

## 7. The Genius of Childhood: How Nature Nurtures Creativity

*I played around our yard some and talked to the fence posts, sung  
songs and made the weeds sing . . .*

—WOODY GUTHRIE

ART CRITIC BERNARD BERENSON, echoing the words of the psychologist Erik Erikson, father of human developmental theory, theorized that creativity begins “with the natural genius of childhood and the ‘spirit of place.’” He once described how, as he looked back on his seventy years, and recalled his moments of greatest happiness, they were usually times when he lost himself “all but completely in some instant of perfect harmony”:

In childhood and boyhood this ecstasy overtook me when I was happy out of doors . . . A silver haze shimmered and trembled over the lime trees. The air was laden with their fragrance. The temperature was like a caress. I remember . . . that I climbed up a stump and felt suddenly immersed in Itness. I did not call it by that name. I had no need for words. It and I were one. Surely most children are like that. I have retained that faculty through the years.

Robin Moore would agree with Berenson. As a champion for outdoor play, Moore has written that natural settings are essential for healthy child development because they stimulate all the senses and integrate informal play with formal learning. According to Moore, multisensory experiences in nature help to build “the cognitive constructs

necessary for sustained intellectual development,” and stimulate imagination by supplying the child with the free space and materials for what he calls children’s “architecture and artifacts.” “Natural spaces and materials stimulate children’s limitless imaginations and serve as the medium of inventiveness and creativity observable in almost any group of children playing in a natural setting,” says Moore.

Early theoretical work in this field was done by Cambridge architect Simon Nicholson, the son of two of Britain’s most prominent twentieth-century artists, Ben Nicholson and Barbara Hepworth. In a 1990 obituary for Nicholson, the *Guardian* of London described Nicholson’s contention that everybody is innately creative but that modern society suppresses the creative instinct, while promoting artists as a gifted elite, “who, as it happens, have all the fun.” Nicholson’s “loose-parts” theory has been adopted by many landscape architects and child’s-play experts. Nicholson summed up his theory this way: “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.” A “loose-parts” toy, as Nicholson defined it, is open-ended; children may use it in many ways and combine it with other loose parts through imagination and creativity. A typical list of loose parts for a natural play area might include water, trees, bushes, flowers, and long grasses, a pond and the creatures within it, along with other living things, sand (best if it can be mixed with water), places to sit in, on, under; structures that offer privacy and views. Go beyond that play area, to woods, fields, and streams, and the parts become looser and even more potent to the imagination.

One might argue that a computer, with its near-infinite coding possibilities, is history’s deepest box of loose parts. But binary code, made of two parts— $\times$  and 0—has its limits. Nature, which excites all the senses, remains the richest source of loose parts.

The loose-parts theory is supported by studies of play that compare green, natural play areas with blacktop playgrounds. Swedish studies

found that children on asphalt playgrounds had play that was much more interrupted; they played in short segments. But in more natural playgrounds, children invent whole sagas that they carried from day to day to day—making and collecting meaning.

The growing number of such studies, comparing patterns of creative play in green versus built spaces, “are consistent with the notion that green space supports healthy child development,” according to a review of the literature by Andrea Faber Taylor and Frances Kuo at the Human-Environment Research Laboratory at the University of Illinois.

In Sweden, Australia, Canada, and the United States, studies of children in schoolyards with both green areas and manufactured play areas found that children engaged in more creative forms of play in the green areas. One of these studies found that a more natural schoolyard encouraged more fantasy and make-believe play in particular, which provided ways for boys and girls to play together in egalitarian ways; another reported that children showed a greater sense of wonder. The researchers defined creative play widely: playing with action figures and dolls; role-playing on imaginary battlefields and planets, and in mythical landscapes with fairies and queens; elaborate jump-rope routines; constructing buildings or objects from loose materials; and exploring the environment.

Researchers have also observed that when children played in an environment dominated by play structures rather than natural elements, they established their social hierarchy through physical competence; after an open grassy area was planted with shrubs, the quality of play in what the study termed “vegetative rooms” was very different. Children used more fantasy play, and their social standing became based less on physical abilities and more on language skills, creativity, and inventiveness.

In their review of these studies, Taylor and Kuo cautioned that in some of them children were self-selecting the spaces in which they played. Children, when given a choice, may choose green spaces when

they intend to engage in creative play. Taylor's and Kuo's own studies demonstrated that children have greater ability to concentrate in more natural settings. In their study, children also selected where they wanted to play. These studies, therefore, do not prove a direct link between nature-play and creativity. Nonetheless, the possibility that creative children prefer natural areas for their play raises its own crucial question: What happens when creative children can no longer choose a green space in which to be creative?

### Nature and Famous Creators

Curious about the influence of nature in the early development of the famously creative, I asked my teenage son, Matthew, to spend some summer library time searching through biographies for examples. He took on this job with enthusiasm. I offered to pay him for his time, but he declined money, as is his way. Realizing how much work he was in for, I persisted. Would any other kind of compensation do?

"How about StarCraft, Dad," he said.

"A video game?"

"Computer game."

I acquiesced. He headed for the library and hauled back the first stack of biographies. Excited, he brought me the first passage he found, from a biography of the great science-fiction author—the man who also originated the principles of the geostationary communication satellite—Arthur C. Clarke. Clarke grew up in Minehead, England, a coastal town on the Bristol Channel, with boyhood "vistas of the Atlantic Ocean that created the illusion of infinite space," as biographer Neil McAleer tells it. On that shore, McAleer wrote, the young Clarke "built battlements of sand and explored the tidewater pools."

During the winter months [Clarke] often cycled home in the dark, with the stars and moon illuminating his route in clear weather. Such starry evenings influenced Clarke's budding cosmic consciousness. The

silent night sky above him stirred his imagination and brought forth images of the future. Men would walk on the moon someday, he knew, and later they would leave their boot prints on the red sands of Mars. Even the gulf between our sun and other stars would be bridged eventually, and their planets explored by the descendants of our species.

In his later years, Clarke admitted that the only place where he was ever completely relaxed was by the edge of the sea, or weightless within it.

I added Matthew's collection to other examples I had found. Joan of Arc first heard her calling, at age thirteen, "toward the hour of noon, in summer, in my father's garden." Jane Goodall, at two years of age, slept with earthworms under her pillow. (Don't try this at home.) John Muir described "reveling in the wonderful wildness" around his boyhood home in Wisconsin. Samuel Langhorne Clemens held down an adult job as a printer at fourteen, but when his working day ended at three in the afternoon, he headed to the river to swim or fish or navigate a "borrowed" boat. One can imagine that it was there, as he dreamed of becoming a pirate or a trapper or scout, that he became "Mark Twain." The poet T. S. Eliot, who grew up alongside the Mississippi River, wrote, "I feel that there is something in having passed one's childhood beside the big river which is incommunicable to those who have not." And the imagination of biophilia's patron, E. O. Wilson (whose boyhood nickname was "Snake"), was ignited while exploring the "woods and swamps in a languorous mood . . . [forming] the habit of quietude and concentration."

In *Edison: Inventing the Century*, biographer Neil Baldwin tells how "Little Al," as Edison was nicknamed, wandered away one day while visiting his sister's farm. Her husband found him sitting in a box of straw. The little boy explained, "I saw baby chickens come out of eggs the old hen was sitting on so I thought I could make little geese come out of the goose eggs if I sat on them. If the hens and geese can do it, why can't I?" Later, seeing the egg stain on Al's pants, and that he was upset, his sister comforted him, reportedly saying, "It's all right, Al . . . If no one

ever tried anything, even what some folks say is impossible, no one would ever learn anything. So you just keep on trying and maybe some day you'll try something that will work.”

Or consider Eleanor Roosevelt, one of the more creative public figures in American history. In *Eleanor and Franklin*, Joseph P. Lash tells how, “as she passed from childhood to adolescence, the beauty of nature spoke to her awakening senses.” He goes on:

The changes of the seasons, the play of light on the river, the color and coolness of the woods began to have the profound meaning to her that they would retain throughout her life. When she was a young girl, she wrote a half century later, “there was nothing that gave me greater joy than to get one of my young aunts to agree that she would get up before dawn, that we would walk down through the woods to the river, row ourselves the five miles to the village in Tivoli to get the mail, and row back before the family was at the breakfast table.”

She disappeared into the woods and fields for hours, where she would read her books and write stories filled with awe and rooted in the metaphors of nature. In “Gilded Butterflies,” a particularly fanciful short story Lash recounts in his book, Eleanor unconsciously describes her own future. In her story, she is lying on her back in the long grass one hot summer day, when she is startled by the voices of butterflies. “Curiosity sharpening my ears I began to hear what they were saying.” One butterfly blurts out, “Pooh! I’m not going to sit on a daisy always. I have higher aspirations in life. I am going to know a great deal and to see everything. I won’t stay here to waste my life. I mean to know something before I’ve finished.” For Eleanor, literature, nature, and dreams were forever linked. We can only imagine how this little girl would have developed without her time in nature, but surely her fragile power needed protection as it grew, and time and space to hear an inner voice.

For Beatrix Potter, the connection between the mystery of nature and imagination is even more direct. Potter, one of the most famous

children’s authors, exhibited ruthless collecting abilities. As her biographer Margaret Lane tells it, Beatrix and her brother “were not squeamish, and there was a toughness about some of their experiments which would have surprised their parents.”

The two siblings “smuggled home innumerable beetles, toadstools, dead birds, hedgehogs, frogs, caterpillars, minnows and sloughed snake-skins. If the dead specimen were not past skinning, they skinned it; if it were, they busily boiled it and kept the bones. They even on one occasion, having obtained a dead fox from heaven knows where, skinned and boiled it successfully in secret and articulated the skeleton.” Everything they brought home, they drew or painted, and sewed the pieces of drawing paper together to make their books of nature. The depictions were realistic for the most part, “but here and there on the grubby pages fantasy breaks through. Mufflers appear round the necks of newts, rabbits walk upright, skate on ice, carry umbrellas, walk out in bonnets . . .”

Nature offers a well from which many, famous or not, draw a creative sense of pattern and connection. As Moore points out, nature experiences “help children understand the realities of natural systems through primary experience. They demonstrate natural principles such as networks, cycles, and evolutionary processes. They teach that nature is a uniquely regenerative process.” An appreciation of these patterns is essential in fostering creativity, which of course is not the sole domain of the arts, but of science and even politics.

Richard Ybarra, a political operative from California and son-in-law of the late labor leader Cesar Chavez, describes Chavez’s seemingly inexhaustible power of spirit and energy and how his early childhood prepared him for a deep understanding of natural—including human—systems:

He always had a connection to nature that went back to his days growing up on a farm on the Gila River. He always had the river connection. Even his magical life-twists carried him full circle back to the

very river region where his life began. His dad raised him to understand the land, soils, water and how things work. His mom raised him to know about herbs and all that nature produced. It is obvious in so many ways that his genius was very much derived from life's simplest and most basic processes and systems. He could always see with great clarity, no matter the complexities or challenges.

Of course, not everyone with childhood experience in nature is affected in this particular way, and not every child who is touched becomes a Chavez, Roosevelt, Potter, or Clarke—or, thankfully, Joan of Arc. Creativity draws from other immersions as well. When Matthew and I explored the biographies of more recent creators, mentions of nature as inspiration began to fade. Creative people who came of age in the 1970s—rock stars among them—seldom described inspirational childhood experiences in nature. So, it seems, creativity occurs without natural influences, but it may have a different tempo.

### **Nature, Creativity, and Ecstatic Places**

Economist Thorstein Veblen once offered an alternative way to define serious research. Its outcome, he said, “can only be to make two questions grow where one question grew before.” By this definition, Edith Cobb was a good researcher. She offered a deep box of loose parts, and influenced a generation of childhood researchers.

In 1977, after years of dedicated (if not strictly scientific) research, Cobb published her influential book, *The Ecology of Imagination in Childhood*. Though she had a degree from the New York School of Social Work, Cobb was not a sociologist; her expertise came mainly from her many hours of observing and documenting children at play, and her years of reflection on what she had learned about children's relationships with nature. She based much of her analysis on a collection of some three hundred volumes of autobiographical recollections of childhood by creative thinkers from diverse cultures and eras. She concluded

cent the likelihood that they will develop concentration problems and other symptoms of attention-deficit disorders by age seven.

This information is disturbing. But television is only part of the larger environmental/cultural change in our lifetime: namely, that rapid move from a rural to a highly urbanized culture. In an agricultural society, or during a time of exploration and settlement, or hunting and gathering—which is to say, most of mankind's history—energetic boys were particularly prized for their strength, speed, and agility. As mentioned earlier, as recently as the 1950s, most families still had some kind of agricultural connection. Many of these children, girls as well as boys, would have been directing their energy and physicality in constructive ways: doing farm chores, baling hay, splashing in the swimming hole, climbing trees, racing to the sandlot for a game of baseball. Their unregimented play would have been steeped in nature.

#### **The “Restorative Environment”**

Even without corroborating evidence, many parents notice significant changes in their hyperactive child's behavior when they hike in mountains or enjoy other nature-oriented outings.

“My son is still on Ritalin, but he's so much calmer in the outdoors that we're seriously considering moving to the mountains,” one mother says.

Could it simply be that he needs more physical activity?

“No, he gets that, in sports,” says the mother. “There's just something calming to him about being outside in nature.”

Many physicians and psychologists agree. “Our brains are set up for an agrarian, nature-oriented existence that came into focus five thousand years ago,” says Michael Gurian, a family therapist and best-selling author of *The Good Son* and *The Wonder of Boys*. “Neurologically, human beings haven't caught up with today's overstimulating environment. The brain is strong and flexible, so 70 to 80 percent of kids adapt fairly well. But the rest don't. Getting kids out in nature can make a difference. We know this anecdotally, though we can't prove it yet.”

New studies may offer that proof.

This research builds on the well-established attention-restoration theory, developed by a husband-and-wife research team, Stephen and Rachel Kaplan. Environmental psychologists at the University of Michigan, the Kaplans were inspired by philosopher and psychologist William James. In 1890, James described two kinds of attention: directed attention and fascination (i.e., involuntary attention). In the early 1970s, the Kaplans began a nine-year study for the U.S. Forest Service. They followed participants in an Outward Bound–like wilderness program, which took people into the wilds for up to two weeks. During these treks or afterward, subjects reported experiencing a sense of peace and an ability to think more clearly; they also reported that just being in nature was more restorative than the physically challenging activities, such as rock climbing, for which such programs are mainly known.

The positive effect of what the Kaplans came to call “the restorative environment” was vastly greater than the Kaplans expected it to be. According to the Kaplans’ research, too much directed attention leads to what they call “directed-attention fatigue,” marked by impulsive behavior, agitation, irritation, and inability to concentrate. Directed-attention fatigue occurs because neural inhibitory mechanisms become fatigued by blocking competing stimuli. As Stephen Kaplan explained in the journal *Monitor on Psychology*, “If you can find an environment where the attention is automatic, you allow directed attention to rest. And that means an environment that’s strong on fascination.” The fascination factor associated with nature is restorative, and it helps relieve people from directed-attention fatigue. Indeed, according to the Kaplans, nature can be the most effective source of such restorative relief.

In a paper presented to the American Psychological Society in 1993, the Kaplans surveyed more than twelve hundred corporate and state-office workers. Those with a window view of trees, bushes, or large lawns experienced significantly less frustration and more work enthusiasm than those employees without such views. Like similar studies on stress

reduction, this study demonstrated that a person does not have to live in the wilderness to reap nature’s psychological benefits—including the ability to work better and think more clearly.

Subsequent research has supported the Kaplans’ attention-restoration theory. For example, Terry A. Hartig, an associate professor of applied psychology at the Institute for Housing and Urban Research at Uppsala University in Gävle, Sweden, along with other researchers, compared three groups of backpacking enthusiasts; a group who went on a wilderness backpacking trip showed improved proofreading performance, while those who went on an urban vacation or took no vacation showed no improvement. In 2001, Hartig demonstrated that nature can help people recover from “normal psychological wear and tear”—but nature also improves the capacity to pay attention. Hartig emphasizes that he does not test the extremes—say, the Sierras versus East Los Angeles. Rather, his studies have focused on what he describes as “typical local conditions.” As described in *Monitor on Psychology*, Hartig asked participants to complete a forty-minute sequence of tasks designed to exhaust their directed-attention capacity. After the attention-fatiguing tasks, Hartig then randomly assigned participants to spend forty minutes “walking in a local nature preserve, walking in an urban area, or sitting quietly while reading magazines and listening to music,” the journal reported. “After this period, those who had walked in the nature preserve performed better than the other participants on a standard proofreading task. They also reported more positive emotions and less anger.”

### **Nature’s Ritalin**

Attention-restoration theory applies to everyone, regardless of age. But what about children, especially those with ADHD?

“By bolstering children’s attention resources, green spaces may enable children to think more clearly and cope more effectively with life stress,” writes Nancy Wells, assistant professor at the New York State

College of Human Ecology. In 2000, Wells conducted a study that found that being close to nature, in general, helps boost a child's attention span. When children's cognitive functioning was compared before and after they moved from poor- to better-quality housing adjacent to natural, green spaces, "profound differences emerged in their attention capacities even when the effects of the improved housing were taken into account," according to Wells.

Swedish researchers compared children within two daycare settings: at one, the quiet play area was surrounded by tall buildings, with low plants and a brick path; at the other, the play area, based on an "outdoors in all weather" theme, was set in an orchard surrounded by pasture and woods and was adjacent to an overgrown garden with tall trees and rocks. The study revealed that children in the "green" day care, who played outside every day, regardless of weather, had better motor coordination and more ability to concentrate.

Some of the most important work in this area has been done at the Human-Environment Research Laboratory at the University of Illinois. Andrea Faber Taylor, Frances Kuo, and William C. Sullivan have found that green outdoor spaces foster creative play, improve children's access to positive adult interaction—and relieve the symptoms of attention-deficit disorders. The greener the setting, the more the relief. By comparison, activities indoors, such as watching TV, or outdoors in paved, non-green areas, increase these children's symptoms.

In a survey of the families of ADHD children ages seven to twelve, parents or guardians were asked to identify after-school or weekend activities that left their child functioning especially well or particularly poorly. Activities were coded as "green" or "not green." Green activities, for example, included camping and fishing. Not-green activities included watching television, playing video games, doing homework. Some activities, such as rollerblading, were labeled ambiguous. The controls in this study were more complex than space allows me to describe, but suffice it to say, the research team was careful to account

for variables. They found that greenery in a child's everyday environment, even views of green through a window, specifically reduces attention-deficit symptoms. While outdoor activities in general help, settings with trees and grass are the most beneficial. As they reported in the journal *Environment and Behavior*, "compared to the aftereffects of play in paved outdoor or indoor areas, activities in natural, green settings were far more likely to leave ADD children better able to focus, concentrate. Activities that left ADD children in worse shape were far more likely to occur indoors or outdoors in spaces devoid of greenery."

They also found that the positive influence of near-home nature on concentration may be more pronounced for girls (ages six to nine) than for boys. On average, the greener a girl's view from home, the better she concentrates, the less she acts impulsively, and the longer she can delay gratification. This helps her do better in school, handle peer pressure, and avoid dangerous, unhealthy, or problem behaviors. She is more likely to behave in ways that foster success in life, according to the researchers. Perhaps, if girls are less biologically prone to ADHD, as some mental health professionals believe, they may exhibit milder symptoms and may also have a more robust, healthy response to the treatment—whether pharmaceutical or green.

Based on the study, the University of Illinois issued this informal advice regarding girls to parents, caregivers, and others. The information also applies to boys:

- Encourage girls to study or play in rooms with a view of nature.
- Encourage children to play outdoors in green spaces, and advocate recess in green schoolyards. This may be especially helpful for renewing children's concentration.
- Plant and care for trees and vegetation at your residence, or encourage the owner to do so.
- Value and care for the trees in your community. Caring for trees means caring for people.

In addition to its work in the housing projects of inner-city Chicago, the Human-Environment Research Laboratory has also examined nature's impact on children with ADHD in middle-class settings. There, as in the public housing development, parents reported that their children exhibited fewer symptoms of ADHD after spending time in green surroundings. "You could say that the kids who had greener settings were just richer," says Kuo. "But that doesn't explain the fact that even rich kids do better after being in green settings . . ." In the report:

Participants were asked if they had had any experiences, either positive or negative, related to any aftereffects of green settings on their child's attention. One parent said she had recently begun taking her son to the local park for 30 minutes each morning before school because the weather was nice, and they "had some time to kill." She then said, "Come to think of it, I have noticed his attitude toward going to school has been better, and his schoolwork has been better this past week. I think it's because spending time at the park is pleasurable, peaceful, quiet, calming."

Another parent reported that his son could hit golf balls or fish for hours, and that during these times the boy was "very relaxed" and his attention-deficit symptoms minimal. "When I read the results of your study, they hit me in the face," he told the researchers. "I thought, yes, I've seen this!"

So had some of the parents I interviewed. Noticing that their children's ADHD symptoms were calmed by natural settings, they applied common sense; they were already encouraging their kids to spend more time outdoors, and they felt affirmed when I told them about the Illinois studies.

Taylor's and Kuo's more recent research findings are equally provocative. According to an unpublished study (which Taylor emphasizes is "a work in progress"), attention performance for unmedicated children clinically diagnosed with ADHD was better after a simple twenty-minute walk in a park, with a natural setting, than it was after a walk through well-kept downtown and residential areas.

Expanding such knowledge, and applying it in practical ways, will be the next challenge. Although today's common medications for ADHD offer temporary gains, including sustained attention and academic productivity, these medications may do little for a child's long-term success, either socially or academically. The medications can also have unpleasant side effects, among them sleep disruption, depression, and growth suppression of approximately half an inch per year on average, as reported in a large randomized trial funded by the National Institute of Mental Health. A second class of treatment—behavioral therapies—teaches children how to self-monitor attention and impulsive behavior, but the success of these therapies has been mixed.

More time in nature—combined with less television and more stimulating play and educational settings—may go a long way toward reducing attention deficits in children, and, just as important, increasing their joy in life. Researchers at the Human-Environment Research Laboratory believe that their findings—if replicated and broadened by additional research—point to nature therapy as a potential third course of treatment, applied either in concert with medication and/or behavioral therapy, or on its own. Behavioral therapy and nature therapy, if used collaboratively, might teach the young how to visualize positive experiences in nature when they need a calming tool. One psychiatrist who works with ADHD children relates how he sometimes slides into mild depressions. "I grew up fly-fishing in Michigan, and that was how I found peace as a child," he says. "So, when I begin to feel depressed, I use self-hypnosis to go there again, to call up those memories." He calls them "meadow memories." Though he is a firm believer in the proper use of the currently available medications for ADHD, he is encouraged by the possibility that nature therapy might offer him another professional tool. And, as Kuo points out, prescribing "green time" for the treatment of ADHD has other advantages: it's widely accessible, free of side effects, nonstigmatizing, and inexpensive.

If it's true that nature therapy reduces the symptoms of ADHD, then the converse may also be true: ADHD may be a set of symptoms aggravated

by lack of exposure to nature. By this line of thinking, many children may benefit from medications, but the real disorder is less in the child than it is in the imposed, artificial environment. Viewed from this angle, the society that has disengaged the child from nature is most certainly disordered, if well-meaning. To take nature and natural play away from children may be tantamount to withholding oxygen.

An expanded application of attention-restoration theory would be useful in the design of homes, classrooms, and curricula. New York's Central Park, the first professionally designed urban park in America, was originally seen as a necessary aid to both civic consciousness and public health. It was construed as a place where all New Yorkers, regardless of class, age, or health, would benefit from fresh air. If nature-deficit disorder, as a hypothetical condition, affects all children (and adults) whether or not they have some biological propensity for attention deficit, then nature therapy at the societal and individual levels will do the greatest good for the greatest number of people.

Research on the impact of nature experiences on attention disorders and on wider aspects of child health and development is in its infancy, and easily challenged. Scientists doing some of the best of this research are the first to point that out. "For many of us, intuition emphatically asserts that nature is good for children," write Taylor and Kuo, in an overview of the research to date. "Beyond these intuitions, there are also well-reasoned theoretical arguments as to why humans in general—and therefore children—might have an inborn need for contact with nature." Yes, more research is needed, but we do not have to wait for it. As Taylor and Kuo argue, "given the pattern of statistically reliable findings all pointing the same direction and persisting across different subpopulations of children, different settings, and in spite of design weaknesses, at some point it becomes more parsimonious to accept the fact that nature does promote healthy child development." If, as a growing body of evidence recommends, "contact with nature is as important to children as good nutrition and adequate

sleep, then current trends in children's access to nature need to be addressed."

Even the most extensive research is unlikely to capture the full benefits of direct, natural experience. One aspect sure to elude measurement—a phenomenon that will be discussed later in these pages—is the contribution of nature to the spiritual life of the child, and therefore to the adult. This we know: As the sign over Albert Einstein's office at Princeton University read, "Not everything that counts can be counted, and not everything that can be counted counts." We don't have to wait for more, needed, research to act on common sense, or to give the gift of nature—even when it might seem to be too late.

### **Touching the Sky with a Stick**

On a Sunday afternoon, a half-dozen teenagers gathered in defense attorney Daniel Ybarra's office not far from where I live. These teenagers—several diagnosed with ADHD—were on probation. They looked like your usual troubled teenage suspects: a gang member wearing a white net skullcap and black jersey; a girl with orange hair, her fingernails chewed to the quick; another boy with a black skullcap with a bandana tied around his head. He was wearing a sealskin Tlingit medicine pouch around his neck.

"You gonna carry your bus tokens in that, now?" one of the teens teased.

They had just returned from two chaperoned weeks living with tribal people in Ketchikan, Alaska, and in the southwestern Alaskan village of Kake, population 750. Kake is on an island served by a ferry that comes once every five days. The young people had been ordered to Alaska by a superior court judge who has an interest in alternative approaches to punishment.

For years, Ybarra had dreamed of pulling at-risk kids out of their urban environment and exposing them to nature. With the blessing of the judge, he acted. He convinced Alaska Airlines to provide inexpensive

## 12. Where Will Future Stewards of Nature Come From?

*[What is the] extinction of a condor to a child  
who has never seen a wren?*

—NATURALIST ROBERT MICHAEL PYLE

RECENTLY, I ASKED A COMMITTED and effective environmentalist—a person active in the creation of Southern California's ocean-to-mountains San Dieguito River Park—this question: When the park is completed, and the vast stretches of land and water are preserved, how will kids play in it?

“Well, they’ll go hiking with their parents . . .” He paused.

Would a kid be able to wander freely on this land, and, say, build a tree house? My friend became pensive.

“No, I don’t think so—I mean, there are plenty of more constructive ways to experience nature.” When asked how he first interacted with the outdoors, the environmentalist answered, sheepishly, “I built forts and tree houses.”

He understands the paradox here, but does not know quite what to do about it. Many of the traditional activities in nature are destructive. To some people, building a tree house or a fort in the woods is not much different than running quads across the dunes. The difference is one of degree: one way of experiencing joy in nature excites the senses, the other way drowns the senses in noise and fumes, and leaves tracks that will last thousands of years.

Working through such distinctions is not easy, but as the care of nature

increasingly becomes an intellectual concept severed from the joyful experience of the outdoors, you have to wonder: Where will future environmentalists come from?

If environmental groups, along with Scouting and other traditional outdoors-oriented organizations, wish to pass on the heritage of their movement, and the ongoing care of the earth, they cannot ignore children's need to explore, to get their hands dirty and their feet wet. And they must help reduce the fear that increasingly separates children from nature.

Until recently, most environmental organizations offered only token attention to children. Perhaps their lack of zeal stems from an unconscious ambivalence about children, who symbolize or represent overpopulation. So goes the unspoken mantra: We have met the enemy and it is our progeny. As Theodore Roszak, author of *The Voice of the Earth*, has said: "Environmentalists, by and large, are very deeply invested in tactics that have worked to their satisfaction over the last thirty years, namely scaring and shaming people. . . . I am questioning whether you can go on doing that indefinitely . . . [pushing] that same fear-guilt button over and over again. As psychologists will tell you, when a client comes in with an addiction, they are already ashamed. You don't shame them further."

That environmentalists need the goodwill of children would seem self-evident—but more often than not, children are viewed as props or extraneous to the serious adult work of saving the world. One often overlooked value of children is that they constitute the future political constituency, and their attention or vote—which is ultimately based more on a foundation of personal experience than rational decision-making—is not guaranteed.

Take, as just one example, our national parks.

### **Welcome to Matrix National Park**

To a new generation, the idea of camping at Yosemite is a quaint notion and brings to mind those ancient reruns of Lucy, Desi, Fred, and

Ethel banging around in their Airstream trailer. Some of the largest parks are reporting a peculiar drop-off in attendance over the past few years—a trend that predates the 9/11 terrorist attacks in New York and Washington, D.C. Such a decrease would seem to be good news for overcrowded parks choking on exhaust fumes. But there's a hidden, long-term danger.

First, the numbers. Overall visits to the national park system have remained roughly level over the past decade, but a closer look at the statistics shows that attendance at Eastern urban parks and historical sites has grown, while attendance at the West's major parks has fallen. "Statisticians predict further declines in the next two years," according to *Oregonian* reporter Michael Milstein, in an incisive article about the trend. Indeed, some of the numbers are dramatic. Yosemite National Park attendance has fallen 16 percent since 1996. The number of visitors topped out at the Grand Canyon in 1991, Yellowstone in 1992, and Oregon's Crater Lake National Park in 1995. Mount Rainier National Park attendance dropped from 1.6 million visitors in 1991 to 1.3 million in 2002. Since the late 1980s, the number of Carlsbad Caverns National Park visitors plummeted by nearly half since the late 1980s.

The most important reason for the decline, I believe, is the break between the young and nature—the transition from real-world experience to virtual nature. But a Northern Arizona University study of the nation's parks names two central barriers: shortage of family time and a widely held perception that parks are for viewing scenery, period. Other reasons include shorter vacations; the shrinking American road trip (from 3.5 to 2.5 days); the growth of immigrant groups, particularly in California, with no prior experience with wilderness parks; increased entrance fees, as of this writing as high as twenty dollars per car; and a perception that national parks are for the affluent (a Portland survey of California park visitors showed that more than two-thirds of visitors have incomes of at least fifty thousand dollars a year). What park officials call "windshield tours" are replacing camping. In 2001, the

number of visitors who camped in national parks dropped by nearly a third, to its lowest point in a quarter century. The drop-off in camping is especially evident among people younger than thirty, possibly because no one took them camping when they were kids. Consequently, they're not taking their own kids camping. One California survey, cited by Milstein, found that more than eight of ten campers became interested in the outdoors when they were children—but more than half of the camping parties surveyed had no children with them.

But *are* parks for kids anymore? For the *Matrix* generation, much of the natural mystery and risk of the outdoors has been surgically removed. As park officials work to make parks safer and more accessible, the outdoors often ends up feeling more like Disneyland than wilderness. Some kids end up disappointed that the parks aren't *more* Disneyesque. When middle school students sent me their reflections on nature, one boy reported visiting Utah's Rainbow Bridge National Monument, the world's largest natural bridge, which was carved out of the cliffs above modern-day Lake Powell over thousands of years. "The bridge was somewhat disappointing. It was not as perfect as in the brochure," the boy wrote. His parents enhanced the family vacation by renting Jet Skis.

Here's the hidden danger. If park and forest attendance stagnates as the visitor age rises, what happens to the future political constituency for parks and national forests? Not much, if visitor drop were the only change at hand. But that phenomenon appears to be occurring at the exact moment when development and energy interests are rapidly ratcheting up their pressure on the natural environment.

The political wind is currently in their favor. For example, the U.S. Forest Service, currently conducting an update of its fifteen-year plan for Southern California's Cleveland National Forest, is considering several radical proposals for the northern third of the forest. These include the damming of a canyon to create a 100-acre reservoir; two high voltage transmission lines, 28.5 miles and 31 miles long; and a new highway

that would open a transportation corridor between Riverside County and Orange County through the national forest.

Theodore Roosevelt created Cleveland National Forest in 1908; since then, the forest has shrunk from 2 million acres to 427,000 fragmented acres. If the proportion of people with hands-on emotional attachment to such endangered places also shrinks, how much forest and parkland will remain in, say, 2108, when our vastly expanded population will likely be desperate for a little breathing room?

### The Endangered Environmentalist

The broader issue involves the future of the stewardship ethic, in particular the shrinking genetic pool of environmentalists, conservationists, and other stewards.

In 1978, Thomas Tanner, professor of environmental studies at Iowa State University, conducted a study of environmentalists' formative influences. He probed what it was in their lives that had steered them to environmental activism. He polled staff members and chapter officers of major environmental organizations. "Far and away the most frequently cited influence was childhood experience of natural, rural, or other relatively pristine habitats," according to Tanner. For most of these people, the natural habitats were accessible for unstructured play and discovery nearly every day when they were kids. "Several studies since mine have supported my findings," he said. Studies of environmental activists in locales as diverse as Kentucky and Norway indicate that childhood experiences are significant precursors for adult activism on behalf of the environment. "But for some reason, you don't hear many environmentalists expressing much concern about the intimacy factor between kids and nature."

In other surveys of environmental leaders, according to environmental psychologist Louise Chawla, most "attributed their commitment to a combination of two sources: many hours spent outdoors in a keenly remembered wild or semi-wild place in childhood or adolescence,

and an adult who taught respect for nature." The childhoods of environmentalists and naturalists are replete with stories of their childhood inspiration, leading directly to their later activism. E. O. Wilson, the father of biophilia, addressed this in his memoir, *Naturalist*: "Most children have a bug period, and I never outgrew mine. 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."

Edmund Morris's description of the boyhood years of the presidential patron of conservation, Theodore Roosevelt, suggests a similar genesis:

the bookish "Teedie" became aware of the "enthraling pleasures" of building wigwams in the woods, gathering hickory nuts and apples, hunting frogs, haying and harvesting, and scampering barefoot down long, leafy lanes. . . . Even in these early years, his knowledge of natural history was abnormal. No doubt much of it was acquired during his winters [reading] . . . but it was supplemented, every summer, by long hours of observation of the flora and fauna around him.

. . . Teedie's interest in all "curiosities and living things" became something of a trial to his elders. Meeting Mrs. Hamilton Fish on a streetcar, he absentmindedly lifted his hat, whereupon several frogs leaped out of it, to the dismay of fellow passengers. . . . A protest by a chambermaid forced Teedie to move the Roosevelt Museum of Natural History out of his bedroom and into the back hall upstairs. "How can I do the laundry," complained the washerwoman, "with a snapping turtle tied to the legs of the sink?"

We may owe Yosemite to that turtle. Like Roosevelt, writer Wallace Stegner filled his childhood with collected critters, often with no thought to the welfare of the species; such were the times. In his essay, "Finding the Place: A Migrant Childhood," he described the prairie town in Saskatchewan that was his home in his early years. His pets or

temporary boarders included burrowing owls, magpies, and a black-footed ferret. He spent many of his young days "trapping, shooting, snaring, poisoning, or drowning out the gophers that gathered in our wheat field. . . . Nobody could have been more brainlessly and immorally destructive. And yet there was love there, too."

In some ways, environmental organizations face the same force of attrition that newspapers now encounter with the aging of their readerships. On average, American newspaper subscribers are in their early and mid-fifties, and climbing, as subscription rates fall. The Sierra Club members' average age is now pushing fifty, and climbing. In a country whose young are more culturally and ethnically diverse than ever (and nature is valued in radically different ways and degrees among some of these cultures), environmentalists look increasingly old and white. All the more reason for environmental and conservation groups to triple their efforts to reach the young—a topic to be addressed in a later chapter. The immediate challenge, however, is for such organizations to ask themselves if their policies, and cultural attitudes, are subtly adding to the separation.

Other organizations, ones that have traditionally linked children to nature, must ask the same question.

### Scouting the Future

Madhu Narayan was three months old when her parents, recent immigrants from India, took her camping for the first time. A few years later, they drove across the West, camping as they went. Narayan figures her parents didn't have a lot of money, and camping was an inexpensive way to see their nation of choice. "We moved through days of beautiful weather, and then the rains came," she says. During a lightning storm, the wind blew away the family's tent, and they slept in the car listening to the banshees of wind and rain howl and crash through the woods. Even now, at thirty, Narayan shivers as she tells this story.

She was shaped by such elemental experiences and the mystery that

rode with them. Today, as the outdoor education manager for a sprawling Girl Scouts region—covering the California counties of Imperial and San Diego—she wants to offer natural experiences to girls. But there's a problem. The traditional perception of Scouting—for girls or boys—is that nature is the star of the show, the organizing principle, the *raison d'être*; but the *raison* is shrinking.

At Scout headquarters at San Diego's Camp Balboa, an urban campground created in 1916, Narayan and Karyl T. O'Brien, associate executive director of the regional Girl Scouts Council, spread out a stack of literature to describe the rich programs they provide to more than thirty thousand girls. Impressive, but over the past three years, membership in the region has remained flat, even as the population has grown precipitously. This region's council markets itself aggressively. It offers such programs as an overnighter with the city's natural history museum, a daylong junior naturalist program, and popular summer-camp experiences. But the overwhelming majority of Girl Scout programs are unconcerned with nature. Included (along with selling cookies) are such offerings as Teaching Tolerance, Tobacco Prevention, Golf Clinic, Self-Improvement, Science Festival, EZ Defense, and Financial Literacy. Soon, Camp CEO will bring businesswomen to a natural setting to mentor girls in job interviewing, product development, and marketing.

The divide between past and future is seen best at the Girl Scout camps in mountains east of the city: one is billed as traditional, with open-air cabins and tents hidden in the trees; the newer camp looks like a little suburbia with street lights. "I flipped when I learned that girls weren't allowed to climb trees at our camps," says O'Brien. Liability is an increasing concern. "When I was a kid, you fell down, you got up, so what; you learned to deal with consequences. I broke this arm twice," says Narayan. "Today, if a parent sends a kid to you without a scratch, they better come back that way. That's the expectation. And as someone responsible for people, I have to respect that."

Scouting organizations must also respect, or endure, outrageous increases in the cost of liability insurance. This is not only an American

phenomenon; in 2002, Australia's Scouting organizations Girl Guides and Scouts Australia reported increases of as much as 500 percent in a single year, leading the executive director of Scouts Australia to warn that Scouting could be "unviable" if insurance premiums continued to rise.

Considering the mounting social and legal pressures, Scouting organizations deserve praise for maintaining any link to nature. Narayan pointed out that most of the two thousand girls who attend summer camps are touched by nature, even if indirectly. "But we now feel compelled to put tech labs in camps or computers in a nature center, because that's what people are used to," says O'Brien. Scouting is responding to the same pressures experienced by public schools: as family time and free time have diminished, Americans expect these institutions to do more of society's heavy lifting—more of its social, moral, and political juggling. Ask any Boy Scout how difficult that act can be.

Justly or not, the public image of the Boy Scouts of America has shifted from that of clean-cut boys tying knots and pitching tents to one of adult leaders who ban gays and expel atheists. Like the Girl Scouts, the Boy Scouts struggle to be up-to-date—and marketable. At the new National Scouting Museum in Irving, Texas, displays use virtual-reality technology to allow visitors to climb a mountain, kayak down a river, and conduct simulated rescues on mountain bikes. People for the Ethical Treatment of Animals (PETA) activists launched a campaign to convince the Boy Scouts to drop their fishing merit badge. In 2001, the *Dallas Morning News* reported that some Boy Scout councils across the country were selling off wilderness camps to pay their bills.

For the Boy Scouts and the Girl Scouts, it's not easy being green.

Today's parents push such organizations toward ever safer, more technological activities. Scouting struggles to remain relevant, to be a one-stop shop, to offer something for just about everyone. That may be a good marketing policy. Or not. (An astute book editor once told me: "A book written for everyone is a book for no one.") As the scope of Scouting has widened, the focus on nature has narrowed. But a slim

minority of parents and Scout leaders is beginning to argue for a back-to-nature movement. "They're usually the older adults," says O'Brien, "the ones who can remember a different time." Could this set of adults offer a targeted marketing opportunity to future capital campaigns? Rather than accept nature's slide, or suggest that non-nature programs be dropped to make way for the outdoors, why not ask these adults to build a whole new nature wing to Scouting? Interesting possibility, said O'Brien. In fact, it makes sense not only as a marketing tool—define your niche and claim it—but also as a mission.

Scout leaders emphasize that Scouting is an educational program that teaches young people about building character, faith traditions, mentoring, serving others, healthy living, and lifelong learning. Boy Scouts founder Lord Baden-Powell surely sensed that exposure to nature nurtures children's character and health. The best way to advance those educational goals (and, in a marketing sense, revive Scouting) is a return to the core orientation to nature—an approach that many parents and Scout leaders support.

Narayan is one of them. "In my first counseling job, with another organization, I took children with AIDS to the mountains who had never been out of their urban neighborhoods," she says. "One night, a nine-year-old woke me up. She had to go to the bathroom. We stepped outside the tent and she looked up. She gasped and grabbed my leg. She had never seen the stars before. "That night, I saw the power of nature on a child. She was a changed person. From that moment on, she saw everything, the camouflaged lizard that everyone else skipped by. She used her senses. She was *awake*."

### **An Attachment Theory**

The protection of nature depends on more than the organizational strength of stewardship organizations; it also depends on the quality of the relationship between the young and nature—on how, or if, the young attach to nature.

I often wonder: What am I attached to here in Southern California, other than good friends, good work, and the weather? Certainly what attaches me is not the man-made environment, or most of it, a landscape sliced and diced beyond recognition. I do love the parks and older neighborhoods of my city, particularly on those mornings when the fog softens their edges. And I love the beaches. The Pacific Ocean, resisting change, remains the last wilderness for surfing Southern Californians. It is dependable, always there, but at the same time offering mystery and danger—and some of its creatures are larger than human size or ken. I do not surf, but I understand the attachment surfers feel toward the ocean, and once this attachment is made, it is never lost.

When I drive east into the mountains, through Mesa Grande and Santa Ysabel and Julian, I know that these places have entered my heart. They have a mystery distinct from anywhere on Earth. But then always, always, a voice in me says: don't get too attached. Because of urban/suburban sprawl, I have the sense that the fields and streams and mountains that I love here could be gone the next time I drive to the country, and so I cannot entirely commit to them. I wonder about children who either are never attached to nature, or learn to mistrust that attachment early. Do they exhibit similar characteristics or responses?

Surely children need a quality attachment to land not only for their own health, but in order to feel compelled to protect nature as adults—not only as common-sense conservationists, but as citizens and as voters.

For twenty-five years, psychologist Martha Farrell Erickson and her colleagues have used what they call "attachment theory," an ecological model of child development, as the framework for their ongoing longitudinal study of parent-child interaction. They apply those ideas to preventive intervention with parents in high-risk circumstances. The family's health, related to the health of the surrounding community, has become a growing concern to Erickson.

"The way we usually talk about parent-child attachment is that we rarely see the absence of attachment, even when parents are unreliable,

unresponsive, or erratically available. Rather, we see differences in the *quality* of attachment. For example, a child with a parent who is chronically unresponsive (let's say a depressed parent, for example) will protect himself from the pain of rejection by detaching, acting disinterested in the parent—developing what we call an anxious-avoidant attachment.”

I suggested to her that some of the same responses or symptoms associated with attachment deficit occur with a poor sense of attachment to land. In my own experience, the rate of development in my part of the country is so fast that attachment to place is difficult; to many of us who came here decades ago (in my case from Kansas), Southern California captures the body, but not the heart. In the world of child development, attachment theory posits that the creation of a deep bond between child and parent is a complex psychological, biological, and spiritual process, and that without this attachment a child is lost, vulnerable to all manner of later pathologies. I believe that a similar process can bind adults to a place and give them a sense of belonging and meaning. Without a deep attachment to place, an adult can also feel lost.

“It’s an intriguing idea to approach a child’s relationship with nature from the perspective of attachment theory,” Erickson said. She continued:

Children’s experience with the natural world seems to be overlooked to a large extent in research on child development, but it would be interesting to examine children’s early experiences with nature and follow how those experiences influence the child’s long-term comfort with and respect for the natural world—comfort and respect being concepts that are central to the study of parent-child attachment. Given the power of nature to calm and soothe us in our hurried lives, it also would be interesting to study how a family’s connection to nature influences the general quality of family relationships. Speaking from personal experience, my own family’s relationships have been nourished over the years through shared experiences in nature—from

sharing our toddler’s wonder upon turning over a rock and discovering a magnificent bug the size of a mouse, to paddling our old canoe down a nearby creek during the children’s school years, to hiking the mountains.

ATTACHMENT TO LAND is not only good for the child, but good for the land as well. As naturalist Robert Finch asserts: “There is a point . . . in our relationship with a place, when, in spite of ourselves, we realize we do not care so much anymore, when we begin to be convinced, against our very wills, that our neighborhood, our town, or the land as a whole is already lost.” At this point, he argues, the local landscape is no longer perceived as “a living, breathing, beautiful counterpart to human existence, but something that has suffered irreversible brain death. It may still be kept technically alive—with sewage treatment plants, ‘compensatory’ wetlands, shellfish reseeding programs, lime treatments for acidified ponds, herbicides for . . . ponds, beach nourishment programs, fenced-off bird sanctuaries, and designated ‘green areas’—but it no longer moves, or if it does, it is not with a will of its own.”

If a geographic place rapidly changes in a way that demeans its natural integrity, then children’s early attachment to land is at risk. If children do not attach to the land, they will not reap the psychological and spiritual benefits they can glean from nature, nor will they feel a long-term commitment to the environment, to the place. This lack of attachment will exacerbate the very conditions that created the sense of disengagement in the first place—fueling a tragic spiral, in which our children and the natural world are increasingly detached.

I am not suggesting the situation is hopeless. Far from it. Conservation and environmental groups and, in some cases, the traditional Scouting organizations are beginning to awaken to the threat to nature posed by nature-deficit disorder. A few of these organizations, as we will see, are helping to lead the way toward a nature-child reunion. They

recognize that while knowledge about nature is vital, passion is the long-distance fuel for the struggle to save what is left of our natural heritage and—through an emerging green urbanism—to reconstitute lost land and water. Passion does not arrive on videotape or on a CD; passion is personal. Passion is lifted from the earth itself by the muddy hands of the young; it travels along grass-stained sleeves to the heart. If we are going to save environmentalism and the environment, we must also save an endangered indicator species: the child in nature.

PART IV

THE NATURE-CHILD REUNION

*I am well again, I came to life  
in the cool winds and crystal waters of the mountains. . . .*

—JOHN MUIR

*Each new year is a surprise to us.  
We find that we had virtually forgotten the note of each bird,  
and when we hear it again, it is remembered like a dream,  
reminding us of a previous state of existence . . .*

*The voice of nature is always encouraging.*

—HENRY DAVID THOREAU

### **James and the Giant Turnip**

An increasing number of parents and a few good schools are realizing the importance and the magic of providing hands-on, intimate contact between children and nature as a larger part of a child's education. Some teachers come to interdisciplinary place-based education on their own, with no institutional support besides a sympathetic principal. Most current progress in education, in fact, comes from iconoclastic individuals, including the principals, teachers, parents, and community volunteers who chart their own courses. Committed individuals and service organizations can accomplish a great deal.

One creative elementary school teacher, Jackie Grobarek, describes what she called her "butterfly theory" of teaching, based loosely on meteorologist Edward Lorenz's theory that very small inputs at the beginning of a system's evolution are amplified through feedback and have major consequences throughout the system. (One interpreter popularized Lorenz's theory by calling it the "butterfly effect," wondering if the flap of a butterfly wing in Brazil could set off a tornado in Texas.) Grobarek describes the kind of hands-on experience with a payoff not always immediately visible:

Schools are nonlinear systems and small inputs can lead to dramatically large consequences. Our students this summer have raised earthworms, plants, and caterpillars and released the emerged butterflies. Because the students' "babies" needed food, they also learned that the worms would eat garbage, the plants would thrive on worm castings, and that the butterflies required specific plants to eat, and other plants on which to lay their eggs. Many of these things were identified on our school grounds and in our canyon. They realized that our canyon, which had become an unattractive nuisance and trash pit in the neighborhood, was actually a wonderful habitat. It is filled with wild fennel, which is the host as well as food plant for the giant swallowtail butterfly. We are now working as class teams, and this week alone have hauled almost four Dumpsters of trash out of the area. Will this

improve their reading and math scores? Maybe, but I feel that this experience will change them in ways that tests may not be able to measure.

Sometimes, the catalyst is a principal with vision. At Torrey Pines Elementary School, near where I live, a committed young principal and his students adopted a nearby canyon. "We get the classes down here touching, tasting, smelling, tracking. It's hard to get twenty-six kids to be quiet, but we do it," said Dennis Doyle, the principal. He believes that encouraging more hands-on experience with nature is a better way to introduce children to science than relying just on textbooks. In fact, he explained, during the nineteenth century, nature study, as it was called, dominated elementary school science teaching. Now that nature study has been largely shoved aside by the technological advances of the twentieth century, an increasing number of educators have come to believe that technically oriented, textbook-based science education is failing.

At Torrey Pines Elementary, sixth-grade classes were scoring poorly on the hands-on portion of a science test given nationwide by the National Teachers Association. So Doyle and his staff decided on a radical tactic. They would restore the canyon behind the school to its natural state to create an outdoor classroom and nature trail. The idea was to help kids experience the kind of intimacy with nature that many of their parents enjoyed, and to improve science education—to make it immediate and personal.

On their forays into the canyon, work teams of kids, teachers, and parents ripped out the plants not native to the area, including pampas grass and Hottentot fig (commonly known as ice plant). Spanish sailors probably brought Hottentot fig to California. It is an edible and hardy plant rich in vitamin C, useful in the prevention of scurvy, explained a docent from nearby Torrey Pines State Park, who had teamed up with the school. Many people believe the Hottentot fig, a ground cover, prevents soil erosion, but, because of weighty water content in finger-like

leaves, the plant can pull down a steep embankment. In this canyon, for this fig, the jig was up. The students returned the canyon habitat to native plants, including Torrey pines, yucca, cacti, and chaparral. The schoolchildren grew seedlings in their classes for later replanting.

One weekend, thirty parents worked in the canyon alongside the kids. Half of the parents were from wealthy nearby neighborhoods, the other half from the less affluent neighborhoods from which some of the students were bused. They hacked away at the pampas grass with machetes, all pushing and pulling together. "That kind of experience binds people together more than any formal integration program," Doyle said.

Doyle tries to keep the kids' canyon forays as relaxed as possible, and his adult view of nature minimized. As we walked through the canyon behind the school one day, he asked the kids questions, but didn't give the answers.

"Look at these twigs," said a boy named Darren. "It looks like one twig is dead, but one is alive."

"Why do you say that?" asked Doyle.

Darren launched into an elaborate and erroneous theory.

"That's an interesting theory."

Darren trailed after Doyle, excitedly checking other twigs. In this special classroom, imagination was more important than technical precision.

IN 1999, I MET a remarkable woman named Joan Stoliar. She lived in Greenwich Village with her husband, appeared to be in her sixties, had battled two types of cancer, and often traveled the streets of New York, with her high heels and fish-shaped earrings, astride her Lambretta motor scooter. A few months before cancer finally claimed her life, I accompanied her on a visit to a classroom at Intermediate School 318 in Brooklyn, where a cluster of seventh-graders attended four hundred trout fingerlings. The students hovered over the aquarium, set up to replicate a piece of trout stream.

For decades, Stoliar was one of the grande dames of the tweedy, traditional New York fly-fishing culture. She was probably the first woman to join the old, distinguished Theodore Gordon Flyfishers club. She talked the club into sponsoring New York State's trout-in-the-classroom program—with the help of Trout Unlimited, the National Fish and Wildlife Foundation, Hudson River Foundation, and Catskill Watershed Corporation.

Such programs—which began in California—have been springing up around the nation over the past decade. Their goal: to enliven biology and to connect kids to nature. The New York effort matches city kids with country kids, in what Stoliar called “a social experiment in creating sensitivity at both ends of the water tunnel.” Several hundred students in ten inner-city New York schools and eight upstate schools work together to raise the trout and replant streams.

“This program gives city kids an appreciation for nature, but also teaches them about the source of their drinking water. They become watershed children,” she said. In October, each school received several hundred fertilized brown trout eggs from the state's Department of Environmental Conservation; the hatchery director even gave the kids his home number in case anything went wrong. Students placed the eggs in tanks designed to re-create the habitat of a trout stream.

In Brooklyn's eight-foot piece of stream, a pump pushed water over rounded rocks and aquatic plants, and routed it through a chiller to keep it at a steady forty-nine degrees. Above the water, in a canopy of screening, insects hatched, rose, and fell. A “trout-cam” sent magnified images of the fish to an adjacent TV. The students cared for the trout and checked water temperature and pH level and other factors that can kill the eggs or fish. Stoliar called what the kids were learning “instant parenting.”

In January of that year, the kids reported their progress on their class Web page: “We saw a caddis fly larvae eating a dead trout [and] we found a large fry with a trout tail sticking out of its mouth—it proba-

bly ate a smaller fish. Lot of dining action! About 42 fish have died in 1999 but we still have over 400 fish.” As the trout grew, the rural and urban kids traded letters and e-mail about their progress. “We hope they remain friends for years, and maybe even fish in the same streams together someday,” Stoliar said.

Each year, if the delicate trout survive until spring, the kids are bused north to a stream in the Catskills, where they meet the rural students, and together they release the fish into the wild. An eighth-grader named LaToya told me, “Up there you don't smell anything like toxic waste. I never saw a reservoir before. It was so beautiful, so clean.”

ONE MORNING I visited the private Children's School in La Jolla, where teachers, parents, and kids were hard at work on a garden, following the guidelines of a famous expert on gardening who would visit shortly. As the students waited for Mel Bartholomew's arrival, I asked the fourth-, fifth- and sixth-graders in teacher Tina Kafka's class what they thought of gardening.

“I think the lettuce you buy at the store tastes better than the lettuce you get from a garden,” said James, a skeptical eleven-year-old. “At the store they wash it real well. They've got those spray nozzles going all the time.” James is new to gardening; the school's is his first. Matt, ten, offered his own critique of gardening. “The problem I have with gardening is it's not improving, not like technology, not like TVs and computers. All these old wood gardening tools haven't changed in decades.” Speaking like a true child of the twenty-first century, he added, “Tools should improve.” James and Matt are typical of many youngsters today, particularly the ones who live in Southern California housing tracts with their square-foot backyards. It's tough for a garden to get a kid's attention, unless it's on CD-ROM.

In an effort to change that, Kafka and her co-teacher, Chip Edwards, helped their students create a garden based on Bartholomew's approach. Bartholomew, now a retired civil engineer and efficiency expert,

wrote *Square Foot Gardening* several decades ago. The best-selling book was the basis for a long-running Discovery Channel series on cable TV. People who use his system eschew traditional rows, which made sense for plowing, in favor of square-foot blocks, which lend themselves to more personal care. Gardeners can easily reach the plants in each cluster for planting or weeding. This approach also seems to make more sense for kids, whose arms and reach are shorter. It reduces gardening to a more manageable scale and increases the chance for success. "I ate some lettuce from our school garden," said Brandon, ten. "I washed it and put some salad dressing on it, and it tasted better than the lettuce you get from the store."

A classmate, Ben, eleven, added, "I like the radishes out of our garden a lot better. The ones from the store are too spicy." And Ariana, ten, reported how a gopher attacked a turnip she grew in the school garden. "He hollowed it out!"

I turned to James. "Would any turnip that touched a gopher's lips touch yours?" "No!" he answered in horror.

Just then, Bartholomew arrived. Bartholomew, who lives in Old Field, New York, is a tall, lanky man with a mustache, thinning hair, and the kindest of eyes; he was accompanied by his sister, Althea Mott, of Huntington Beach. The two of them founded the Square Foot Gardening Foundation, which promotes the therapeutic value of gardening. They visit libraries, nursing homes, churches, and schools.

"Our goal is to have gardening included in every school curriculum," he explained. "We're writing programs for all grade levels and all seasons. We want kids to communicate with other gardening kids around the country, first by letter, but eventually through the Internet. We also hope they'll take gardening home and involve their families." Wearing jeans and ready to garden, Bartholomew headed out back to the class garden. The kids (including James and Matt, who now seemed particularly eager) moved confidently to their tasks, to weeding and watering. Bartholomew hovered over them, smiling, asking them gently about their crops.

Kafka, who stood to one side, said, "For us, the garden has been much more than simply planting vegetables and taking care of them. It's been a bonding experience. When we go to the garden as a class at the end of the day, there is a strong feeling of shared joy and peace no matter how hard the day has been." She described how, one drizzly Monday morning, the students arrived to find that skateboarders had vandalized their garden. "We decided to focus on renewing our garden rather than on whodunit," said Kafka. After the vandalism, the students named their garden "Eve's Garden," after one of their fellow students, who had left the school and whom they missed.

Bartholomew looked proudly at the students working together. "It's so important for kids to understand where their food comes from," he said. Suddenly James announced, "My turnip is ready. It's a *big* one."

"James and the Giant Turnip," someone said.

"Drum roll!"

James grunted and pulled on the turnip until it came loose from the soil. He held it up proudly for all to see, and brushed the dirt from it. Then he held the turnip close to his ear. He knocked on it to see if it was hollow. And he grinned.

### **Ecoschools**

Ideally, school nature programs will go beyond curriculum or field trips: they will involve the initial, physical design of a new school; or the retrofitting of an old school with playscapes that incorporate nature into the central design principle; or, as described earlier, the use of nature preserves by environment-based schools.

The schoolyard habitat movement began in the 1970s, stimulated by environmental education programs, such as Project Learning Tree and Project WILD, and a successful national program in Great Britain called Learning through Landscapes. At least one-third of Britain's thirty thousand schoolyards have been improved by this program, inspiring a similar program in Canada called Learning Grounds, and a

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*For Jason and Matthew*

*The first child in the woods, the first child in the woods,  
And that child became part of him for the day or a certain part of the day,  
Or for many years or wandering years of years.  
The early blue became part of this child,  
And green and white and red morning glories, and white and red daisies,  
and the song of the thrasher bird,  
And the Three-musketeer lands, and the sun's pink face later,  
and the water's pool and the croak's call.*

—Walt Whitman

*I like to sleep in the better world that's where all the  
the best things are.*

*A CHILDHOOD IN SAN DIEGO*