooms. If we recognize that hunting and gathering still exert a strong magnetic pull on children, we can use them to enliven children's learning about the world.

We can do this in both literal and figurative ways. The traditional hunter, prior to the invention of firearms, was an attuned, sophisticated observer of the natural world. Without these skills, he would fail as a hunter. In *Indian Boyhood*, Charles Eastman describes his Sioux childhood in the latter part of the nineteenth century.

> *It was part of our hunting to find new and strange things in the woods. We examined the slightest sign of life; and if a bird had scratched the leaves off the ground, or a bear dragged up a root for his morning meal, we stopped to speculate on the time it was done. If we saw a large old tree with some scratches on its bark, we concluded that a bear or some raccoons must be living there… An old deer-track would at once bring on a warm discussion as to whether it was the track of a buck or a does. Generally, at noon, we met and compared our game, noting at the same time the peculiar characteristics of everything we had killed. It was not merely a hunt, for we combined with it the study of animal life.* (1971)

Designed with recognition that this spirit is alive in children, Keith Badger of the High Mowing School in Wilton, New Hampshire, adapted his year-round field ecology program for high school students into a summer camp experience for nine- to thirteen-year-olds. The Way of the Naturalist teaches children the traditional skills of surviving in the wilderness, including tracking and hunting small game, gathering wild edibles, making fire, and orienteering. Eight summers ago, my son participated in these programs. I was most impressed watching all the children make handmade bows. Using traditional Native American techniques, Keith had cut the six-foot white ash staffs in the winter and then set them to dry for six months. Then each child worked laboriously, first with a drawknife, then with files, to achieve just the right thinness and taper. When

complete, they were strung with sinew, and then each child was trained in the appropriate use of this potentially dangerous weapon. If a child chose to hunt, it was clear that one hunted only if one intended to eat the animal and use its skin appropriately.

To make fires, children were taught two techniques—starting fires with flint and steel or with the use of bow drills. Neither of these came easily, especially because they had to make their own bow drills, but they'd labor for hours to get just the right technique. Figuring out the right angle for striking the flint against the steel, getting just the right kind of flammable material for the spark to land in, learning to blow with the right force once an ember started to glow. What a thrill when the first flame actually appeared!

It was a joy to pick up my son and his best friend each day after their exploits in the woods. They eagerly talked about the day's activities:

We were so lost today! Keith took us way far away and dropped us off and we had to find our way back to camp. In the beginning I was really scared and we were all arguing. But eventually, we sat down with the map and compass and remembered what we were supposed to do, and we figured it out. We came out of the woods on the road only about a hundred yards from the camp!

Today we ate grasshoppers. We collected them in the field and then brought them back and fried them in some oil over the fire. I was grossed out and swore I wouldn't eat any. But Keith popped a couple in his mouth and Ryan tried one and said they were OK so I tried one, and, you know what? They were good, kind of like popcorn.

For a period of time when he was around ten years old, my son, Eli, was fascinated with making fires. He had his own little fire kit in a little red plastic toolbox—his flint and steel, some tinder, matches, a lighter, candles. I built a fire pit in the backyard so he had a safe place to ply his craft. He got particularly good at getting fires going in the rain, and I came to depend on him when I needed to get brush fires going. One autumn night he went out to the fire pit after dinner and returned a couple of hours later. "It was so beautiful out there," he said. "Just the darkness, the stars, and the fire. I thought I'd be scared and lonely out there all by myself, but it was really cozy. It was almost as if the fire was my friend."

Isn't this what we want, this sense of friendship between the natural world and our children? It's so easy to take all the risk and solitude out of our children's lives—don't

play with matches, don't go out there alone, no you can't use your pocketknife unless you're with an adult. Instead, we need to follow their instinctual hunting and gathering predispositions and use them as the basis for skill development. Tom Brown's Tracker programs, Boy and Girl Scouts, Outward Bound, and National Outdoor Leadership School (NOLS) courses for adolescents are all based on preserving the old ways that live, nascent, inside us.

It's also useful to use the hunting and gathering motif figuratively, to capitalize on the thrill of the quest, the search for the elusive. Unfurl the treasure map slowly. The aged paper threatens to crumble in your hands if you don't exercise the utmost care. Lay it out on the table, rocks placed gently on the corners. Ah yes, there's the old oak, Big Rock, the path around the swamp. And over there, behind the haunted house, that must be the place. That pile of little diamonds must show where the treasure is hidden. That's not far from here! Let's go find it.

Only the stodgy and infirm can resist the lure of treasure. The Gold Rush, sunken treasure, the tomb of King Tutankhamen have captured the imaginations of countless seekers, old and young alike. Mention treasure to three- and four-year-olds and their ears perk up. Unruly gangs of nine- and ten-year-olds can become a captive and submissive audience if the promise of treasure is hinted at.

For me, hunting for treasure is one of the core metaphors for what education is all about. One of the objectives of schooling should be to engage students in searching for the meaning of life—the quest for the Holy Grail. When students get really enraptured in a topic and start to search for pieces of information, see the connections between different ideas, and then glimpse the big pattern, they're really engaged in a kind of treasure hunt. I see treasure hunts as embodying the best of what many progressive theorists refer to as "constructivist learning." Treasure hunts with elementary students provide a concrete illustration of the process of doing research and probing into the hidden recesses of a subject that happens in secondary school and in professional lives.

In the Upper Valley towns of New Hampshire and Vermont, educators have created an elegant, regional, place-based education treasure hunt that weaves together curriculum development, family recreation, and ecotourism. For their social studies and science curriculum, classroom teachers and students create treasure hunts to cultural and natural areas of significance—forgotten village centers, hilltop views, historic Shaker ritual sites, old-growth forests. It's integrated curriculum at its best—involving poetry writing, mapmaking, primary-source texts, field studies. When completed, they're all

collected into the Valley Quest guides that are used by historical societies, families, 4-H groups, and garden clubs to provide compelling treasure hunts. At the hiding place, questers find a secret box with a journal, educational information, and a unique rubber stamp and ink pad so you can gather an impression in your quest book. (See Chapter 7, "Valley Quest: Strengthening Community Through Educational Treasure Hunts," for a full description of this and other permanent treasure hunts.)

On a more everyday basis, I've seen treasure hunts used throughout the elementary grades to provide scaffolding for all the different curriculum areas. One kindergarten/first-grade teacher started the school year off with a pictorial treasure hunt that worked perfectly for all her nonreaders. After the first teacher-constructed hunt, the children started to create their own hunts, both inside the building and in the woods around the school. Treasure hunting expanded and became the theme or motif for the whole year in her classroom. Even when they weren't doing treasure hunts, the vocabulary of treasure hunting—finding clues, making maps, figuring out meanings, searching, uncovering hidden things—was the vocabulary they used when talking about problems in math and when learning to read. "I tried to make deciphering the clues attainable for everyone by including a picture clue on the back of each clue card as a fallback method if reading proved too difficult," she explained.

I've seen treasure hunts used in a fifth-grade mathematics curriculum where each clue led to a number problem on the schoolgrounds. In Keene, New Hampshire, the Robin Hood Forest treasure hunt was used as part of the environmental education curriculum for teaching map-reading skills in fourth grade. In Norwich, Vermont, an architectural clues treasure hunt was used in the fifth-grade social studies curriculum to introduce a unit on American history. And I've designed treasure hunts purely in books to teach library skills. One of my favorites was the Family Fun Day Pirate Treasure Hunt created for families with young children in Peterborough, New Hampshire. The hunt included finding snorkeling and excavating equipment to use for locating treasure that was actually in a chest sunk in about five feet of water about one hundred feet from shore. Very exciting. This was a true multigenerational event and is an excellent prototype for a school celebration.

To introduce a new state park to the people of southern New Hampshire about fifteen years ago, we created the Pisgah State Park treasure hunt. The clues, published in the local paper, required research in local libraries and historical societies, poring over old maps, and using natural history field guides. The treasure was a leather bag filled with fifty silver dollars. A treasure with real heft. After the event was completed, I received a letter from a sixty-year-old grandmother who said, "My husband and I

traveled all over Pisgah trying to find answers to all the clues. We climbed the hills, explored the old village sites of Hardscrabble and Nash City, and enjoyed the solitude. We never found the real treasure, but we discovered that the real treasure was the beauty of this lost piece of New Hampshire, right out our back door."

That kind of sums it all up, doesn't it?

In Conclusion

This chapter has been like the Family Fun Day Pirate Treasure Hunt I just described above. I've provided you with the tools to dig for your own treasure. The design principles are the tools; the treasure is the compelling education experiences you're going to design. And if you're really lucky, along the way some children will have transcendent experiences that you'll probably never know about. But what you will know is that your students, or your children, have had indelible experiences of true immersion in the natural world. And as my twenty-year-old daughter recently wrote in a letter to me: "This connection to the earth, which is everywhere and always nurturing, is one of the greatest gifts I have ever received; it allows me to feel at home anywhere I can plant my feet in the soil and hug the trees and helps me to find solitude and peace within myself and the world around me."

Sounds like the Holy Grail to me.