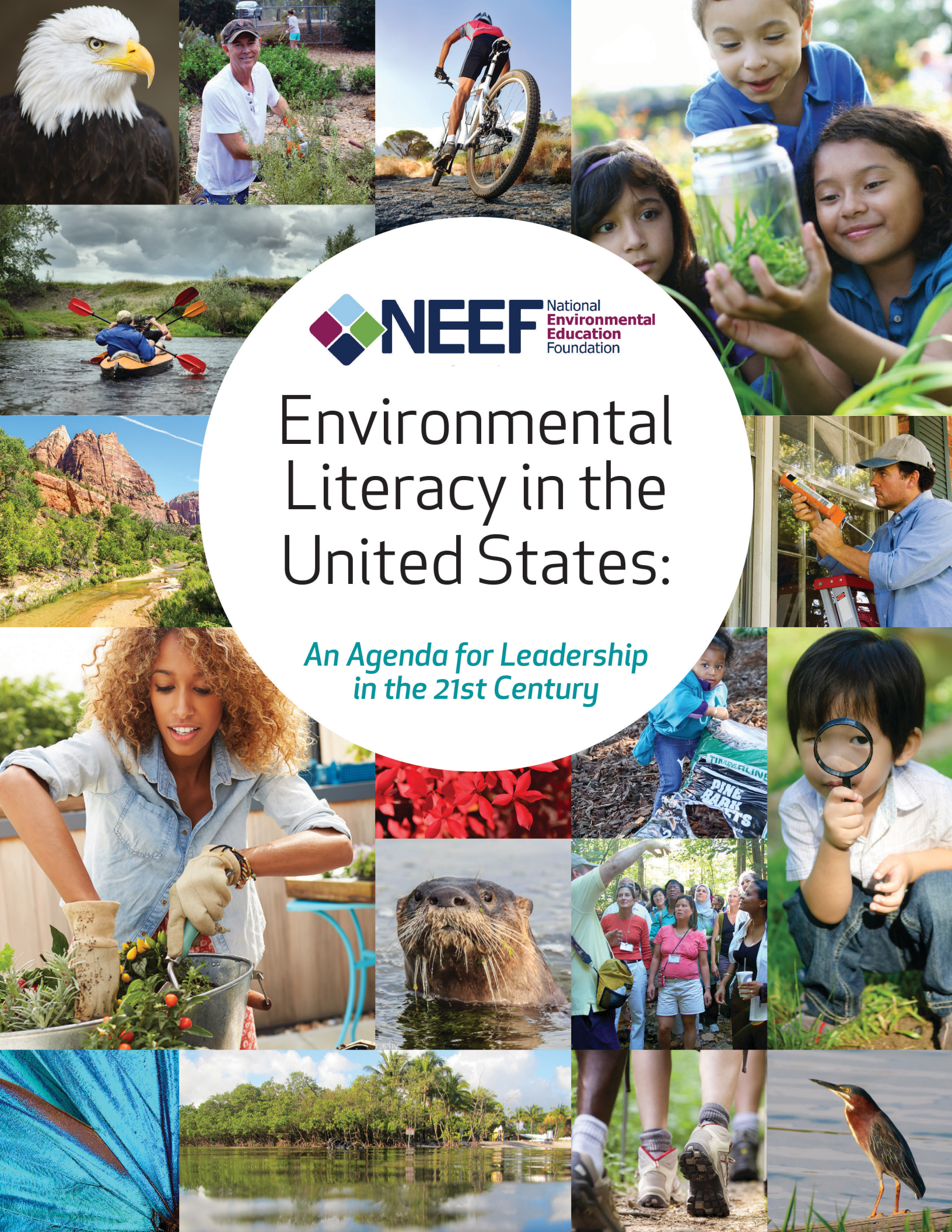
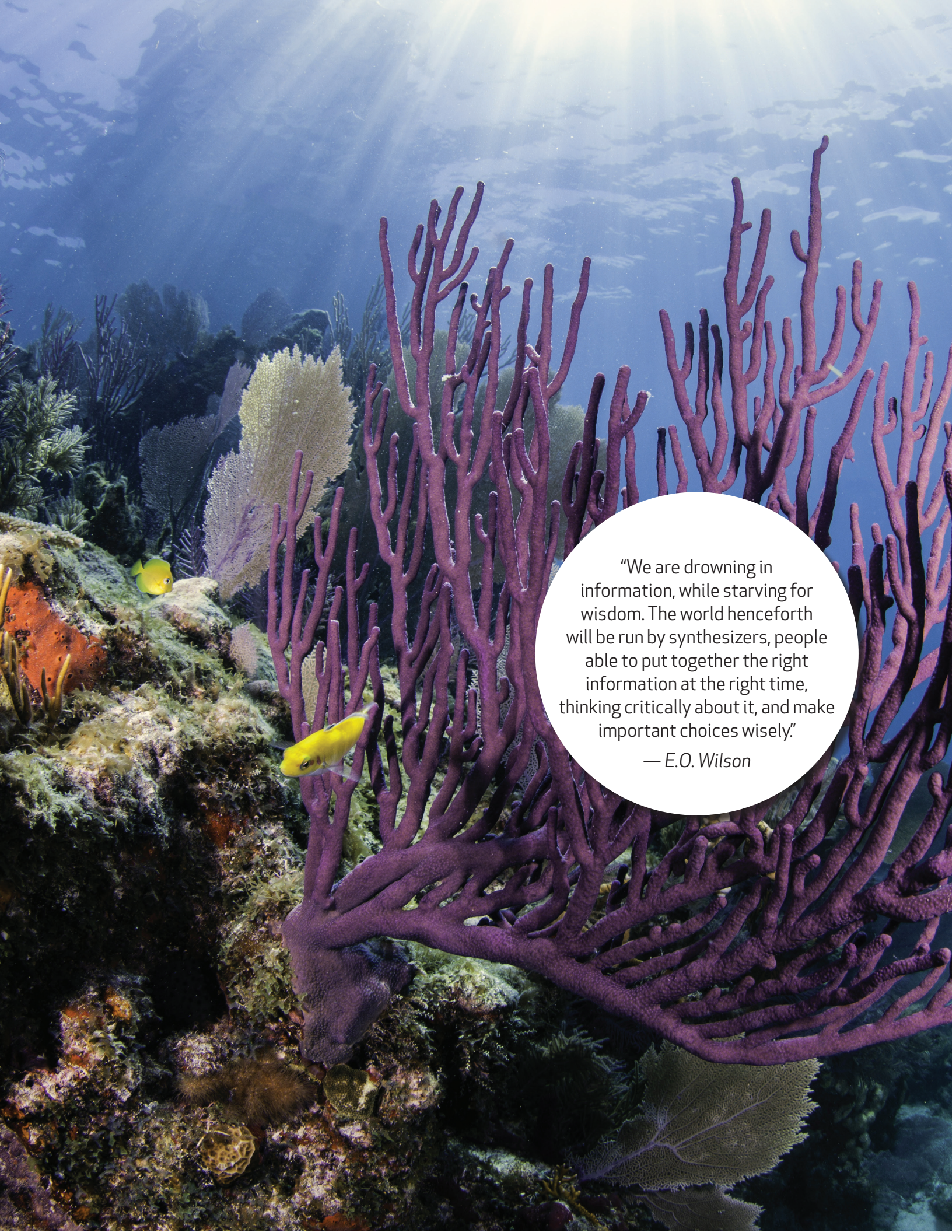


NEEF National Environmental Education Foundation

Environmental Literacy in the United States:

An Agenda for Leadership in the 21st Century



"We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers, people able to put together the right information at the right time, thinking critically about it, and make important choices wisely."

— E.O. Wilson

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Environmental Literacy in the United States: An agenda for Leadership in the 21st Century started at NEEF under the careful guidance of Deborah Sliter (formerly of NEEF) and the stewardship of Heidi McAllister at the USDA Forest Service. Both deserve much credit and thanks for getting this project off the ground.

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A special thanks to Jim Stewart at A Sense of Wonder Photography (https://www.facebook.com/ASenseOfWonderPhotography?ref=bookmarks) for the use of several beautiful images.

Lastly, a special thanks to all those Environmental Education researchers and practitioners who, with great passion, move this field and Americans forward towards an understanding of the environment and our role in it.

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PREFACE LETTER

Dear Reader:

It is a pleasure to present this report to you as a national compendium of environmental education accomplishments, needs and potential. In 2012, the USDA Forest Service Office of Conservation Education recognized a need for an examination of environmental education and an overview of the efforts of the thousands of people working in this field delivering environmental education to children and adults throughout the country every day.

The National Environmental Education Foundation (NEEF) has a long history of research in the environmental education field and produced such a report in 2005. As a leader in environmental education nationwide, the USDA Forest Service invited NEEF to work together to create a new report—one that offers an overview of what environmental education can do, and recommendations for strengthening the field so it can meet its full potential.

This report comes at a crucial time. Our country is faced with environmental challenges affecting everyday life: our families, our jobs, our communities and our health. Solutions often require a sophisticated understanding of complex systems and the interdependencies of people and the natural environment. Environmental education is key to giving people the understanding and skills needed to best address many of our most complex 21st century problems. In this report you will see examples of how people of all ages can learn about their relationship to our environment, learn how to be environmentally responsible and become inspired and motivated to act on this knowledge. The report also demonstrates all that environmental education offers for developing the next generation of environmental stewards and public land managers, reaching out to new and diverse audiences in urban America and for making real strides in conserving resources while ensuring our families and our planet are healthier.

This report explores how environmental education links to major trends and innovations in technology, employee engagement, nature appreciation, K-12 teaching and building sustainable communities. This report is intended for environmental education practitioners, funders and policy makers and we hope it will lead to greater support for environmental education and all it offers for a more sustainable future. None of this would be possible without the hard work of the practitioners and believers in environmental education.

Enjoy this report and keep us abreast of the work you do so we can make regular updates in the future.

Sincerely,

Diane W. Wood
President
National Environmental Education Foundation

Tom Tidwell
Chief
USDA Forest Service

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INTRODUCTION

Environmental educators have an unprecedented opportunity to create a more environmentally literate citizenry — a citizenry equipped with the knowledge, skills, and motivation to tackle the environmental, social, and economic challenges that we face today and in the future.

In 2005, the National Environmental Education Foundation (then called NEETF) published "Environmental Literacy in America: What Ten Years of NEETF/Roper Research and Related Studies Say about Environmental Literacy in the United States." That report highlighted the status of environmental literacy, based on data from a decade of Roper Surveys that assessed what Americans knew and felt about environmental issues and environmental education. The report found that "at a time when Americans are confronted with increasingly challenging choices, we learn that our citizenry is by and large both uninformed and misinformed." Although Americans cared about the environment and supported environmental education, their knowledge of environmental issues lacked substance and depth.

The world has changed dramatically since the last report was published, especially in key areas that shape how people think about the environment and what it means to be environmentally literate. This report explores some of these extraordinary changes in society and the environment, and summarizes recent polling data that can help the broad community of environmental educators understand Americans' current dispositions and actions regarding the environment.

Environmental educators have an unprecedented opportunity today to build on the recommendations from the past report and put renewed energy and support into creating a more environmentally literate citizenry — a citizenry equipped with the knowledge, skills, and motivation to tackle the environmental, social, and economic challenges of today and tomorrow. There are many bright spots across the country, as well as a growing understanding of the power of education to create new thinking, a renewed interest in civic engagement, and a commitment to positive change and a greener economy. The challenge for environmental educators of every description, including those working in non-traditional educational settings like corporate or government human resource departments, is to expand the impact of those bright spots by making them even more visible and connected. Too much of the progress in environmental education goes unrecognized because it takes place outside of the classroom. Environmental educators need to be open to where education happens and be willing to collaborate with many practitioners. As they step out of their comfort zone, environmental educators can help all segments of society, from school boards to board rooms to policy forums and everything in between, create a comprehensive and well-funded environmental education strategy for our country.

The need for change is already pushing diverse interests to recognize the importance and interplay of a healthy environment, social equity, and economic prosperity for all. The momentum is clear in the explosion of the Green Schools movement, the push for training in science, technology, engineering, and math (STEM) that uses the environment as an engaging platform, the "No Child Left Inside" revolution to get children away from their laptops and cell phones and into nature, and the important role environmental education plays in addressing key conservation and social issues. Environmental educators need to harness these positive directions and propel them forward at a more ambitious pace and with a boldness that gets society to the equitable, ethical, and sustainable place that allows humans and nature to thrive.

The following chapters focus on the critical role that environmental education can play in transforming how people learn, think, and take responsible actions to create a more sustainable future for all. Education increasingly focuses on the collective action of communities of all kinds, but educators also recognize that individual actions matter as well, and a key component of lasting impact will be helping individuals understand and experience how their efforts, even seemingly small ones, can add up to transformative change. This report also showcases many of the bright spots across the country and recommends strategies that will help build on success and achieve a level of environmental literacy that will lead to a healthier environment and more vibrant communities.

chapter

1

Environmental Literacy and Change

CHAPTER 1

Environmental Literacy and Change

The scale and pace of social and environmental change demands systems to provide citizens — young and old — with the information, skills, and tools they need to navigate a far more uncertain world than anyone predicted even a decade ago. Everyone must understand and experience that they can be part of the solution. This is the goal of environmental literacy.

Concern for the environment and healthier communities has over the past decade translated into significant progress toward protecting the resources we all depend on —from technological progress (more efficient light bulbs and solar panels) to policy shifts (increase in fuel efficiency standards for vehicles and reductions in mercury). Environmental education has also grown dramatically throughout society and now takes place in doctor's offices and boardrooms, in church basements and town hall meetings, and in schools, community colleges, universities, and vocational institutions. Environmental education also takes place when communities come together to tend a garden, when friends share resources online, when employers and employees work together to shrink their businesses' footprints, and when adults introduce children and grandchildren to special outdoor places.

Despite these significant advances, the planet's resources are under increasing pressures, from climate change and loss of biodiversity to shortages of clean water, wetlands, mangroves, fisheries, minerals, forests, and topsoil. According to the Economist, by 2030, the world population of 7 billion "will demand twice as many resources as the planet can supply."[1]

All of these challenges are taking place against the backdrop of massive and rapid societal change, from technology shifts to changing demographics. The scale and pace of change demands systems to provide citizens — young and old — with the information, skills, and tools they need to navigate a far more uncertain world than anyone predicted even a decade ago. Everyone must understand and experience that they can be part of the solution. This is the goal of environmental literacy.

1 A., J. (2012). *A Top Ten for Business Leaders*. The Economist. http://www.economist.com/blogs/theworldin2013/2012/11/global-trends-2013

What is environmental literacy?

According to Webster, literacy means: the ability to read and write; and the condition or quality of being knowledgeable in a particular subject or field, such as cultural literacy or biblical literacy. The definition leads many people to equate environmental literacy with "knowledge" and an environmentally literate person as someone who understands environmental issues.

Although knowledge and understanding are important components of environmental literacy, they are not the whole picture. Research has shown that there is often a disconnect between what people know and what they do.[2] In reality, other factors — how people feel, their environmental experiences, social norms, what their priorities are, their skills, their self-identity, and other factors — come into play when people decide to do something or not.

Terms like environmental literacy or environmental education are always being refined and reexamined by experts in the field, but this report defines an environmentally literate person as someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life.[3]

Building Environmental Literacy through Environmental Education

Environmental educators have played a key role in shaping what Americans know, think, feel, and do in relation to the environment. Whether it comes in the form of employee engagement, community service projects, health tips from your doctor to get outside, school curricula, or visits to nature centers and zoos environmental education equips people to play an important part in building a more sustainable future.

DEFINING ENVIRONMENTAL EDUCATION

Our focus on environmental literacy can be traced back to one of the first definitions of the field. The goal of environmental education is to develop a world population that is "aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones."

--UNESCO-UNEP, 1976

Environmental education is built on best practices in education and a core set of principles and guidelines. The following list of best practices was adapted from NAAEE's National Project for Excellence in Environmental Education, a series that has helped define best practice in the field. (For more about guidelines in the field, see the box on page 102):[4]

A Focus on Sustainability: Environmental education explores pathways to sustainability — meeting the needs of the present without compromising our ability to meet the needs of the future. In the process of understanding what sustainability means, education helps people examine the relationships between ecological integrity, economic prosperity, and social equity.[5]

2 Finger, M. (1994). *From knowledge to action? Exploring the relationships between environmental experiences, learning, and behavior*. Journal of social issues, 50(3):141-160.

3 North American Association for Environmental Education. (2011). *Developing a Framework for Assessing Environmental Literacy*. North American Association for Environmental Education. http://www.naaee.net/sites/default/files/framework/DevFramewkAssessEnvLitOnlineEd.pdf.

4 North American Association for Environmental Education. (2010). *Excellence in environmental education: Guidelines for learning (K-12)*. North American Association for Environmental Education. http://resources.spaces3.com/89c197bf-e630-42b0-ad9a-91f0bc55c72d.pdf.

5 President's Council on Sustainable Development. (1996). Sustainable America: A New Consensus for the Prosperity, Opportunity and a Healthy Environment for the Future. President's Council on Sustainable Development. http://clinton2.nara.gov/PCSD/Publications/TF_Reports/amer-top.html

Interdependence and Systems Thinking: Humans are a part of the natural order, and our societies, political systems, economies, religions, cultures, and technologies impact the environment. Environmental education challenges us to recognize our dependence on the natural world, and to think in terms of how each issue or action affects larger systems.

A Sense of Place: Environmental education encourages learners to explore, understand, and forge connections with their immediate surroundings. The sensitivity, knowledge, and skills needed for this connection provide a base for moving out into larger systems, broader issues, and an expanding understanding of causes, connections, and consequences.

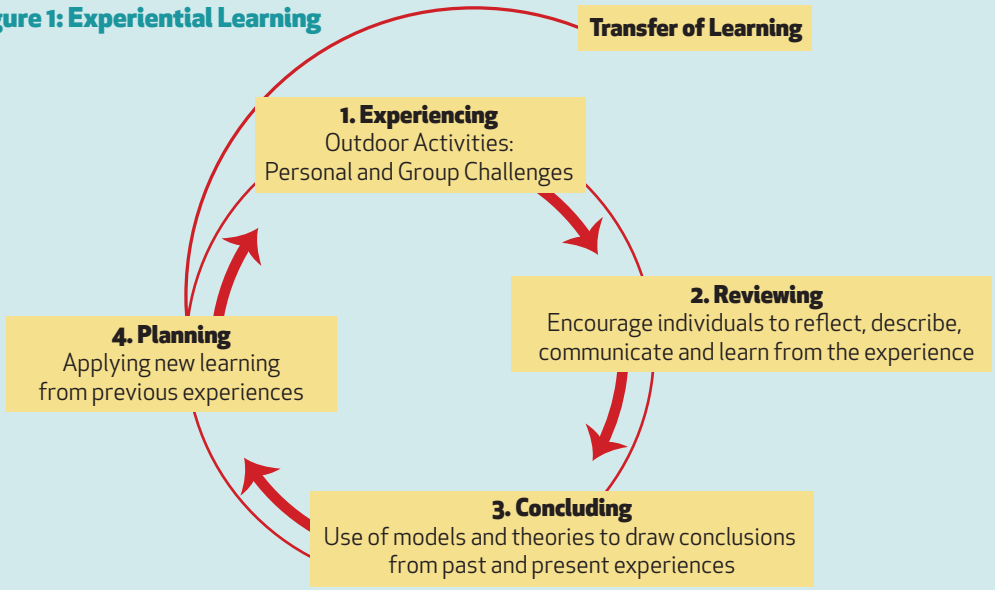
Integration and Infusion: Environmental education offers opportunities for integration among traditional disciplines, drawing from wide range of fields of study, and providing a deeper understanding of the technological, political, and social options and strategies for managing the relationship between society and the environment.

Lifelong Learning: Environmental education focuses on lifelong learning that takes place in all forums—from classrooms to parks to zoos and aquariums to businesses. Environmental education also supports developing 21st century skills, including critical thinking, creative thinking, collaboration, and communication as well as information, media, and technology skills.

Roots in the Real World: Environmental education helps learners develop knowledge and skills through direct experience with the environment, environmental issues, and society. Investigation, analysis, and problem solving are essential activities and are most effective when relevant to the real world.

Experiential Learning: Environmental education programs guide learners of all ages through the experiential learning cycle, from a concrete experience (such as visiting a degraded area, planting a garden, or calculating their carbon footprint), through a process of reflection and critical thinking in which they build knowledge and reflect on their attitudes and values, and then apply what they're learning in new situations, and ultimately in their own lives (Figure 1).[6]

Figure 1: Experiential Learning



6 Exeter, D. J. (2001). *Learning in the Outdoors*. Outward Bound Trust.

SOLAR YOUTH: LITERACY IN ACTION

Many neighborhoods in New Haven, Connecticut, have less than their share of good jobs and economic opportunity, and more than their share of environmental challenges. It can be a tough place to grow up. Solar Youth aims to give kids in these neighborhoods skills for taking on environmental challenges where they live, and they are skills that young people can use to help solve all sorts of problems in their communities as they grow up.

Solar Youth educators take kids out to explore their communities. Together, they visit natural areas that many residents never explore. They also find out about environmental problems. Then educators help the kids develop solutions. Students have raised money for recycling programs, planted gardens, built bridges to increase access to natural areas, and educated their communities. Programs like Solar Youth build environmental literacy by helping students learn more about their communities, motivating them to take responsibility for finding solutions, developing skills for taking action, and following through on their plans.

Measuring Environmental Literacy

Environmental literacy involves more than just knowledge about the environment. So measuring people's environmental literacy requires more than simply asking them what they know about the environment. It also requires assessing the skills they have for taking action, their emotional dispositions toward the environment, and whether or not they engage in responsible environmental behaviors.

The term "literacy" itself can be fraught. Some communities see it as a means of exclusion, a neat dividing line that reinforces the idea that there is one proper way to be. As a result, measuring environmental literacy is complex. Even when it is measured, there is no threshold, no "passing score" that indicates that someone has become environmentally literate. It is a continuum; the more environmentally literate a person is, the more equipped he or she is to deal effectively with environmental issues. Environmental educators must walk a fine line along that continuum, conveying skills, knowledge, and understanding without reinforcing exclusion.

The components of environmental literacy are often studied separately. Educators, evaluators, or researchers typically evaluate the effect of various programs on participants' knowledge, values, behaviors, or other indicators. This research suggests that environmental education programs can help people develop one or more of these essential components of literacy. Some education programs incorporate all the aspects of environmental literacy, and we know that they can work. The National Environmental Literacy Project, for example, is one of the longer term studies focused on environmental literacy in formal settings. Among the findings of the second phase of the project (2009 – 2011):

- General environmental literacy scores were significantly higher among eighth-grade students in ongoing environmental education programs than among their grade-level counterparts in the random sample.

- Sixth-grade students in ongoing education programs scored significantly higher than their grade-level counterparts on the specific environmental literacy variables of ecological knowledge, verbal commitment, environmental sensitivity, environmental feelings, and environmental behavior.[7]

- Eighth-grade students in ongoing education programs scored significantly higher than their grade-level counterparts on the specific environmental literacy variables of ecological knowledge, verbal commitment, environmental sensitivity, environmental feelings, issue identification, issue analysis, and environmental behavior.

7 National Environmental Literacy Project. (2011). *National Environmental Literacy Assessment, Phase Two: Measuring the Effectiveness of North American Environmental Education Programs with Respect to the Parameters of Environmental Literacy.* National Environmental Literacy Project.

There are no national measures of adult environmental literacy in America. However, the National Environmental Education Foundation (NEEF) recently conducted a survey that provides benchmark data on environmental attitudes, environmentally-friendly behaviors, and environmental knowledge. The NEEF Benchmark Survey found that an estimated 65 million people, nearly one-third of the adult population in the United States, are actively engaged in environmental issues, 6 in 10 adults take some sort of action when learning about the environmental issues facing the world today, and all adults practice at least some environmentally-friendly behaviors. The survey also found a significant opportunity in that nearly half of the population can be characterized as cost-sensitive, but willing to adopt environmentally friendly behaviors and open to learning and understanding what more they can do (Figure 2).[8]

Figure 2: National Environmental Education Foundation Benchmark Survey Report

1. Environmentally Friendly Behaviours
The behaviors that can impact the environment (e.g., recycling habits, appliance usage, grocery bag choices, MPG/daily miles traveled, environmentally conscious purchases, environmentally-friendly habits, etc.)

2. Attitudes Towards The Environment
The degree to which the public agrees or disagrees with various statements concerning the environment (e.g., worried about climate change, concerned about environmental impact on family health, being environmentally friendly is too time consuming, etc.)

3. Environmentally Informed
The amount of information that the public is exposed to about various environmental issues (e.g., self-reported level of environmental knowledge, knowledge of specific recyclable items, level of awareness with different environmental issues, etc.)

Where the average American falls on each Pillar:

The average score on the Environmentally Friendly Behaviors Pillar is:
48

The average score on the Attitudes Towards the Environmental Pillar is:
57

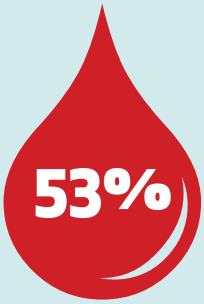
The average score on the Environmentally Informed Pillar is:
51

Range= 0-100. 0 is the lowest possible score. 100 is the highest possible score

Attitudes

While personal health and the health of ones own family is a priority, the perceived cost and effort of living an environmentally-friendly lifestyle exists as significant barriers that must be overcome.

are **very concerned** about their personal and the health of their family



believe that **natural environments** make people healthier

8 National Environmental Education Foundation. (2013). *Benchmark Survey Report*. National Environmental Education Foundation. http://neefusa.org/pdf/NEEF_Benchmark_Survey_Report.pdf

Polling data in general indicate that American adults care about the environment and are getting outdoors in greater numbers. They also participate in certain green behaviors, such as recycling, in large numbers. But the data also suggests that American adults are distracted by other priorities, overwhelmed by the complexity of the issues we face, polarized about problems and solutions (not just along political lines but also culturally and in terms of how we understand and evaluate science), misinformed about key issues, and less confident than they once were about their ability to take major steps to address environmental problems. The following are highlights from some of the recent research:

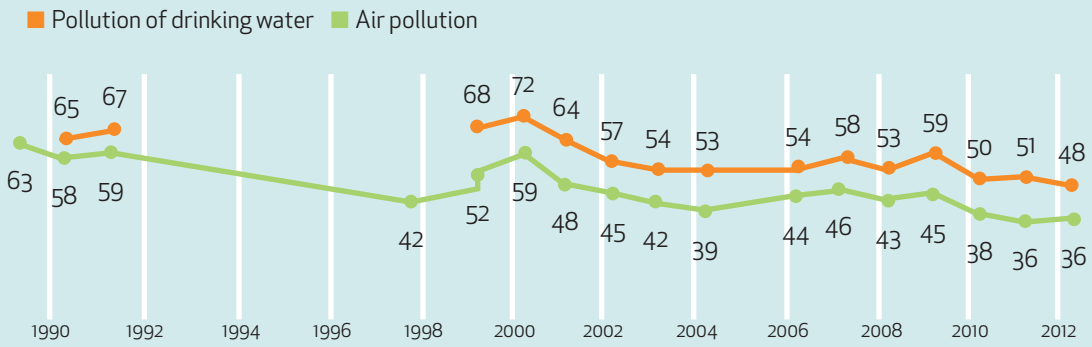
Environmental Concern Is on the Decline. Americans focus on air and water quality, but the proportion of Americans concerned about environmental problems has declined over the past decade. From 2000 to 2012, the proportion of Americans worrying about air and water pollution tumbled 23 and 24 percent, respectively. While the economic recession has likely played a large role in this shift, Gallup cites another possible contributing factor: Americans perceive environmental conditions in the U.S. to be improving. According to Gallup, the percentage of Americans rating the quality of the environment in the U.S. as "excellent" or "good" rose from 39 percent in 2009 to 44 percent in 2012 (Figure 3).

Economic Concerns Now Surpass Environmental Concerns. For nearly 30 years, Gallup has asked Americans about how they prioritize economic development and environmental protection. For nearly all of that time, Americans have favored the environment, agreeing that "the environment

Figure 3: Gallup Environmental Poll, 2012

I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all.

% Worried a great deal



Percentage Worried "A Great Deal" About Environmental Problems, 2000 vs. 2012 Gallup Polls

	2000 %	*2012 %*	*Change (pct. pts.)*
Pollution of drinking water	72	48	-24
Air pollution	59	36	-23
Pollution of rivers, lakes, and reservoirs	66	48	-18
Contamination of soil and water by toxic waste	64	50	-14
Loss of tropical rain forests	51	37	-14
Global warming	40	30	-10
Extinction of plant and animal species	45	36	-9

Gallup
http://www.gallup.com/poll/153875/worry-water-air-pollution-historical-lows.aspx

should be given priority, even at the risk of curbing economic growth." In 2000, for example, Gallup notes that "Americans overall favored the environment over the economy by a better than 2-to-1 margin (67 percent to 28 percent)." But today, Americans prioritize the economy over the environment. The shift happened after the onset of the economic recession in 2008. In 2011, a record-high 54 percent of Americans chose the economy over the environment, while a record low percentage of Americans supported the environment. The number of Americans prioritizing the economy fell to 48 percent in 2013 (with 43 percent in favor of protecting the environment), which may be a response to the improving economy (Figure 4).[9]

ECONOMY VS. ENVIRONMENT: A FALSE CHOICE?

While Gallup's long-term trends in Americans' thinking are instructive in understanding changes over time, many question the utility of these either-or propositions for understanding people's true thinking and preferences. Do people really see the world in such black-and-white terms, where the only two choices are the economy or the environment? For example, although Americans favor energy development over environmental protection, Americans by a 25 percent margin prefer the development of alternative energy to the production of more oil, gas, and coal.[10]

Americans often support other options, such as alternative energy, that can offer both economic and environmental benefits. In fact, overwhelming numbers of Americans believe that the economy and environment are not always at odds. A 2012 poll from Yale University and George Mason University found that 83 percent of Americans think that protecting the environment either improves economic growth and provides new jobs (58 percent) or has no effect on economic growth or jobs (25 percent). Just 17 percent felt that environmental protection reduces economic growth and costs jobs.[11]

Figure 4: Gallup Environmental Poll, 2012

Prioritizing Environmental Protection vs. Economic Growth – Recent Trend

With which one of these statements about the environment and the economy do you most agree – [protection of the environment should be given priority, even at the risk of curbing economic growth (or) economic growth should be given priority, even if the environment suffers to some extent]?

Gallup
Trends based on Gallup's annual Environmental surveys, conducted April 2000 and each March since 2001.

9 Jones, J.M. (2011). *Americans Increasingly Prioritize Economy Over Environment*. Gallup. http://www.gallup.com/poll/146681/Americans-Increasingly-Prioritize-Economy-Environment.aspx; Saad, L. (2013). *More Americans Still Prioritize Economy Over Environment*. Gallup. http://www.gallup.com/poll/161594/americans-prioritize-economy-environment.aspx

10 Jones, J.M. (2012). *Americans Split on Energy vs. Environment Trade-Off*. Gallup. http://www.gallup.com/poll/153404/Americans-Split-Energy-Environment-Trade-Off.aspx.

11 Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Hmielowski, J.D. (2012) *Climate Change in the American Mind: Public Support for Climate & Energy Policies in March 2012*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate-communication/files/Policy-Support-March-2012.pdf.

Americans Feel Good about Protecting the Environment: According to a 2011 SC Johnson/GfK survey of Americans' environmental attitudes and behaviors, three-quarters of Americans say they "feel good when they take steps to help the environment.

Large numbers of Americans report engaging in certain green behaviors. The 2011 SC Johnson-GfK survey reports that, "Compared with 20 years ago, twice as many Americans recycle (58 percent in 2011 say they do so on a regular basis), buy green products (29 percent), and commute in an environmentally friendly manner (18 percent)." A 2010 Gallup poll found that large majorities of the population reported that they had recycled (90 percent), reduced household energy use (85 percent), chosen a product because it is better for the environment (76 percent), and used reusable grocery bags (70 percent) in the past year.[12]

Americans are increasingly taking action to save energy. According to a 2012 poll conducted by Yale Project on Climate Change Communication and George Mason University, more than half of Americans (56 percent) reported that they had tried to reduce their family's energy consumption over the past year. Likewise, the number of Americans reporting that they often walk or ride a bike instead of driving is now at its highest recorded level (25 percent). Energy-saving CFLs also have gained favor with Americans. From 2008 to 2012, the number of Americans reporting that most or all of their household light bulbs are CFLs has risen 40 points to an impressive 57 percent of Americans.[13]

Americans' Skepticism Is Growing: While Americans increasingly place responsibility for addressing environmental problems on individuals, fewer Americans think they can make a big difference for the environment. Compared to 1990, fewer Americans say they can do "a lot" to address environmental problems, and more say they can do "a little." Encouragingly, fewer believe they can do "nothing."[14]

Americans Are Not Convinced about the Impact of Energy-saving Actions. In 2012, the Yale Project on Climate Change Communication and George Mason University Center for Climate Change Communication found that "Americans have become less confident that their individual actions to save energy will reduce their own contribution to global warming (32 percent, down 16 points since 2008)." The same report found that "Though still a majority, Americans are also less likely to say that if most people in the United States took similar actions, it would reduce global warming 'a lot' or 'some' (60 percent, down 18 points since 2008)."[15] Consumers are also often confused about which actions will produce the greatest impact.[16]

One place for Americans to learn about the impact of their actions is EcoMythsAlliance.org. The EcoMyths Alliance mixes science with humor to empower people to make eco-friendly choices in their daily lives. They are passionate about making it easy. The simple science articles, cartoons, radio shows, and other content EcoMyths creates, enables people to understand environmental issues on a personal level and to take action with just One Green Thing.

12 Morales, L. (2010). *Green Behaviors Common in U.S., but Not Increasing.* Gallup. http://www.gallup.com/poll/127292/Green-Behaviors-Common-Not-Increasing.aspx

13 Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Hmielowski , J. D. (2012) *Americans' Actions to Conserve Energy, Reduce Waste, and Limit Global Warming*: March 2012. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate-communication/files/Behavior-March-2012.pdf

14 GfK. (2014). *The Environment: Public Attitudes and Individual Behavior–A Twenty-Year Evolution.* GfK.

15 Leiserowitz, A., Maibach, E., Roser-Renouf, C., Feinberg, G., & Howe, P. (2012) *Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in September, 2012.* Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate/files/Climate-Beliefs-September-2012.pdf.

16 Attari, S., Z., DeKay, M.L., Davidson, C.I., & Bruine de Bruin, W. (2010). *Public Perceptions of Energy Consumption and Savings*. PNAS. http://www.pnas.org/content/107/37/16054.full.pdf+html

Americans' Knowledge Often Falls Short: In 2010, the Yale Project on Climate Change released a report on their measurement of Americans' climate knowledge. The results were not encouraging. Overall, 52 percent of Americans earned a score equivalent to an F. Forty percent would receive a score of C or D for their level of knowledge, and about 8 percent would earn an A. Less than half of Americans (45 percent) understand that carbon dioxide traps heat near the Earth's surface, and a majority think that the hole in the ozone layer contributes to global warming. These kinds of misunderstandings prevent Americans from making informed decisions about this important issue.

Political Differences Are Wide on the Environment. America's two major political parties have become polarized, reflecting deep divisions on key social, economic, and cultural issues. Climate change is one such issue that has divided Americans, according to the Pew Research Center for People and the Press. While 79 percent of Democrats believe there is solid evidence that the Earth's average temperature has been increasing over the past few decades, less than half as many Republicans (38 percent) agree with the statement. A majority of Democrats (53 percent) attribute the warming to human activity, in contrast to just 16 percent of Republicans. Democrats and Republicans are also deeply divided about how serious the problem is, and whether there is even scientific consensus on the issue. While 50 percent of Democrats believe global warming is a very serious problem, only 14 percent of Republicans see global warming as very serious. By nearly a 2-to-1 margin (59 percent to 32 percent), Democrats believe that there is scientific consensus on the issue of global warming. Republicans hold nearly the opposite view, with 30 percent seeing scientific agreement and 58 percent believing most scientists don't agree (Figure 5).[17]

Figure 5: Gallup Poll, 2002 and 2012

Preference for Emphasizing Energy Conservation or Increased Energy Production, by Political Party, 2002 and 2012 Gallup Polls

	All Americans	*Democrats*	*Independents*	*Republicans*
2002				
Conservation	60%	66%	62%	53%
Increased Production	30%	28%	28%	35%
Gap in favor of conservation	+30	+38	+34	+18
2012				
Conservation	51%	67%	55%	29%
Increased production	40%	26%	32%	63%
Gap in favor of conservation	+11	+41	+23	-34

Gallup
Source: http://www.gallup.com/poll/153404/Americans-Split-Energy-Environment-Trade-Off.aspx

17 PewResearchCenter. (2010). *Wide Partisan Divide Over Global Warming: Few Tea Party Republicans See Evidence*. PewResearchCenter. http://pewresearch.org/pubs/1780/poll-global-warming-scientists-energy-policies-offshore-drilling-tea-party.

ENVIRONMENTAL EDUCATION RESEARCH NEEDS

What are some of the trends for environmental education research? In a study conducted by Nicole Ardoin, Charlotte Clark, and Elin Kelsey,[18] several key topics emerged, including:

1. A focus on community (moving from individuals to communities and collective impact)
2. Connections between the social and the ecological (with a focus on social justice, health, well-being, and emotions)
3. The urban context (what does EE look like in an increasing urban world)
4. The rise of the digital age (how will technology enhance EE and learning? Are there drawbacks?)
5. Behavior change (how does EE lead to behavior change? What are the factors that influence behavior change?)

In addition, there are a number of research questions we need to answer, including:

1. How does spending time outside impact stewardship, learning, health, etc.? What dosage of nature makes a difference?
2. How do worldviews and belief systems impact environmental and social change?
3. How does preschool education impact life-long stewardship goals?
4. What is the role of environmental education in achieving conservation impacts and influencing behavior change?
5. How environmental education can help meet business sustainability goals.
6. How environmental education can help enhance STEM learning and other educational goals.
7. Where is EE currently taking place beyond K-16?

Creating Societal Transformation

Research on America's knowledge and attitudes shows that environmental education has never been more important. Effective education, however, requires understanding the difference among individuals and communities and tailoring strategies to reach them. As the work of the Yale Cultural Cognition Project shows, simply providing the public with more facts may not be enough to change perceptions about contentious issues such as climate change. The kind of lifelong learning required to build environmental literacy and sustain environmentally responsible behaviors happens only when people have access to places where they can learn, connect, get inspired, and take action throughout their lives.[19]

In the following chapters, we will look at trends that are influencing how we function as a global society, and highlight the inspiring progress we're making in multiple sectors. We will also identify the challenges and gaps that exist on the path to creating a sustainable future.

18 Ardoin, N.M., Clark, C., & Kelsey, E. (2013). *An Exploration of Future Trends in Environmental Education Research*. Environmental Education Research. doi: 10.1080/13504622.2012.709823. http://dx.doi.org/10.1080/13504622.2012.709823

19 http://www.culturalcognition.net/kahan/.

chapter

2

The New American Landscape

CHAPTER 2

The New American Landscape

Our society is experiencing change at an unprecedented pace, from changes in the demographic make-up of the country to increases in people living in cities to more people, especially young people, living below the poverty line. All of these trends will affect how we build environmental literacy.

The American population is changing, and the changes create enormous opportunities to foster future generations of environmental stewards. These changes also reflect the shifting global landscape and affect how U.S.-international interactions address social and environmental challenges worldwide. Consider these facts:

- Approximately 92 languages have been identified among students of the Los Angeles Unified School District.
- About 8,000 Americans will turn 65 every day over the next five years, and they will live longer than previous generations.
- Women now hold nearly half of all paid U.S. jobs, own 40 percent of all businesses and hold 43 percent of executive, administrative, and managerial positions in the U.S. economy.

This chapter considers the implications of the shifting demographic and social trends on efforts to increase environmental literacy and the new thinking required to address the environmental challenges facing the United States and our global partners.

A New Majority

The population of the United States has more than doubled since 1950 and now stands at more than 300 million people. The proportion of America's major racial groups has also shifted.

In just a 15-year span, according to census data, non-Hispanic[20] Whites fell from 76 percent of the population in 1995 to 63 percent in 2013. In 2012, for the first time in U.S. history, the majority of births in the country were minorities. According to current estimates, non-Hispanic Whites, previously the majority in the United States, will become a "minority" in 2043. By 2027, the 18-29 year old population will already have a minority majority, made up mostly of growing Hispanic and Asian populations.

It is impossible to predict the long-term impact of shifting demographics on Americans' interest in and support for the environment, but research suggests that people of color support environmental protection. A 2010 report by the Yale Project on Climate Change Communication and George Mason University on support for climate change legislation among American racial groups concluded: "It is commonly believed that global climate change is primarily a concern of only

20 This report uses the terms "Hispanic" and "Caucasian" only when referring to Census Bureau data. Elsewhere, the report uses the terms Latino and White

upper and middle class Whites, while minorities are focused only on local issues of environmental justice. These two national studies strongly suggest that these assumptions are often wrong. In fact, minorities often support action to respond to this global threat at levels equal to or greater than Whites."[21] (See Figure 6)

People of color support a range of environmental policies. An analysis of ballot referenda to set aside open space revealed that land trusts (often the referenda sponsors) tend to focus their campaigns on White communities. But, based on the analysis of voting patterns on these referenda, the researchers conclude that land trust groups may be "over-stereotyping" by focusing on White communities. The researchers note that "there appear to be excellent opportunities in more minority communities" and in more middle-class areas.[22]

This support for environmental protection is reflected in the growing influence of the environmental justice movement but is not represented in many environmental organizations. For example, a summary of the report The State of Diversity in Environmental Organizations: Mainstream NGOs, Foundations & Government Agencies, indicates that "Despite increasing racial diversity in the United States, the racial composition in environmental organizations and agencies has not broken the 12% to 16% 'green ceiling' that has been in place for decades."[23] According to the National Committee for Responsive Philanthropy, from 2007-2009, only 15 percent of environmental grant dollars benefitted marginalized communities, and only 11 percent advanced social justice strategies.[24]

In addition to poor representation inside traditional environmental groups, people of color are also underrepresented in outdoor recreation activities that are linked to environmental sensitivity. According to the "Outdoor Recreation Participation" report,[25] about three-quarters of youth and young adults participating in outdoor recreation are White.

Figure 6: Support for Environmental Policies

How much do you support or oppose the following policies?

Establish a special fund to help make buildings more energy efficient and teach Americans how to reduce their energy use. This would add a $2.50 surcharge to the average household's monthly electric bill.

	National Average	*Hispanics (13%)*	*Blacks (11%)*	*Other race/ ethnicity (6%)*	*Whites (69%)*
Strongly support	20	30	19	26	17
Somewhat support	43	42	61	43	41
Somewhat oppose	21	19	12	13	24
Strongly oppose	16	9	8	18	18

n=2,064; x2, p<0.002

21 Leiserowitz, A. & Akerlof, K. (2010) *Race, Ethnicity and Public Responses to Climate Change*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change. http://environment.yale.edu/climate-communication/files/Race_Ethnicity_and_Climate_Change_2.pdf.

22 Banzhaf, H.S., Oates, W.E., & Sanchirico, J.N. (2010). *Success and Design of Local Referenda for Land Conservation*. Journal of Policy Analysis and Management, 29 (4): 769-798

23 Taylor, D.E. (2014). *The State of Diversity in Environmental Organizations*. Green 2.0. http://diversegreen.org/wp-content/uploads/sites/4/2014/07/FullReport_Green2.0_FINAL.pdf.

24 Hansen, S. (2012). *Cultivating the Grassroots: A Winning Approach for Environment and Climate Funders*. National Committee for Responsive Philanthropy

25 The Outdoor Foundation. (2012). *Outdoor Recreation Participation: Topline Report 2012*. The Outdoor Foundation. http://www.outdoorfoundation.org/pdf/ResearchParticipation2012Topline.pdf

Participation rates among youth of color in outdoor recreation have remained essentially unchanged over the past five years.[26]

Table 6: Ethnicity

	2007	2008	2009	2010	2011
African American/ Black	8%	8%	8%	11%	7%
Asian/Pacific Islander	4%	6%	5%	6%	6%
Caucasian/White, non-Hispanic	77%	75%	78%	71%	76%
Hispanic	7%	7%	7%	9%	8%
Other	4%	4%	3%	4%	4%

Likewise, analysis of visitation to America's national parks shows that people of color are underrepresented among park visitors, while White participation is highest. These participation levels remained more or less unchanged from 2000 to 2008.[27]

BRIGHT SPOT:
USDA FOREST SERVICE AND AD COUNCIL TEAM UP TO ENCOURAGE AFRICAN AMERICAN FAMILIES TO DISCOVER NATURE

In 2013, The USDA Forest Service, in partnership with the Ad Council, launched a public service campaign to help African American families discover nature. While more than 245 million Americans live within 100 miles of a national forest or grassland, research shows that a majority of children in some segments of the population are not spending active time outdoors. Only 37 percent of African American children ages 6-12 participate in outdoor recreation, compared to 67 percent of Caucasian children in the same age range.

Tom Tidwell, the USDA Forest Service Chief, explained that the campaign "seeks to get kids and families out to enjoy the wonders of our forests. The physical, mental and spiritual benefits our great outdoors provide are more important now than ever. We know that children who play outside have lower stress levels and more active imaginations, become fitter and leaner, develop stronger immune systems and have greater respect for themselves and for others."

Discover the Forest aims to engender a love for nature in kids and families by fostering a connection with urban and national forests, ultimately creating a lifelong interest and a legacy of stewardship through first-hand experience.

The Campaign is supported through the campaign website, which includes interactive games, a list of activity ideas and a convenient forest locator, powered by NatureFind and GoogleMaps, which allows users to find the closest forest or park to them. There is also a site in Spanish to encourage Latino audiences to get outside as well.[28]

26 The Outdoor Foundation. (2012). *Outdoor Recreation Participation: Topline Report 2012*. The Outdoor Foundation. http://www.outdoorfoundation.org/pdf/ResearchParticipation2012Topline.pdf.

27 Taylor, Patricia A., Burke D. Grandjean, and James H. Gramann. (2011). *National Park Service Comprehensive Survey of the American Public, 2008–2009: Racial and Ethnic Diversity of National Park System Visitors and Non-visitors*. Natural Resource Report NPS/NRSS/SSD/NRR—2011432. National Park Service, Fort Collins, Colorado. http://www.nature.nps.gov/socialscience/docs/CompSurvey2008_2009RaceEthnicity.pdf.

28 Discover the Forest. (n.d.) *Discovertheforest.org*. Discover the Forest. http://www.discovertheforest.org & http://www.descubreelbosque.org.

Generational Shifts

In 1950, senior citizens made up 8.1 percent of the U.S. population. By 2009, seniors accounted for 12.8 percent of the population. Demographers predict that by 2050, one in five Americans will be over the age of 65.[29] Some have described the increase in seniors as a "silver tsunami," with more than 70 million Baby Boomers (the generation born roughly from 1945 to 1965) leaving the U.S. workforce over the next 20 years.

The mass exodus of Baby Boomers from the workforce poses distinct challenges to the environmental field. The problem, sometimes referred to as the "Greying of the Green Generation," is that as Boomers leave natural resource professions such as wildlife management, law enforcement, and information and education, fewer young professionals are prepared to step into their jobs. A 2004 survey of state wildlife professionals found 47 percent planned to retire by 2015. Even more surprising, over three-quarters of people in top leadership positions in state wildlife agencies planned to retire over that time span.

With so many older Americans retiring, there will also be impacts in the overall workforce, not just for environmentally specific jobs. The talent pool overall will lose some of the country's most skilled workers. Given the complex and interdisciplinary nature of environmental issues, all sectors will be looking to replace this retiring workforce with employees who have the knowledge and skills to address current and future environmental and social challenges. At the same time, retired people form a highly-educated workforce, many of whom are seeking opportunities as volunteers and mentors and are a potentially important resource for environmental educators.

Of course, not all Americans of Generation X (born roughly between 1965 and 1980), and Millennials (1980 to early 2000s) will become environmental professionals. But the level of environmental literacy of younger generations will determine how the nation faces current and future environmental challenges. As a result, it's important to understand each generation's interests, outlook, and ways of engaging with the environment.

Millennials in particular are a challenging group to characterize. Although young people have reputations for being idealistic, caring, and especially concerned about the environment, new research suggests that Millennials may, in fact, be less civic minded than their predecessors.

Researchers from San Diego State University and the University of Georgia compared young people's responses to surveys of high school seniors and college freshmen that have been collected since the 1960s and 1970s. According to the researchers, Millennials' showed a particularly steep decline in interest in helping the environment. By a margin of 3 to 1 (15 percent to 5 percent) Millennials were more likely than Boomers to report taking no personal effort at all to help the environment. By contrast, 9 percent of Millennials report making quite a bit of effort to help the environment, while 15 percent of Boomers said the same when they took the survey. Millennials also are less interested in saving electricity: 51 percent of Millennials report making an effort to cut down on electricity use, compared to 68 percent of Boomers and 60 percent of GenXers. A similar trend emerged in reducing heat usage in winter to save energy. While 78 percent of Boomers and 71 percent of GenXers reported turning down the heat, just 56 percent of Millennials reported taking the same action.[30]

It is impossible to know now whether these declines in interest for helping the environment will continue with the next generation, or if they have hit a low. Some researchers have argued that Millennials may not be as disengaged as this data suggests, but instead are participating in ways that are not captured by some of the traditional measures of civic engagement. These researchers point to Millennials' high rates of volunteerism, and participation in newer political activities.

29 Shrestha, L.B., & Heisler, E.J. (2011). *The Changing Demographic Profile of the United States*. Congressional Research Service, RL32701. http://fas.org/sgp/crs/misc/RL32701.pdf.

30 Twenge J.M., Campbell W.K, Freeman, E.C. (2012). *Generational Differences in Young Adults' Life Goals, Concern for Others, and Civic Orientation, 1966–2009*. Journal of Personality and Social Psychology, 102(5), 1045-1062. https://www.apa.org/pubs/journals/releases/psp-102-5-1045.pdf.

These generational trends provide a high-level view of how different age groups are thinking about their societal interactions. The pending generational transitions in the United States will require those working to advance environmental literacy to carefully consider their audiences and recognize that generations (and individuals within a generation) carry their own sets of values, preferences, and outlooks based on their collective life experiences.

Urbanization Abroad and at Home

Populations in urban and suburban communities continue to increase in the United States and worldwide, and the trend is expected to continue. In 1950, less than one-third of the world's population lived in cities; by 2050 over two-thirds of the world population will be living in urban areas. Over the next 40 years, urban areas are expected to absorb all of the world's expected population growth of 2.3 billion people, and also absorb more of the rural population.[31]

In the United States, 80.7 percent of the population lives in urban areas, according to the most recent census data. Population growth in America's cities outpaced the nation's overall growth rate from 2000-2010, while the rural population declined as a percentage of the national population. This increasingly urban existence brings certain challenges for developing environmental literacy. A largely human-built environment surrounds people living in cities, making wildlife and natural habitats harder to find. As a result, it can be difficult for people to experience and understand the ways that they are connected to the natural world.

Urban living, however, does not preclude environmental engagement. Urban environmental challenges such as water scarcity, pollution, and access to fresh produce or clean energy hold valuable lessons. In fact, no research demonstrates that people living in urban areas have lower levels of environmental literacy than those living in rural areas. Some educators argue that, despite their dense development, cities nevertheless are ecosystems, and urban residents can build their environmental literacy by learning about the ecological system in which they live. The Baltimore Ecosystem Study, for example, is a long-term research effort aimed at understanding the city of Baltimore's ecology and how it changes over time in response to people's actions. The project includes not just ecologists, but also social scientists, educators, artists, and others who help understand the interplay between ecological and social systems in the city, and help residents build environmental literacy that's rooted in the city's unique ecological landscape.[32]

BRIGHT SPOT:
LINKING ART AND SCIENCE

The Baltimore Ecosystem Study (BES) conducts research on metropolitan Baltimore as an ecological system, integrating biological, physical, and social sciences. As a way to help translate the work of BES scientists, the project named Patterson Clark as Artist-In-Residence. Clark has dedicated his work to developing a complete, sustainable system for creating art using non-native plants harvested from the environment where he works. This project, called "Alienweeds," emerged from his desire to restore balance between the native and non-native plants growing near his home in Washington, D.C.

Clark uses plants to create papers, inks, brushes, pens, printing blocks, and cordage, finally resulting in colorful prints. Clark is also a visual journalist: in 2009 he created the column "Urban Jungle" for the Washington Post, highlighting a particular aspect of the urban ecosystem in text and illustrations, citing the research of scientists he interviews.

The Baltimore Ecosystem Study feels that by spending time with BES scientists as an Artist-in-Residence, Clark can be a potential conduit for wider exposure of BES research. In addition, they hope his involvement in BES will stimulate the social and natural scientists, and the educators in the project, to explore new avenues and stimuli of creativity.[33]

31 Heilig, G.K. (2012). World Urbanization Prospects: the 2011 Revision. United Nations Department of Economic and Social Affairs. http://esa.un.org/wpp/ppt/CSIS/WUP_2011_CSIS_4.pdf.

32 http://www.beslter.org/.

33 http://alienweeds.com/; Clark, P. (n.d.) *Urban Jungle Archive*. The Washington Post. http://www.washingtonpost.com/wp-srv/special/metro/urban-jungle/?media=recent

The Rise of Poverty

The Great Recession pushed many American families into poverty. From 2000 to 2009, the national poverty rate increased from 11 percent to 15 percent. Certain groups have borne the brunt of the rise in poverty: 20.1 percent of American children and 20 percent of Americans 15-24 years old lived below the poverty line in 2009. Hispanics' poverty rate was 27 percent in 2009, and the rate among African Americans was 31 percent. The rates for Black and Hispanic children were even higher. Research shows that for all Americans, regardless of race, higher levels of poverty are associated with lower levels of education.[34]

According to researchers at John's Hopkins University, students living in poverty, regardless of race or gender, are more likely to be chronically absent from school (that is, to miss more than 10 percent of the school year). According to the researchers, students who chronically miss school underperform in kindergarten through high school. Research also indicates that poorer communities have less access to green spaces.[35]

Because of its association with lower educational performance and less access to natural areas, poverty requires environmental educators to be creative and to link with the broader educational community to address these barriers. Many child development experts think that early childhood is the best time for intervention to break this cycle. Research shows that children living in poverty who are exposed to high-quality early education programs can excel in school, and those gains can last for many years.[36] In fact, the benefits of early childhood education are so great to society that in 2010 the United Nations Educational, Scientific, and Cultural Organization (UNESCO) held its first World Conference on Early Childhood Care and Education. With the theme "Building the Wealth of Nations," the conference positioned early childhood education as a key path to economic development for all nations. In addition to boosting future educational performance, early childhood education programs that connect young learners to nature help build a foundation for environmental literacy.

No matter the age of the audience, however, environmental education programs must account for the unique challenges of families living below the poverty line, and be careful to ensure programs are accessible to, and targeted specifically for, children and adults with lower incomes. These audiences must not be marginalized because, unfortunately, a substantial number of low-income families live in America today. Since environmental educators are not necessarily experts in education reform, poverty alleviation, and bringing about change, they can often be most effective by building partnerships with trusted, credible community representatives and NGOs who have deep relationships with the communities in which they operate.

34 National Center for Education Statistics. (2011). *Youth Indicators 2011, America's Youth: Transitions to Adulthood*. National Center for Education Statistics, Chapter 3 (31). http://nces.ed.gov/pubs2012/2012026/chapter3_31.asp.

35 Balfanz, R., & Byrnes, V. (2012). *Chronic Absenteeism: Summarizing What We Know From Nationally Available Data*. Baltimore: Johns Hopkins University Center for Social Organization of Schools. http://new.every1graduates.org/wp-content/uploads/2012/05/FINALChronicAbsenteeismReport_May16.pdf; Strife, S. & Downey, L. (2009). Childhood development and access to nature: A new direction for environmental inequality research. Organization and Environment, 22(1), 99-122.

36 Schweinhart, L.J., (1994). *Lasting Benefits of Preschool Programs*. Eric Digest. http://www.ericdigests.org/1994/lasting.htm.

BRIGHT SPOT:

FOOD BANKS AND FARMING

A small budget can often be a big hurdle in maintaining a healthy diet. Not only can it be a challenge for low-income families to afford healthful foods, but a number of studies show that many disadvantaged communities do not have access to supermarkets that offer fresh fruits and vegetables and other high-quality foods. According to the USDA, more than 23 million people live in areas that do not have access to healthful foods, and most are in disadvantaged neighborhoods.

In Tucson, Arizona, the Community Food Bank of Southern Arizona is aiming to tackle the challenge of long-term food insecurity by helping residents grow their own healthy food. The program also educates local children about where food comes from. And as an added benefit, gardeners in the program who grow more than they can eat can sell their surplus at farmer's markets that the organization sponsors, helping them earn a little extra cash. It's not a solution to the problem of poverty, but it can help people in the community spend more time outside, grow healthful foods, and learn about their connections to the natural world.[37]

The Bottom Line: The New American Landscape

Society is changing at an unprecedented pace, from demographic shifts to increases in people living in cities to more people, especially young people, living below the poverty line. All of these trends will affect how educators build environmental literacy with audiences that are young and old, urban and rural, and representing all races and ethnicities. Environmental educators need to:

- Conduct focused research to understand the interests, motivations, knowledge, and values of people of different backgrounds, races and ethnicities, socio-economic levels, and other types of diversity to better meet the needs of specific audiences.
- Leverage partnerships with community-based organizations, foundations, environmental groups, government agencies, faith organizations, social service organizations, scientists, business, and others who can help connect educators to specific communities.
- Promote diversity in the environmental workforce and leadership, so that environmental educators reflect the diversity of their audiences.
- Recognize the unique interests and motivations of different generations, but also work to promote intergenerational learning where appropriate.
- Increase professional development opportunities for educators to gain the skills needed to work with the changing demographics of the country, including cultural competency, intergenerational skill building, and values-based communication.
- Focus on ways to help urban residents remain connected to natural systems and features.

37 Fessler, P. (2013). *Tucson Food Bank Help the Needy Grow Their Own Food.* NPR: Weekend Edition Saturday. http://www.npr.org/blogs/thesalt/2013/07/27/205240639/tucson-food-bank-helps-the-needy-grow-their-own-food.

chapter

3

Tectonic Shifts in Technology

CHAPTER 3

Tectonic Shifts in Technology

From 3-D printing to wearable technology to augmented reality, the future of technology promises exciting opportunities for learning. Environmental educators need to learn more about how technology enhances environmental literacy, and how to choose when to use technology and which technology strategies will best meet environmental literacy objectives.

Technologies of connection have changed our lives forever. Social media connects over a billion people across the planet, and mobile technology puts information in people's hands in ways never before possible. Digital technologies are changing everything from the roles of teachers and students in classrooms to how businesses communicate with their customers to the way we understand the idea of community. No facet of society is unaffected by the galloping pace of technological change. In the span of a decade, we have gone from a print world to a digital world. These rapid changes have caused environmental professionals to rethink the ways they reach people with news, ideas, and information.

A Social Society

The rise of social media has been shockingly swift. Before 2004, no one had heard of Facebook. Today, more than a billion people are on Facebook. One in four Americans watch a YouTube video every day, on a service that launched only in 2005. Wikipedia, the crowdsourced encyclopedia, now has 17 million articles and grew by 21 percent in the last year. It is not just younger generations that have embraced social media: more than 69 percent of online adults use social networking sites, and adults over 55 are one of the fastest growing segments using social media.

Social media has emerged as a tool for environmental educators to promote programs, disseminate information, build enthusiasm, share solutions, and encourage interaction. In the 21st century, virtual communities are as relevant to building environmental literacy as physical communities. But while most educators can imagine the potential of social media to help build literacy, there is limited research available about how social media is being used in environmental education, and some worry that too much time spent in virtual environments can distance people from the "real" environment.

The good news is that researchers are starting to explore the relationship between technology and education — including how technology can enhance environmental literacy. For example, one Facebook-based education application has demonstrated how to connect young people to communities both online and offline. An evaluation of the Hot Dish Facebook application, which allows users to share climate-related stories and information and participate in climate-related action challenges, concluded that the application built knowledge and spurred behaviors. Many of the challenges helped users connect to their local community. The evaluation found that 22 percent of actions completed in the program were taken in the community, such as attending a town meeting or volunteering for a local group.[38]

No formal assessments or research gauges the overall use of social media in environmental education, but one analysis identified social media and other digital technologies as a key trend in the field.[39] It is likely that researchers will be looking more closely at the impact of social media on environmental literacy in the coming years.

The New World of News

If you still get your paper delivered every day, you're in a rapidly shrinking minority. According to the Pew Research Center, "the percentage of Americans who say they read a print newspaper the previous day continues to drop, falling 18 points over the last decade to 23 percent." The proportion of people who say they read a magazine in print yesterday has declined as well, falling from 26 percent in 2000 to 18 percent in 2012. Although Americans still say they enjoy reading as much as ever, a growing number of Americans are swapping paper news for digital.[40]

TV news is also experiencing a decline in viewers — especially with younger audiences. Among adults younger than age 30, as many saw news on a social networking site the previous day (33 percent) as saw any television news (34 percent), with just 13 percent having read a newspaper either in print or digital form.[41]

Online and digital news consumption, meanwhile, continues to increase, with many more people now getting news on cell phones, tablets, or other mobile platforms. Growing numbers of people mix the ways in which they get information from a wide variety of sources. A 2011 study from the Pew Research Center found that most American adults (64 percent) use at least three different types of media to get news and information about their local community, and 15 percent use at least six different types.[42]

As people turn to multiple news sites to get their information, many select news outlets that support their political views, which may be contributing to today's record-high levels of political polarization.43 According to the Center for Information and Research on Civic Learning and Engagement (CIRCLE), that polarization poses a real problem for educators because it interferes with people's ability to interpret information. They point to one study in which American viewers were shown political ads that independent reviewers deemed misleading. Despite its misleading and incendiary content, fewer than 20 percent of Republicans found the anti-Democratic ad to be unfair, while 80 percent of Democrats opposed it. Likewise, after viewing an equally misleading ad aimed at Republicans, less than 10 percent of Democrats deemed the ad unfair, while more than 70 percent of Republicans reacted negatively.[44]

38 Robelia, B.A., Greenhow, C., & Burton, L. (2011). *Environmental Learning in Online Social Networks: Adopting Environmentally Responsible Behaviors*. Environmental Education Research 17(4): 553-575. doi: 10.1080/13504622.2011.565118.

39 Ardoin, N.M., Clark, C., & Kelsey, E. (2013). *An Exploration of Future Trends in Environmental Education Research*. Environmental Education Research. doi: 10.1080/13504622.2012.709823. http://dx.doi.org/10.1080/13504622.2012.709823.

40 PewResearchCenter. (2012). *Number of Americans Who Read Print Newspapers Continues Decline*. PewResearchCenter. http://www.pewresearch.org/daily-number/number-of-americans-who-read-print-newspapers-continues-decline/.

41 PewResearchCenter. (2012). *In Changing News Landscape, Even Television is Vulnerable*. PewResearchCenter. http://www.people-press.org/2012/09/27/in-changing-news-landscape-even-television-is-vulnerable/.

42 Rosenstiel, T., Mitchell A., & Rainie, L. (2011). *How People Learn About Their Local Community*. http://www.journalism.org/analysis_report/local_news?src=prc-headline.

43 Duke Today. (2013). *U.S. Political Polarization Charted in New Study*. Duke Today. http://today.duke.edu/2013/05/us-political-polarization-charted-new-study#video.

44 Levine, P. (2013). *Guest Post: Educating Voters in a Time of Political Polarization*. Democracy Fund. http://www.democracyfund.org/blog/entry/educating-voters-in-a-time-of-political-polarization.

Certainly, a polarized society is not the kind of climate that fosters environmental literacy. That polarization is not simply a matter of liberal versus conservative political views. According to the Second National Risk and Culture Study, such views explain far less of the variation in attitudes toward climate change, for example, than more fundamental beliefs about how to organize society. Individuals process factual information about risk in a manner that fits cultural predispositions, the authors of the study argue, and it is that tendency that leads to cultural polarization.[45] While the digital revolution has given people unprecedented access to information and ideas, educators are still grappling with how to encourage people to look for, find, and apply accurate information that helps build environmental literacy.

BRIGHT SPOT:
INTERNET USE FOSTERS CIVIC ENGAGEMENT AMONG YOUTH

After following the online and offline habits of hundreds of teens and young adults for over three years, researchers concluded that spending time in online communities helps young people become more connected to their actual communities, not less. While many worry that the internet promotes half-hearted youth activism, or "slacktivism," the results of this study suggest the opposite. Researchers found that youth that spent a significant amount of time in online communities centered around hobbies, sports, or other interests were more likely to volunteer and work with others on community issues. The young people in the study also reported relatively little exposure to partisan politics online, countering fears that young people are exposed only to certain political viewpoints on the internet.

In a press release on the results of the 2011 research, study author Joe Kahne explained, "Both in the United States and abroad, so much civic and political life is online. We've got to pay attention to new media when we think about civic learning." He continued, "Research demonstrates that many youth are disengaged from traditional forms of civic and political life but are very engaged with new media." According to Kahne, "there are ways to build on their engagement with digital media to foster engagement in civic life."[46]

45 Kahan, Dan M. and Braman, Donald and Slovic, Paul and Gastil, John and Cohen, Geoffrey L., The Second National Risk and Culture Study: Making Sense of - and Making Progress In - The American Culture War of Fact (October 3, 2007). GWU Legal Studies Research Paper No. 370; Yale Law School, Public Law Working Paper No. 154; GWU Law School Public Law Research Paper No. 370; Harvard Law School Program on Risk Regulation Research Paper No. 08-26. Available at SSRN: http://ssrn.com/abstract=1017189 or http://dx.doi.org/10.2139/ssrn.1017189.

46 UCHRI. (2011). *Does the Internet Make for More Engaged Citizens? For Many Youth, the Answer is Yes, According to a New Study by Civic Learning Scholars*. University of California Humanities Research Institute. http://www.civicyouth.org/wp-content/uploads/2011/02/YPPMediaRelease.FINAL_.pdf.

Information on the Move

Mobile technology means that people can find and share information more quickly, more often, and in more ways than ever. Contrary to some perceptions of technology sequestering people indoors behind computers and televisions, mobile technology allows people to connect and share about their life outdoors, sometimes even while they are actually in the outdoors.

Pew Internet Project's *2012 Digital Differences report* found that mobile technology is "changing the story" of internet access in America. According to Pew, "Groups that have traditionally been on the other side of the digital divide in basic internet access are using wireless connections to go online. Among smartphone owners, young adults, minorities, those with no college experience, and those with lower household income levels are more likely than other groups to say that their phone is their main source of internet access." The report also notes that African Americans and English-speaking Latinos are as likely as Whites to own a mobile phone, and use their phones for a wider range of activities.[47]

In addition to delivering news and information, mobile technology can also can serve as a platform for education and engagement. At the Jacksonville Zoo and Gardens, for example, educators used prototype smartphone technology to engage visitors more deeply as they visited the zoo. Visitors can report animal behaviors on their phone, and download an application for their phones that let them learn more about the animals on display. In an evaluation of the prototype, researchers found that, while not all visitors want to use mobile technology in the zoo, many do. The researchers conclude that "Mobile phone activities such as those created for Call the Wild clearly have the ability to play a key role in delivering educational media to visitors during a zoo visit."[48]

The National Park Service plans to put wireless internet into more parks, with Wi-Fi hot spots at park entrances and visitor centers that would allow people to download the latest information on the park. They are also soliciting input from the public to help shape their policies. For some, such connectivity is a great thing because it will help people learn more about what's in the park, including flora and fauna, as well as provide information about lodging, food, programs, and other travel tips. Others are concerned that it will prevent people from actually exploring the National Parks and it will disrupt one of the most valued parts of a park experience — solitude.

A similar tension exists within the field of environmental education. Some educators see technology as a vital tool, while others see it as interfering in the relationship between people and nature.

In addition to providing interactive ways to deliver information, digital technology is also being used to collect and apply environmental information. Crowdsourcing — in which people work together online to help solve a specific problem — represents one such promising application. Crowdsourcing is a participatory online activity in which a person, organization, company, or other entity issues an open call for help with a specific task or problem. Anyone is free to participate in helping solve the problem, with each person bringing their own unique experiences, knowledge, and perspective to the problem. Crowdsourcing can be used to help develop software, create a dictionary, or trace environmental contaminants to their source. Crowdsourcing is a promising tool in developing environmental literacy because it allows people to participate in problem solving.

47 Zickuhr, K., & Smith, A. (2012). *Digital Differences*. Pew Internet & American Life Project. http://www.pewinternet.org/files/old-media/Files/Reports/2012/PIP_Digital_differences_041312.pdf.

48 Yocco, V., Danter, E.H., Heimlich J.E., Dunckel, B.A. & Myers, C. (2011). *Exploring Use of New Media in Environmental Education Contexts: Introducing Visitors' Technology Use in Zoos Model*. Environmental Education Research 17(6): 801-814. doi: 10.1080/13504622.2011.620700.

For example, in the aftermath of the Gulf of Mexico Deepwater Horizon oil spill in 2010, citizens along the Gulf Coast from Texas to Florida, and outside the U.S. in Cuba, Mexico, and the Cayman Islands, reported impacts from the spill in the Oil Spill Crisis Response Map. The map gave ordinary citizens the ability to participate in the response by providing real-time data that otherwise may have gone uncollected. With mobile technology, residents could capture impacts as they encountered them and immediately upload them to the map.

Sociologist Sabrina McCormick, who studied the impact of the map, believes that crowdsourcing represents an important way to influence scientists and decision makers. "Crowdsourcing is key to this new realm of citizen science that... allows a broader range of participation, a larger amount of more diverse data that potentially represent a broader range of impacts, and the facility of comparing citizen reports with government monitoring, therefore increasing the ability of advocates to show its value."[49]

Education On Demand

Today, anyone with an internet connection can take classes for free from world-class experts from leading universities through massive open online courses, or MOOCs. In addition to access to courses, students have access to more educational content than ever before, with online videos, lessons, and learning communities that can help them supplement their learning by exploring everything from the ocean floor to outer space. Over a thousand TED talks — featuring thought-provoking ideas delivered by experts and thought leaders — are freely available online and have been viewed by millions of curious learners.[50]

Younger students can follow along on real-life expeditions with National Geographic's online teaching and learning tools, reading explorers' blogs, following along with photography, video, and maps that spur curiosity and engagement with the natural world. And web cams let people anywhere on the globe peer into an eagle's nest in Iowa, count elephants at an African watering hole, or cheer grizzly bears as they fish for salmon in Alaska.

Online resources can even now stand in for a talk with a ranger in a National Park. The National Park Service has experimented with offering ranger talks online for people who visit a park's website, and who may never visit the park in person. An evaluation of one such program at Canyonlands National Park compared visitors' and viewers' emotional, intellectual, and stewardship responses after watching a ranger talk in person or online. While the in-person talks scored highest for overall effectiveness, the evaluators concluded that the online talks were only "slightly less effective interpretive tools than traditional ranger talks." The evaluators conclude that video podcasts can serve as an effective substitute for real-life interpretation programs, especially in remote parks, "for it generates similar intellectual, emotional, and stewardship connections to the resource despite the lack of actual visitation."[51]

Education on demand also presents some unique "recognition" opportunities for learning. For example, many learning institutions and other organizations are experimenting with "open badges," awarding learners with digital recognition for what they know and have accomplished, including experience with social media and other types of technology. These badges not only give individuals recognition for what they are learning, but also help employers know more about lifelong learning activities that don't show up as a formal degree, including skills that cut across disciplines. LinkedIn, the professional networking site, has also used digital recognition from peers as a way to help potential employees and users of the site to see what others think of a colleague's skills.

This anywhere, anytime access to virtual nature and environmental content certainly has the potential to engage more people in environmental education, and, therefore, increase environmental literacy. But more research will provide a deeper understanding of how this explosion in access to education increases environmental literacy and

49 McCormick, S. 2012. *After the cap: risk assessment, citizen science, and disaster recovery*. Ecology and Society, 17(4):31. http://dx.doi.org/10.5751/ES-05263-170431.

50 http://www.ted.com/talks.

51 Henker, K.B., & Brown, G. (2011). *As Good as the Real Thing? A Comparative Study of Interpretive Podcasts and Traditional Ranger Talks*. Journal of Interpretation Research, 16(1):7-23.

will help track the learning and resulting changes in commitment and behavior. New technologies and the innovative application of existing ones will be key components of the essential task of tracking and measuring the impact of environmental education across the broad spectrum of educational activities.

Technology also offers opportunities for people everywhere to participate in science. Citizen science programs — which allow students, teachers, families, and individual citizens to assist scientists in collecting data about the environment — offer students the opportunity not only to better understand how scientists do their work, but to become a part of the scientific process themselves. FrogWatch, Project BudBurst, the Christmas Bird Count, and the GLOBE project are just a few examples of citizen science programs available today.

Citizen science projects are growing. In 2011, volunteers tallied 61 million bird observations, about a quarter of all living bird species, during the Christmas Bird Count, and monitored water quality at more than 1,750 sites around the United States for World Water Monitoring Day. Technology is making these projects much more accessible for classrooms and adult learning as well. National Geographic's FieldScope citizen science program, for example, has recently upgraded its technology to take advantage of new advances that can help engage even more classrooms. FieldScope uses mapping technology together with social networking capabilities to allow users to upload data to a shared database, and then display and analyze their data. Then users — including classrooms — can share their results with other members of the FieldScope community. It's a real-life application of the scientific method that can engage students in learning more about the places where they live.[52]

Project Noah goes even further. Imagine that you could take a picture of a plant or animal from your backyard and have it identified in a matter of minutes by a complete stranger across the globe. Imagine an inquiry-based learning community that inspires students to explore their local environment and enables people of all ages to document their nature experience. Project Noah is this tool and much more.[53]

What began as a location-based mobile application project out of NYU's Interactive Telecommunications Program in 2010 has grown into a global movement, connecting people with a common passion for discovering and documenting nature. On the Project Noah website and online community anyone can upload wildlife pictures, help identify species in photos, and create their own documentation or education platform. Anyone can design their own mission or join a preexisting cause, be it mapping the moths of the world or documenting urban biodiversity. Co-founder Yasser Ansari quotes David Attenborough when explaining that, "people won't care for the natural world unless they know what it is." Project Noah offers a space for people to learn to appreciate our planet's biodiversity through the sharing of images that document the current state of our earth.

In June, 2010, Project Noah won the grand prize at the Cooney Center's "Breakthrough in Mobile Learning" competition. Since then, Project Noah has grown to include over 250,000 registered members and well over 1,000,000 geo-tagged photographs covering all seven continents as the community rapidly amasses valuable data about the state of our planet's biodiversity. In the last year alone the website had over 1 million visitors spanning 200 countries. Currently Project Noah has partnered with leading organizations like National Geographic, National Wildlife Federation, and the National Environmental Education Foundation to expand their educational outreach and develop new programs. Recently Project Noah has expanded into classrooms by offering teachers educational tools to reconnect school children with nature.

Project Noah demonstrates a unique combination of location-based citizen science and global community that is made possible only through recent technology. The project's founders explain that their success is a result of "our understanding

52 National Geographic Education. (n.d.). Field Scope. National Geographic. http://education.nationalgeographic.com/education/programs/fieldscope/?ar_a=1.

53 http://www.projectnoah.org/.

of technology, our commitment to an engaging user experience, and our dedication to nurturing an active global community."

Technology in the Classroom

Not only is technology bringing more people into virtual classrooms, but technology is also enhancing traditional classrooms with new tools for learning. In Moorseville, North Carolina, schools have not purchased a traditional textbook in more than four years, instead opting to rapidly transition their students to digital content.[54] Students in today's classrooms use textbooks that can read themselves aloud, allow students to manipulate interactive diagrams, include not just photos but also videos that show concepts in action, and more.

Digital technologies in the classroom also include adaptive instructional technologies that deliver specialized content and activities based on how students are learning. Many of these technologies are specifically designed to foster student inquiry, which is a key skill in developing environmental literacy. These programs assist students as they form questions, investigate issues, draw conclusions, and share their ideas, often around issues related to ecology or the environment.

Another digital tool that is common in many classrooms is computer models or simulations that are often used to help students better understand natural phenomena. Digital models create representations of the real-world that students can interact with. As school budgets shrink, some schools have turned to digital labs, in which students can conduct experiments entirely online. While many feel that real-life experience can never be duplicated, at least some research suggests that computer models can be an effective teaching tool. In a review of more than 40 years' worth of research on the effectiveness of computer models, researchers concluded that computer models were often better than, and were almost always at least just as good as, traditional science teaching. They point to one study, for example, in which oceanography students were divided among a field group and a simulation group. Both were able to demonstrate similar overall educational gains, but had strengths in different areas. The researchers concluded that "while the fieldwork provided an authentic experience, the simulated work provided a model-based experience that also offered visualization opportunities not possible in the field."[55]

Tablets and other mobile technologies have also made significant inroads into today's classrooms. Often, those tools are helping students better understand and communicate about the natural world. Kindergarten students at Park Tudor School in Indianapolis posted a YouTube video about how they use iPads to study butterflies. The class supplemented their in-class butterfly life-cycle lesson, which included watching a real caterpillar develop into a chrysalis and butterfly, with other learning made possible with mobile technology. The children viewed pictures and videos of butterflies on their iPads, went out to their school garden with their tablets to take pictures and videos of butterfly habitats, used drawing programs to make pictures of their own, and created a video on their iPad about what they learned.

New technologies also help connect students, spur inquiry, and drive collaborative learning. In Chicago, students in three classes across the city worked collaboratively to study bats with the help of social media. Students in three different grade levels used a shared blog to take on a project they called Bat Bonanza. First graders learned about bats from paper books, then used their iPads to create pictures and a podcast with information and questions about bats. Fourth graders used online tools to research the younger students' questions and created an online presentation with what they learned. Then sixth graders did research of their own about a controversial issue around bat management, and created a video for the other students to watch. At the end of the project, all three classes were able to meet virtually in a Google Hangout, where they could talk and share ideas through online video.[56]

54 McDonnel, S. (2013). *Schools Moving Toward Digital Textbooks*. News 13 Bright House Networks. http://www.cfnews13.com/content/news/cfnews13/news/article.html/content/news/articles/cfn/2013/1/28/schools_moving_towar.html.

55 Smetana, L.K., & Bell, R.L. (2012). *Computer Simulations to Support Science Instruction and Learning: A Critical Review of the Literature*. International Journal of Science Education, 34(9), 1337-1370.

56 Bat Bonanza. http://vimeo.com/63830449#.

These kinds of tools for learning were not possible even five years ago, and today they link classrooms in shared explorations that encourage the kinds of learning that are essential for developing environmental problem solvers. Although more research is needed to understand how technology in the classroom is affecting learning, it is clear that technological changes have already swept through American schools. While it may not be clear exactly how these changes affect student performance over the long term, when used well, technology represents a tool that can foster environmental literacy.

THE FLIPPED CLASSROOM: USING SCHOOL TIME FOR INTERACTIVE LEARNING

Many classrooms have been experimenting with something called the "flipped classroom." A flipped classroom uses a variety of types of technology (video lectures, podcasts, e-books, online collaboration) to help students learn on their own. For example, by having students review on-line lectures in advance of class, a teacher can then use class time for more engaging and active project-based learning. Instead of being the expert, the teacher can become the facilitator helping guide students, allowing the learning to become deeper and more meaningful. With this type of learning, the teachers become "the guide on the side," rather than the "sage on the stage."

The Bottom Line: Tectonic Shifts in Technology

From 3-D printing to wearable technology to augmented reality, the future of technology promises exciting opportunities for learning. But environmental educators need to learn more about how technology enhances environmental literacy, and how to choose when to use technology and which technology strategies will best meet environmental literacy objectives. For example, some people question if technology prevents more people from getting in touch with nature, given the hours people spend on their computers, phones, and electronic games. If technology does influence time spent outdoors, what impact will that have on how much people care about the environment and are willing to get involved?

How can educators ensure that technology helps enhance environmental literacy? Some of the specific areas that the environmental field should focus on include:

- Conduct research about how technology enhances environmental learning. Educators need more and better information to make choices about when to use technology to achieve specific environmental literacy objectives.
- Create criteria for when to use technology in formal, K-12 environmental education to help educators grappling with factors such as training, accessibility, expense, maintenance, learner engagement and motivation, etc.
- Develop educational experiences that help learners of all ages find and assess online environmental information, and redouble efforts to build critical thinking and research skills so that Americans can best judge the credibility of their online information sources.
- Provide targeted training to help educators become more aware of the quickly developing opportunities for using technology in environmental education.
- Encourage leaders in the environmental education field to adopt new technologies as appropriate to help demonstrate how digital tools can help advance environmental literacy.

chapter

4

The Greening of the American Education System

CHAPTER 4

The Greening of the American Education System

The complexity of the challenges we face demands a fundamental environmental literacy of all citizens that embraces the realities of diverse cultural perspectives, trans-generational time frames, and local to global connectedness. Our educational system must instill understanding of the world as coupled natural and human systems involving complicated, multi-scale interactions and having the potential for complex behaviors such as tipping points. The scope of these efforts should be wide and inclusive of attracting a diverse mixture of young people to interdisciplinary careers and of life-long learning for all. The educational tools and approaches we have used in the past are not appropriate: a K-12 system that leads to stove-piped disciplines and undergraduate majors.

--National Science Foundation, 2010

Environmental education may be on the verge of a tipping point in America's schools and institutions of higher education. From preschool through college, there are more opportunities than ever for students to become engaged in environmental education. The past ten years have seen an explosion in interest in connecting young children to nature, which has invigorated environmental education in preschools and other early learning centers. Thousands of schools are now part of the budding Green Schools Movement and are working to cut their environmental impact while they boost environmental learning. We have seen a more organized push for legislative support for environmental education in K-12 programming, and the Department of Education has stepped up to support high- achieving green schools with the Green Ribbon Schools awards program. In higher education, colleges and universities are greening their campuses and their curriculum, with the Princeton Review publishing an annual guide to Green Colleges to help students find and learn about more than 320 colleges and universities focused on sustainability.

Although the American education system is incorporating environmental education into all levels of instruction, from preschool to university, the pace and impacts are uneven. This chapter explores how environmental literacy is being institutionalized in the American education system, and where there are opportunities to accelerate our efforts to achieve a more environmentally literate society.

How Environmentally Literate Are American Students?

The only national measure of American students' environmental literacy has been conducted with middle school students. In 2008, researchers administered the National Environmental Literacy Assessment to more than 2,000 sixth and eighth grade students across the United States in the first broad scale attempt to study American children's environmental literacy.[57] The survey assessed students' environmental sensitivity, ecological knowledge, environmental emotion (attitudes), issue and action skills, verbal commitment (willingness to act), and actual commitment (behavior).

The results show that eighth graders outscore sixth graders on knowledge and skills, while sixth graders top eighth graders in affective and behavior measures. This suggests that students gain ecological knowledge as they mature, but increasing sensitivity or action does not necessarily accompany this growing knowledge.

Using the National Environmental Literacy Assessment as a baseline, a second phase of the project has used the data to determine if students at schools with high-quality environmental education programs have higher levels of environmental literacy.[58] The results clearly demonstrate that students in schools with exemplary environmental education programs have higher levels of environmental literacy. Particularly encouraging is the greater improvement in environmental literacy among the eighth grade students. The researchers note that in many of the "EE schools," environmental education programming is sequenced across the grades, so that by eighth grade, students have had more exposure to environmental education. More exposure leads to higher levels of literacy.

In a global study of young people's knowledge and attitudes about the environment, students in the United States scored below average for their counterparts in developed countries. Every three years, the Organization for Economic Co-Operation and Development's (OECD) Programme for International Student Assessment (PISA)[59] conducts a major study of young people's knowledge and skills in nearly 60 countries, including both OECD and non-OECD nations. In 2006, PISA focused on students' science knowledge, and produced a report called "Green at Fifteen?" that looked specifically at data related to what students know about the environment and environmental issues, their attitudes about the environment, and where they learn about the environment.

The results indicate that American students score below average among OECD nations. While, on average, 19.2 percent of young people score at the highest level of proficiency in environmental science, by contrast, 17.1 percent of American students reached this highest level. For reference, 30.9 percent of students in Finland score at this level, along with 28.4 percent of Japanese students, and 26.3 percent of Canadian students. On average, 15.5 percent of students in all OECD nations scored at the lowest level of proficiency, but 17.3 percent of American students fell into this category. Interestingly, young people across the PISA assessment named school as the place where they learn about the environment, more than any other source of information.

57 McBeth, W., & Volk, T.L. (2010). *The National Environmental Literacy Project: A Baseline Study of Middle Grade Students in the United States*. The Journal of Environmental Education, 41(1): 55-67. https://www.coloradocollege.edu/dotAsset/1d55e032-7b6a-4741-af72-c3b9d069f0db.pdf.

58 McBeth, B., Hungerford, H., Marcinkowski, T., Volk, T., & Cifranick, K. (2011). *National Environmental Literacy Assessment, Phase Two: Measuring the Effectiveness of North American Environmental Education Programs with Respect to the Parameters of Environmental Literacy:* Final Research Report. National Environmental Literacy Project. http://www.oesd.noaa.gov/outreach/reports/NELA_Phase_Two_Report_020711.pdf.

59 Programme for International Student Assessment. (2009). Green at Fifteen? *How 15-Year-Olds Perform in Environmental Science and Geoscience in PISA 2006*. OECD. http://browse.oecdbookshop.org/oecd/pdfs/free/9809071e.pdf.

Environmental Education in Early Childhood

Scientists now understand that early childhood — from birth to age eight — is a vital period in human development, shaping our future learning, health, behaviors, and more. As a result, early childhood education is receiving increasing attention from many sectors, including the environmental education community. From an environmental education perspective, early childhood education represents an opportunity to build a foundation for environmental literacy by connecting young children to nature and providing experiences that we know will help young people get a great start in life. Educators know that outdoor environments — with their ever-changing colors, textures, and places to explore — offer particularly rich learning environments for young children.

As the benefits of spending time in nature become clearer, preschools across the country are reimagining their outdoor spaces, bringing natural elements in for their students to experience and explore. Gardens, forts, bird feeders, and more are making a comeback in many preschools. Nature preschools, which typically operate out of a nature center or other environmental education facility, are also gaining popularity. In these schools, children spend a significant portion of their school day outside exploring.

To help provide educational resources to the growing nature-based early childhood education sector, many environmental education providers now offer curriculum materials specially designed for young learners. For example, two prominent environmental education providers—Project Learning Tree (PLT) and Project WILD—both have new early childhood curriculum guides and training programs. The North American Association for Environmental Education (NAAEE) also provides guidelines focused on early childhood environmental education, which is part of their National Project for Excellence in Environmental Education. NAAEE also has launched a new national alliance, the Natural Start Alliance, to support and advance environmental education in early childhood, with participation from a far-ranging coalition of groups focused on providing high-quality early childhood education.

Despite the rapid growth in this sector, research is lacking about what works in early childhood environmental education.[60] While it is well understood that nature-based instruction has cognitive, emotional, and other developmental benefits, the long-term impacts of nature-based instruction programs in early childhood is not yet well understood, including the impact on environmental stewardship and how caring about the environment at an early age influences feelings and behaviors in the future. We also need a better understanding about dosage — how much time in nature is enough to affect learning and environmental literacy? — and what kinds of activities are most effective.

BRIGHT SPOT:
THE NATURE PRESCHOOL AT IRVINE NATURE CENTER

When students arrive at the Nature Preschool at Irvine Nature Center just outside of Baltimore, Maryland, they meet in a traditional classroom, sing songs, play with toys, and interact with friends and teachers. But before long, they put on their boots and head out to their other classroom: more than 100 acres of woodlands, wetlands, and meadows. When they get outside — which they do every day, rain or shine — Nature Preschool students do what comes naturally to young learners: explore. As they explore with their teachers, they're also building valuable skills and knowledge for kindergarten and beyond, in areas such as language and literacy, early math, arts and music, and more. According to the Nature Preschool at Irvine, "We believe it is every child's right, as an integral part of the natural community, to develop a foundation of academic skills through encounters in the natural world."[61]

60 Davis, Julie M. (2009) Revealing the research 'hole' of early childhood education for sustainability : a preliminary survey of the literature. Environmental Education Research, 15(2), pp. 227-241.

61 http://www.explorenature.org/nature-preschool/about-the-nature-preschool/.

No Child Left Inside

Despite the documented benefits of environmental education for boosting student performance, integrating environmental education into the formal K-12 curriculum remains a challenge in many American schools. Because of the pressures of standardized testing that began with the implementation of the No Child Left Behind Act, teachers continue to report concerns about taking time away from mandated curriculum to insert environmental education.

It is not just environmental education that's being squeezed out of classrooms. According to a 2008 Center on Education Policy report on the impact of the No Child Left Behind Act on elementary instructional time, schools spend more time on reading and math, which are the subject areas tested.[62] According to the report, the shifts were relatively large — increasing time in reading and math by 43 percent on average, and decreasing instructional time in other subjects by 32 percent on average. The report also found that school districts increased reading and math instructional time by making substantial cuts to social studies, science, art and music, physical education, recess, or lunch.[63]

Responding to the need for more support for environmental education, leaders in the environmental education field launched the No Child Left Inside (NCLI) initiative to help better integrate environmental education into K-12 education and give teachers the training and support they need. Led by the Chesapeake Bay Foundation, the environmental education community formed a coalition of more than 2,000 organizations representing business, health, youth, faith, recreation, environment, and education to support the No Child Left Inside Act. The Act is designed to help ensure that every student achieves basic environmental literacy as part of his or her education. If passed, the Act would provide support to states that have developed a state environmental literacy plan. The U.S. House of Representatives approved the Act in 2008, but the Senate did not vote on it. Updated versions of the bill were introduced in 2011 and 2013. The NCLI coalition is hopeful that the Act will move forward.

States, however, have not waited for the passage of national legislation. Many states have begun to develop and implement Environmental Literacy Plans (ELPs) that outline how partners can work together to strengthen environmental education and outdoor experiences for young people and educators. Thirteen states have already approved and begun implementing their state literacy plans.

BRIGHT SPOT:
TAKING CLASSROOMS OUTSIDE

While growing numbers of schools are greening their campuses and classrooms, not every lesson is best taught on school grounds. Sometimes, kids need to get outside — way outside — to learn about how the natural systems around them work. For students on the West Coast, NatureBridge brings science lessons to life with overnight field programs in Yosemite, Golden Gate, Olympic, Santa Monica Mountains, and Channel Islands National Parks. Many programs also involve students in service learning projects that help them see the connections between their own actions and the health of the natural world. Evaluations of NatureBridge programs demonstrate that they have long-term educational impacts, strengthen teacher effectiveness, and encourage stewardship among students.

While trips to national parks can make science stunning, the costs associated with taking students off campus are often a barrier, especially in schools serving large numbers of low-income families. In San Francisco, a coalition of funders called the Environmental Education Funders Consortium have pooled their funding to help provide a "transportation fund" that allows low-income schools in the Bay Area to apply for field trip support. It is part of Science By Nature, a non-profit initiative to provide "one-stop shopping" for science and environmental education programs in the San Francisco Bay area. (See http://www.sciencebynature.org/ for more information.) The Oregon Forest Resources Institute, which is state funded, also offers free transportation for trips to visit forests. (See http://learnforests.org/resource_article/online-reimbursement-form for more information.)

62 Center on Education Policy. (2008). *Instructional Time in Elementary Schools: A Closer Look at Changes for Specific Subject*. Center on Education Policy. http://www.cep-dc.org/displayDocument.cfm?DocumentID=309.

63 Blank, A. (2008). *Where Has the Third Core Subject Gone?*. Primary Science, 105: 4–6.

Teacher Preparation

Teachers who may have had little or no exposure to, or interest in, environmental topics are often called upon to teach about the environment and sustainability in their classrooms. Especially as more states pass environmental literacy plans, more and more teachers will need to be proficient in environmental education.

The Canadian experience suggests that teachers may need more instruction in ecological concepts. In a study in Ontario, Canada, where education leaders have committed to integrate ecological literacy across subject areas in grades K-12 (but have not required teachers to receive any specific pre-service instruction in ecology), pre-service teachers were unable to correctly define three-quarters of the ecological terms the researchers tested.[64] Similar research in the United States reveals that many student teachers have incorrect or incomplete conceptual understandings of the environment.[65]

Unfortunately, the past decade has not brought large advances in preparing classroom teachers as environmental educators. Most state literacy plans thus include specific provisions for teacher education.

In 2007, NAAEE crafted standards for the accreditation of teacher education programs in environmental education. Because teacher education programs renew their accreditation only every seven years, and because the number of environmental education programs is relatively small, the impact of this initiative is not expected to be felt quickly. It is an important step, however, because it puts environmental education at the table with other major disciplines, and it helps ensure that programs that prepare people to become environmental educators meet standards in line with those described in other areas of the Project for Excellence in Environmental Education.

64 Puk, T.G., & Stibbards, A. (2012). *Systemic ecological illiteracy? Shedding light on meaning as an act of thought in higher learning.* Environmental Education Research, 18(3), 353-373.

65 Moseley, C., Desjean-Perrotta, B., & Crim, C. 2010. *Exploring preservice teachers' mental models of the environment.* In: Bodzin, A. M., Shiner Klein, B., & Weaver, S. (Eds.). (2010). *The inclusion of environmental education in science teacher education.* Springer Science+Business Media. pp. 209-223.

Professional development programs can be effective, such as the Environmental Education and Training Partnership and the Expanding Capacity Through Environmental Education Project (read more about both programs), but no data exists today about the reach of environmental education programs across the nation. We simply don't know how well the environmental education field is serving teachers and their professional development needs.

While classroom teachers may need more background instruction related to environmental themes and environmental education, professional environmental educators have different needs. A 2009 needs assessment gleaned from interviews, focus groups, and surveys of environmental educators indicates that the immediate needs in professional development among environmental educators relate to instruction in how to:

- Conduct comprehensive EE programs with diverse audiences in local communities.
- Share models of what succeeds, collaborate, and network.
- Address environmental sustainability, stewardship, and climate change.
- Apply research knowledge to practice about how to:
  - » motivate for citizen participation, action, attitude and behavior change;
  - » connect others with nature;
  - » engage diverse audiences and partners;
  - » help students learn;
  - » instruct adults;
- Comprehend and apply basic EE fundamentals, core concepts and instructional techniques, and the Guidelines for Excellence.
- Teach and implement critical thinking skills, problem solving skills, and inquiry.
- Integrate EE into K-12; Science, Technology, Engineering and Math projects; No Child Left Behind; the Common Core State Standards Initiative, and the Next Generation Science Standards.

- Increase funding, leadership, administrative/executive skills, and communication skills.

- Perform needs assessments, build evaluation into program design, develop objectives, and conduct outcomes evaluation.[66]

NEW STANDARDS FOR A NEW GENERATION

In an effort to raise the bar for American students, the National Governors Association and the Council of Chief State School Officers have created a common set of standards in English language arts and mathematics. Called the Common Core State Standards, the standards are voluntary, and have been adopted by 45 states and the District of Columbia. The goal of the standards is to have one common set of guidelines across states that enable students and teachers to focus on the same learning goals. New standards for science education, called the Next Generation Science Standards, have been developed by a different team, which includes the National Research Council, the National Science Teachers Association, and the American Association for the Advancement of Science. The team has created a framework for K-12 science education, and, in the next step in the standards' creation, states will use the framework to create the Next Generation Science Standards. For environmental education groups working at the national level, the Common Core and Next Generation standards could help to streamline the infusion of environmental learning into the curriculum across states. Many are hopeful that the introduction of national standards for science education (as well as parallel efforts for social studies), which include more of an emphasis on environmental education than past standards, might reinvigorate science teaching in the early grades, where math and literacy have taken center stage because of testing requirements.

The Green Schools Movement

Green Schools by the Numbers

- America's schools spend more than $7.5 billion annually on energy — more than they spend on textbooks and computers combined.

- On average, green schools use 33 percent less energy and 32 percent less water than conventionally constructed schools, significantly reducing utility costs.

- A typical green school saves $100,000 per year on operating costs, enough to hire at least one new teacher, buy 200 new computers or 5,000 textbooks.[67]

While work to improve environmental education capacity continues at the federal and state levels, individual schools that recognize the benefits of environmental education and sustainability are working from the ground up. These schools are part of what many refer to as the Green Schools Movement.

The movement is loosely organized, with schools acting alone or with one or more organizations to improve their environmental performance and their students' environmental literacy. Programs such as National Wildlife Federation's Eco Schools and Project Learning Tree's GreenSchools! offer support to schools, and groups such as the Green Schools National Network and the U.S. Green Building Council are helping provide leadership for the movement. A Green Schools National Conference has also been launched to bring likeminded schools and education providers together.

The U.S. Department of Education endorsed the Green Schools Movement for the first time in 2012 by naming its first cohort of "Green Ribbon Schools." In much the same way that the Department recognizes "Blue Ribbon Schools" for academic achievement, "Green Ribbon Schools" are leaders in reducing environmental impacts, improving health, and offering high-quality environmental education. In the first year, more

66 Fleming, M.L. (2009). *Environmental Education Professional Development Needs and Priorities Study. Environmental Education and Training Partnership*. http://cms.eetap.org/repository/moderncms_documents/eetap_pd_needs_and_priorities_report.1.1.1.1.1.1.1.1.1.1.pdf.

67 http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH10_Schools; The Center for Green School. (n.d.). *Green Schools Save Money*. U.S. Green Building Council. http://www.centerforgreenschools.org/cost-savings.aspx.

than half of states nominated schools for the recognition, and in all, 78 schools were honored.

BRIGHT SPOT:

PROJECT LEARNING TREE'S GREEN SCHOOLS! PROGRAM

Project Learning Tree (PLT) is an international environmental education program that uses the forest as a window on the world to increase students' understanding of the environment, stimulate students' critical and creative thinking, and motivate them to take responsible action on behalf of the environment. In 2008, PLT launched its GreenSchools! program to help students, teachers, and staff create healthier schools that also save money. Today, there are over 2,000 PLT green schools creating change across the country. At Service To All Relations (STAR) school in rural northern Arizona, all the students are Native American. The school was established on the belief "that small community schools can deliver a superior education — even in a community with few jobs, no public utilities, high drop-out rates, and a history of conflict between governmental institutions and the people they are supposed to serve." The school's green, sustainable infrastructure helped earn it its designation as one of the U.S. Department of Education's inaugural Green Ribbon Schools in 2012.

Connecting Classrooms and Communities

Wood Middle School in Alameda, California, sits just blocks from San Francisco Bay. In 2008, teachers and administrators at the school decided to take advantage of the location by linking science teaching to real-world projects aimed at cleaning up the environment around the Bay. Through the Service Learning Waste Reduction Project, students collect data, science teachers help the students interpret it, and together they identify projects the students can take on.

According to Principal Jeff Knoth, the service learning approach is paying off for students and the community. He says, "Our students are really engaged in this work. Because they feel a strong connection to the beach near our campus, they also have a sense of responsibility for keeping our campus and community clean. They understand the impacts of pollution and litter. Their efforts have beautified our campus and improved the overall sense of pride at Wood Middle School."

The numbers back him up. Before the service learning program was implemented 38 percent of students scored as proficient or advanced on California's standardized test for eighth graders. By 2010, the score climbed to 59 percent, and teachers credit the service-learning program for the gains.[68]

Wood Middle School does not appear to be an anomaly. In fact, a study analyzing National Education Longitudinal Study (NELS) data indicates that students who participated in service-learning programs in middle school scored 6.7 percent higher in reading, 5.9 percent higher in science, and 4.6 percent higher in math in a standardized high school exam than those who did not perform community service as part of a course.[69]

Service learning projects not only help improve academic performance and standardized test scores, but environmental educators often regard this type of learning as among the most effective for building environmental literacy. Well-designed service learning projects give students the opportunity to experience hands-on learning, moving through the experiential learning cycle so they can apply what they're learning in new contexts. Service learning projects also have the potential to encourage learning in all of environmental literacy's domains — knowledge, attitudes, skills, and behaviors — in ways that few other learning opportunities provide.

68 Stop Waste at School. (2010). *Service-Learning Supports Achievement at Wood Middle School.* Stop Waste at School. http://schools.stopwaste.org/share/middle-school/wood/365-service-learning-supports-science-achievement-at-wood-middle-school.html.

69 Dávila, A., & Mora, M.T. (2007). *Civic engagement and high school academic progress: An analysis using NELS data.* The Center for Information & Research on Civic Learning & Engagement. http://www.civicyouth.org/PopUps/WorkingPapers/WP52Mora.pdf.

Despite its well-known benefits, service learning appears to be on the decline in American K-12 schools. According to a report from the Corporation for National and Community Service, service learning opportunities ballooned in the 1980s and 1990s. But the trend appears to have reversed, with the percentage of schools offering service learning opportunities declining from 32 percent in 1999 to 24 percent in 2008.The report suggests that service learning faces similar challenges to environmental education in schools that are facing increasing pressures from shrinking budgets and expanding testing requirements.[70]

On the other hand, students at colleges and universities are demanding richer programs that offer deeper engagement in their communities. According to the Kettering Foundation, there is a growing movement of students, faculty, and administrators who want to move higher education's community-outreach strategy beyond the conventional community-service approach. A number of colleges and universities have gone so far as to rename their service-learning efforts as "civic engagement."[71]

Higher Education Embraces Sustainability

With enrollment in higher education surging over the past several decades, universities are becoming an increasingly important venue for building environmental literacy. According to the U.S. Department of Education, between 2000 and 2010, enrollment in American colleges and universities increased 37 percent. In fall of 2011, over 21 million students attended American institutions of higher learning.[72]

University students represent a large, natural audience for environmental education, as colleges and universities prepare students for taking on the challenges of the wider world, including the challenges of sustainability. The extent to which students are prepared to tackle these challenges in their professional lives will help determine how effectively we meet global challenges.

Recognizing the critical role of higher education in addressing sustainability goals, higher education leaders from around the globe gathered in Rio de Janeiro in 2012 at the United Nations Conference on Sustainable Development (Rio+20) and signed on to a declaration committing to:

- Teaching sustainable development concepts;
- Encouraging research on sustainable development issues;
- Greening their campuses;
- Supporting sustainability efforts; and
- Engaging with and sharing results through international frameworks.

As the Association for the Advancement of Sustainability in Higher Education notes in its Call to Action, though, revamping higher education curriculum will not be easy; it "is going to depend on the expertise and ability of approximately 1.2 million faculty in the United States who write course syllabi, sit on curriculum committees, develop student learning outcomes, and create new academic programs to integrate sustainability into their teaching as they see fit." Building environmental literacy among university students also requires interdisciplinary approaches that are new to most higher education institutions. Universities must work to find ways to maintain their disciplinary depth and strength, while also making curricular connections between social, economic, scientific, technological, and other disciplines.[73]

70 Corporation for National and Community Service, Office of Research and Policy Development, Community Service and Service-Learning in America's Schools, 2008 Washington, DC 2008. http://www.nationalservice.gov/pdf/08_1112_lsa_prevalence.pdf.

71 Robinson, A. (2012). *Living Democracy: From Service Learning to Political Engagement*. Connections, 2012: 20-23. https://www.kettering.org/sites/default/files/product-downloads/Connections_12.pdf.

72 National Center for Education Statistics. (n.d.) Fast Facts. Institute of Education Sciences. http://nces.ed.gov/fastfacts/display.asp?id=98; Knapp, L.G., Kelly-Reid, J.E., and Ginder, S.A. (2012). *Enrollment in Postsecondary Institutions, Fall 2011; Financial Statistics, Fiscal Year 2011; and Graduation Rates, Selected Cohorts, 2003–2008: First Look (Provisional Data)* (NCES 2012-174rev). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved 06/18/15 from http://nces.ed.gov/pubsearch. http://nces.ed.gov/pubs2012/2012174rev.pdf.

73 Association for the Advancement of Sustainability in Higher *Education. (2010). Sustainability* Curriculum in Higher Education: A Call to Action. AASHE. http://www.aashe.org/files/A_Call_to_Action_final(2).pdf.

The momentum for building environmental literacy on campuses is growing. Student demand is generating part of that momentum. According to research conducted by the Princeton Review and the U.S. Green Building Council, nearly 7 out of 10 prospective college students say that a school's commitment to sustainability is part of their decision-making process, and as a result, the two organizations have partnered to publish The Princeton Review's Guide to 322 Green Colleges that highlights hundreds of schools with a commitment to sustainability.[74]

In addition, the nation's community colleges represent a tremendous opportunity to train our workforce for environmental careers and green jobs that economists predict will be needed over the next 50 years. Community colleges serve as the access point to higher education for many students. With lower prices, less stringent admission requirements, and geographical proximity to more students than most institutions in other sectors, community colleges provide opportunities for education and training that would otherwise be unavailable.[75]

BRIGHT SPOT:

ARIZONA STATE UNIVERSITY'S SUSTAINABLE CITIES NETWORK AT THE GLOBAL INSTITUTE OF SUSTAINABILITY

Arizona State University (ASU) sits within Arizona's Sun Corridor—a megapolitan area that has grown exponentially over the past century. Because hyper-urbanization brings challenges along with benefits, the University has engaged the community in imagining what a sustainable future should look like, and pooling resources to make it a reality. EPA has recognized the University's Sustainable Cities Network[76] for using its research and technical capabilities in sustainability to address the front-line challenges facing cities. The Network is a collaborative that helps share information and coordinate decisions around land use, transportation, water, economic development, and social services. Partners have worked together to streamline and green city operations, advance solar and renewable energy, mitigate urban heat island, design sustainable neighborhoods, and secure water supplies in a changing climate.

Environmental Education and STEM

When you're a global corporation that depends on exacting scientific research, engineering, and technological innovation to do business, news that American students —your future workforce — are falling behind in science, technology, engineering, and math (STEM), makes you take notice, and take action. Underwriters Laboratories has made a commitment to boosting STEM learning and has sponsored research to identify the best in STEM education. Honeywell's chief executive, David Cote, says STEM education improves employment and innovation, which in turn brings more people into the field to solve problems and create new solutions.[77]

74 The Princeton Review. (2015). *Guide to 353 Green Colleges: 2015 Edition Press Release*. The Princeton Review. http://www.princetonreview.com/green-guide-press-release.aspx.

75 Baum, S., Little, K., & Payea, K. (2011). *Trends in community college education: Enrollment, prices, student aid, and dept levels*. The College Board. Retrieved July, 2, 2012. http://trends.collegeboard.org/sites/default/files/trends-2011-community-colleges-ed-enrollment-debt-brief.pdf.

76 Global Institute of Sustainability. (2013). *U.S. EPA Honors Arizona State University's Sustainable Cities Network*. Arizona State University. http://sustainability.asu.edu/news/archive/u-s-epa-honors-arizona-state-universitys-sustainable-cities-network.

77 Robinson, W. (2014). *Policymakers Hail STEM Education as a Strong Foundation, Pushing Innovation*. The Washington Post. http://www.washingtonpost.com/local/education/policymakers-hail-stem-education-as-a-strong-foundation-pushing-innovation/2014/09/01/5ad9b772-2e01-11e4-bb9b-997ae96fad33_story.html.

Total employment in STEM jobs is expected to increase by twice as much as all other jobs by 2018 and environmental science jobs are expected to grow by 25 percent by 2016 – the fastest among the sciences.[78] But it's not just about STEM focused careers. STEM education builds basic skills and increases critical thinking at early ages.[79]

Whether the focus is getting a job or getting STEM-based skills, environmental education can provide a compelling context for teaching STEM. Environmental education provides a diverse range of real-world challenges that engage students in meaningful hands-on opportunities to apply and reinforce STEM concepts across multiple subject areas

Recognizing this, National Environmental Education Week (EE Week), the nation's largest celebration of environmental education, has had a multi-year focus on connecting the environment with STEM learning. In 2013, EE Week focused on technology and in 2014 it focused on Engineering a Sustainable World — exploring how engineering plays an important part in the way we think about and solve some of today's biggest environmental problems (see box below for examples).

Environmental education engages students in meaningful and exciting projects that can spark their interest in STEM and empower them to take part in solutions to local environmental challenges. By providing students real-world problem to solve, EE builds critical thinking skills and helps create the next generation of professionals that use their STEM skills every day, no matter the profession.

SCIENCE AND ENGINEERING PRACTICES AND ENVIRONMENTAL EDUCATION

Developed by the National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve, the Next Generation Science Standards include a set of eight skills known as Science and Engineering Practices (SEPs). Below are examples of using environmental education to teach these practices through real world experiences.

SEP1: Asking Questions and Defining Problems

A class of 2nd graders visits a local nature center on a field trip. As they meander along a short wooded trail, the students notice that moss tends to grow mainly on one side of the trees. When they return to class the next day, students develop a question that they will investigate: why does moss grow mainly on the north side of the trees?

SEP2: Planning and Carrying Out Investigations

A group of students in the lunchroom debate whether a paper lunch bag should be thrown into the trashcan or the compost bin. Some argue it will take too long to decompose, and others feel the paper will break down quickly along with the food scraps. Back in class after lunch, the students design an investigation to determine how long a paper lunch bag takes to decompose.

SEP3: Analyzing and Interpreting Data

-Students monitored the water quality in a stream on their school's campus once a month for the past 6 months. As the weather warms, they notice dissolved oxygen levels decreasing each month. Concerned for the organisms that depend on the oxygen dissolved in the stream water, the students analyze trends in their data to determine a cause for the decrease.

78 National Environmental Education Week. (n.d.). *STEM & Our Planet*. National Environmental Education Foundation. http://eeweek.org/stem-our-planet-infographic.

79 Robinson, W. (2014). *Policymakers Hail STEM Education as a Strong Foundation, Pushing Innovation*. The Washington Post. http://www.washingtonpost.com/local/education/policymakers-hail-stem-education-as-a-strong-foundation-pushing-innovation/2014/09/01/5ad9b772-2e01-11e4-bb9b-997ae96fad33_story.html.

The Bottom Line: The Greening of the American Education System

All sectors of society are pushing to integrate EE into the educational system. Given that formal education is the pipeline that young people pass through on their way to becoming adult citizens, understanding this sector and how it can help create a more environmentally literate society is critical. Such an understanding requires local, state, and national efforts to:

- Develop a national measure for environmental literacy to better understand the nation's level of environmental literacy, and to measure progress over time.
- Create mechanisms to track the development and delivery of environmental education programs and educator training programs so that the field can effectively explain its impact, and identify needs and gaps.
- Ensure that pre-K to university educators are prepared to deliver environmental education by developing a more systematic and far-reaching process for preparing and supporting educators through pre-service and in-service education.
- Develop and implement State Environmental Literacy Plans for every state, and provide support for implementing and evaluating plans.
- Support state and national advocacy efforts to ensure high-quality environmental education, such as the No Child Left Inside Act, the National Environmental Education Act, and other national legislation that strengthens environmental education.
- Develop job training programs in community colleges, vocational training programs, and other educational settings that prepare students for environmental careers.
- Build sustainable schools and align teaching with the improved physical plant.

chapter

5

Americans in the Great Outdoors

Photo courtesy of OutdoorAfro

Americans in the Great Outdoors

"Nature is fuel for the soul. Often when we feel depleted we reach for a cup of coffee, but research suggests a better way to get energized is to connect with nature."

-- Richard Ryan, Professor of Psychology, University of Rochester.[80]

While many Americans enjoy the outdoors and want it protected, experiencing the outdoors is something Americans now do less often. America, like the rest of the world, has become a primarily urban nation, and the trend toward greater urbanization continues. As people live more urban lives, and as technology tempts people inside and online, maintaining Americans' connections to the outdoors has become a major theme in environmental education. New research suggests that efforts to connect people to nature and the outdoors may be gaining traction, which is good news for those hoping to develop America's environmental literacy.

Americans' Love Affair with the Great Outdoors

According to the 2006 EcoAmerica American Environmental Values Survey, a love of the outdoors is a near-universal American value, with 93 percent indicating that they love to be outdoors. Nearly the same number (92 percent) believe that kids should spend more time outdoors. A large majority (85 percent) thinks that everyone in America should have access to nearby nature trails.

According to the USDA Forest Service, Americans are trending away from "traditional" outdoor activities such as hunting and fishing in favor of activities related to "viewing and photographing nature." Ken Cordell, author of the 2012 Outdoor Recreation Trends and Futures study from the USDA Forest Service, explains, "The study shows that public lands continue to be highly important for the recreational opportunities they offer, with again, a growth in nature-based recreation, especially viewing, photographing, or otherwise appreciating nature." He suggests that public land managers should adapt to the public's changing preferences. For example, he suggests that "Orienting overnight and day-use sites on public lands to emphasize nature viewing, photography and study would seem to be an appropriate strategy."[81]

Most Americans also favor setting aside more land for wilderness. In 2008, more than two-thirds of the Americans surveyed favored designating more federal lands in their state as wilderness, while only 13 percent opposed more wilderness in their state. When asked why wilderness areas are important, over 90 percent indicated that

80 University of Rochester. (2010). *Spending Time in Nature Makes People Feel More Alive*, Study Shows. University of Rochester. http://www.rochester.edu/news/show.php?id=3639.

81 Cordell, H.K., (2012). *Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment*. USDA Forest Service. http://www.treesearch.fs.fed.us/pubs/40453.

protection of air and water quality is an important value of wilderness. Other important values included: protection of wildlife habitat, protection of wild areas for future generations, protection of rare and endangered species, and preservation of unique species.[82]

Americans Turn to Public Lands for Time Outside

Every year, people take hundreds of millions of trips outdoors in America's public lands. Many of those excursions include education and interpretation programs that help build visitors' environmental literacy. But just the experience of being outdoors in nature can contribute to increased environmental literacy. The following visitation statistics demonstrate the power of public lands to connect Americans to the outdoors.

- National Park Service: National parks receive about 280 million visitors every year, present over 95,000 education programs, and reach more than 2 million K-12 students. More than 40 parks offer educational institutes or field schools.

- USDA Forest Service: National forests receive over 165 million visitors every year. In 2008, the USDA Forest Service estimates that it reached 732,000 students and 172,000 educators with education programming. (Connecting Kids to Nature: Building Our Future Through Conservation Education)

- National Wildlife Refuges: National wildlife refuges host over 40 million visitors each year. Over 230 wildlife refuges offer interpretation and environmental education programs, and the refuge system also educates over 1 million K-12 students each year.

- Bureau of Land Management (BLM): The BLM manages over 264 million acres of public lands, mostly in the West, and most of this land is available for recreation. In 2011, more than 200,000 students and teachers participated in BLM education programs. (From Childhood Exploration to Conservation Leadership: An Update on BLM education, engagement, and youth employment programs 2012).

- Army Corps of Engineers: Corps-managed recreation areas host 370 million visitors annually, and Corps-managed waters provide one-third of America's freshwater fishing opportunities.

- State Parks: There are over 7,800 state parks in the US. They welcome over 720 million visitors per year, and offer a range of education programs.

BRIGHT SPOT:
GOOGLE TREKKER MAPS THE GREAT OUTDOORS

From cascading waterfalls in Hawaii to rugged trails in the Grand Canyon, anyone with an Internet connection can now get a trekker's-eye view of some of the most beautiful and remote places on Earth thanks to Google Trekker. With this new addition to Google Maps, people can virtually explore remote wilderness areas, helping them plan a trip, or simply get a virtual experience of a place they may never be able to visit in person.

Google has partnered with organizations to help enhance Google Maps with imagery of the backcountry. Its first partner, the Hawaii Visitors and Convention Bureau helped map some of the islands' remote trails and parks. To capture the images, a volunteer from a partner organization wears the Trekker backpack, which has 15 cameras mounted above it to capture 360-degree images as the volunteer walks. Google works with non-profit organizations, universities, tourism boards, research organizations and others to capture the images. The program offers an opportunity for groups such as tourism boards to boost outdoor tourism, and can also help conservation organizations show the world the places they are working to protect.

82 Cordell, H.K., Betz, C.J., Stephens, B., Mou, S., & Green, G.T. (2008). *How do Americans view wilderness: Part I. A wilderness research report in the IRIS series*. Internet Research Information Series. Available online: http://warnell.forestry.uga.edu/nrrt/nsre/IRISWild/IrisWild1rpt.pdf.

Tracking Americans' Time Outdoors

Despite their love of the outdoors, Americans often don't spend as much time enjoying it as they might like. Many Americans are particularly concerned about the decline in children's time outdoors in nature. In his headline-grabbing 2005 book, *Last Child in the Woods*, Richard Louv touched a nerve in American society. Many Americans felt that children seemed to be spending less time outdoors, but most adults failed to appreciate the consequences of this move indoors for both children's health and the health of the planet. In a summary of the research, *Children's Nature Deficit: What We Know – and Don't Know*, Cheryl Charles and Richard Louv explain:

> *Numerous studies offer both quantitative and qualitative indicators of changes in childhood, among them: perception of growing demands on children's time, resulting in less free and unstructured outdoor playtime in nature than experienced by previous generations; reduced mobility and less range for exploration, including reduction in walking or riding a bike to school; growing fear of strangers, traffic and nature itself; and a dramatic rise in obesity and severe overweight, as well as vitamin D deficiency and other health issues that may in part be related to low levels of outdoor activity and a sedentary lifestyle.*[83]

Time spent outdoors has been found to contribute to ecological sensitivity, a component of environmental literacy. Research has also connected the time children spend outdoors to future environmental commitment in the form of an environmental career. Because time outdoors can play a role in developing environmental literacy, parents and educators need to monitor trends in how children are spending their time.

But the research on children's time outdoors is difficult to interpret, largely because researchers define "outdoors" differently. Some look at participation in specific outdoor activities such as hiking, fishing, camping, and hunting. Other studies ask about the amount of time children spend outside in any activity, including playing organized sports, walking, or simply relaxing. Perhaps the biggest challenge is that no long-term, standardized research exists as a baseline against which yearly fluctuations can be measured.

The available research paints a mixed picture of children's time outdoors. Certainly, there is reason for concern. A 2012 study of preschool children's time spent outdoors revealed that almost half of preschoolers do not play outside with a parent even once a day. Rates were lower for girls than for boys, and were also lower for nonwhite children.[84]

This is despite the fact that, according to the Children and Nature Network, parents believe that nature experiences are good for children and often plan to support their kids in exploring nature.[85] More affluent and educated parents were more likely to hold this view than parents with lower education and income levels. But, the study finds that safety concerns and perceptions that nature experiences only happen far from home are often barriers to getting outside. A 2011study by The Nature Conservancy also reports children's perception that natural areas are not nearby, and that lack of transportation to natural areas prevents more frequent nature exploration (as well as the discomforts that can accompany a trip outdoors, such as bugs and heat).[86] This could explain the study's findings that while 88 percent of children report using a computer almost every day, just 11 percent visit a local park or natural area almost every day.

Indeed, children's media use is substantial. The 2010 Kaiser Family Foundation report, Generation M2: Media in the Lives of 8 - to 18 -Year-Olds, reports a huge increase in children's media time over the past five years. Young people increased their media use by 1 hour and 17 minutes over the past five years, for a total daily use of 7 hours

83 Charles, C., & Louv, R. (2009). Children's Nature Deficit: What We Know -- & Don't Know. Children & Nature Network. http://www.childrenandnature.org/learn/research-resources/summaries.

84 Tandon PS, Zhou C, Christakis DA. *Frequency of Parent-Supervised Outdoor Play of US Preschool-Aged Children*. Arch Pediatr Adolesc Med. 2012;166(8):707-712. doi:10.1001/archpediatrics.2011.1835.

85 Fraser, J. Heimlich, J. E. & Yocco, V. (2010). *Report Number20100226: American beliefs associated with increasing children's opportunities for experiences in nature*. Edgewater, MD: Institute for Learning Innovati on. http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/eecd/nature-based-learning/Research/americans-beliefs-associated-w-children.pdf.

86 The Nature Conservancy. (2011). *Connecting America's youth to nature*. The Nature Conservancy. http://www.nature.org/newsfeatures/kids-in-nature/youth-and-nature-poll-results.pdf.

and 38 minutes a day, every day of the week. The biggest media consumers are 11-14 year olds, who consume 3 hours a day more media than 8-10 year olds. TV and video games account for the biggest chunk of this group's increase in media use, contributing to their total use of 8 hours and 40 minutes a day.

The report also highlights another trend: Latino and African American youth consume much more media than White youth (an average of about 13 hours for Latinos and African Americans, and 8.5 hours for Whites). These differences hold up even after accounting for demographic differences such as the parent's education or whether the child lives in a one- or two-parent household.

Although kids' media use is up, it's not clear that time spent outdoors is going down proportionately. According to the 2009 National Kids Survey on outdoor recreation, 64 percent of children aged 6-19 report spending two or more hours outdoors on typical weekdays and more than 75 percent report spending two or more hours outdoors on weekend days. About half the children spend a lot of time outdoors on the weekends, reporting that they spend four or more hours outside on typical weekend days. Less than 5 percent of children reported spending no time outside.

Some of kids' time outdoors is spent with media (55 percent report listening to music or using electronics while outside, and 46 percent report reading or studying outdoors), but kids' favorite outdoor activities are just playing or hanging out (82 percent) and participating in physical activities like riding a bike or skateboarding (80 percent).

One of the issues that researchers are looking into is what type of outdoor experiences matter to environmental literacy and stewardship for both children and adults. For example, spending time in organized sports might not have the same impact as camping or hiking in more natural settings. Researchers are also looking at the impact of unstructured play outside versus guided instruction, and how each translates into developing environmental stewardship values.

RACIAL DIFFERENCES IN TIME OUTDOORS

Research suggests that Americans' time spent outdoors is not consistent among racial groups. Whites participate in outdoor recreation in far greater numbers than other racial groups. For example, the 2012 Outdoor Foundation Participation Report found that over three-quarters of young people participating in outdoor recreation are White.[87] Likewise, Whites visit national parks in far greater numbers than other racial groups.[88]

Researchers in Oregon conducted a small study to better understand the interests and motivations of African Americans, Latinos, and Asians in outdoor recreation in Oregon. The researchers found some commonalities among the outdoor experiences of the groups they examined. They note, "The social context is a very important aspect of recreation among minorities. The family group is especially important. A lot of free time is devoted to family activities, and often involves the extended family spending time together."

As a result, many families seek out outdoor recreation sites with large picnic facilities, clean restrooms, and easy access. Some groups, especially Latinos, found it difficult to find information about recreation opportunities and were often not aware of differences between different types of parks (for example, national and state parks, etc.). Of course, the authors also note that while there are differences between racial groups in the ways they think about, learn about, and use natural areas, there are often also significant differences within racial groups as well. So it's vitally important that park managers understand their specific audiences and potential users to reach out to them in the most appropriate ways.[89]

87 The Outdoor Foundation. (2012). *Outdoor Recreation Participation Report 2012*. The Outdoor Foundation. http://www.outdoorfoundation.org/pdf/ResearchParticipation2012.pdf.

88 Taylor, Patricia A., Burke D. Grandjean, and James H. Gramann. (2011). *National Park Service comprehensive survey of the American public, 2008–2009: Racial and ethnic diversity of National Park System visitors and non-visitors. Natural Resource Report NPS/NRSS/SSD/NRR—2011432*. National Park Service, Fort Collins, Colorado. http://www.nature.nps.gov/socialscience/docs/CompSurvey2008_2009RaceEthnicity.pdf.

89 Chavez, Deborah J.; Winter, Patricia L.; Absher, James D., eds. (2008). *Recreation visitor research: studies of diversity. Gen. Tech. Rep. PSW-GTR-210. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station*. 216 p. http://www.treesearch.fs.fed.us/pubs/30731.

BRIGHT SPOT:

BE OUT THERE

The National Wildlife Federation has been a leader in publicizing the importance of getting kids outside and the link to environmental literacy. Their "Be Out There" Campaign is designed to get 10 million kids outside through a number of initiatives. Here are some key messages from their "Be Out There" Campaign:

- **Children are spending half as much time outdoors as they did 20 years ago.[90]**
- **Today, kids 8-18 years old devote an average of 7 hours and 38 minutes using entertainment media in a typical day (more than 53 hours a week).[91]**
- **Sixty minutes of daily unstructured free play is essential to children's physical and mental health.[92]**

Declines in Health and Wellness

According to the Centers for Disease Control and Prevention, more than one-third of American adults are obese and at higher risk for associated diseases such as heart disease, stroke, type 2 diabetes, and certain types of cancer. The National Institutes of Health puts some of the blame for Americans' weight and health problems on our increasingly inactive lifestyles. For many people, more time spent in front of computer screens at work and at home, and more time watching TV means less time for exercise and other physical activity.[93]

Poor eating habits and lack of exercise are also contributing to weight gain among American children. Today's children experience triple the rate of obesity (17 percent) compared to the previous generation. Because physical inactivity puts youth at greater risk for obesity, coronary artery disease, stroke, high blood pressure, and diabetes, the American Heart Association recommends that children and adolescents participate in at least 60 minutes of moderate to vigorous physical activity every day. Outdoor environments offer an opportunity for kids to run, play, explore, and exercise in engaging and developmentally appropriate ways. While they're outdoors kids also can interact with friends, parents, caregivers, and others more easily than when sitting behind electronic screens. Kids who play outdoors have lower rates of asthma and allergies as well. For both children and adults, research also suggests that spending time outdoors helps reduce levels of cortisol, a key hormone associated with stress.[94]

Physicians are also increasingly diagnosing children with Attention Deficit Hyperactivity Disorder (ADHD). According to the Centers for Disease Control and Prevention, rates of ADHD diagnosis increased an average of 3 percent per year from 1997 to 2006 and an average of 5.5 percent per year from 2003 to 2007, for a total increase of 22 percent from 2003 to 2007. By 2007, 9.5 percent of children 4-17 years old (5.4 million) had been diagnosed with ADHD at some point during their lives.[95] As with obesity, spending time outdoors — particularly in natural settings — can help. Research has demonstrated a variety of benefits of nature exposure for young people with ADHD. Researchers at the University of Illinois at Urbana-Champaign's Landscape and Human Health Laboratory have examined the link between ADHD in children and contact with nature: "Specifically, ADHD kids are better able to

90 Juster, F.T., Ono, H., & Stafford, F.P. (2004). *Changing Times of American Youth*: 1981-2003. Institute for Social Research, University of Michigan. http://ns.umich.edu/Releases/2004/Nov04/teen_time_report.pdf.

91 Foehr, U.G., Rideout, V.J., & Roberts, D.F. (2010). *Media in the Lives of 8- to 18- Year-Olds*. The Henry J. Kaiser Family Foundation. http://kaiserfamilyfoundation.files.wordpress.com/2013/01/8010.pdf.

92 Gomez, J.E., LeBlanc, C., & Murray, R.D. (2006). *Active Healthy Living: Prevention of Childhood Obesity through Increased Physical Activity*. American Academy of Pediatrics. http://pediatrics.aappublications.org/content/117/5/1834.full.

93 Centers for Disease Control and Prevention. (2014). *Adult Obesity Facts*. Centers for Disease Control and Prevention. http://www.cdc.gov/obesity/data/adult.html; National Heart, Lung, and Blood Institute. (2012). What Causes Overweight and Obesity? National Heart, Lung, and Blood Institute. http://www.nhlbi.nih.gov/health/health-topics/topics/obe/causes.html.

94 Park, B.J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., & Miyazaki, Y. (2010). *The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan*. Environmental Health and Preventive Medicine, 15(1), 18–26. doi:10.1007/s12199-009-0086-.http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2793346/; McDade, T.W. (2012). Early environments and the ecology of inflammation. Proceedings of the National Academy of Sciences. http://www.pnas.org/content/early/2012/10/04/1202244109.abstract.

95 Centers for Disease Control and Prevention. (2011). *New Data: Medication and Behavior Treatment*. Centers for Disease Control and Prevention. http://www.cdc.gov/ncbddd/adhd/data.html.

concentrate, complete tasks, and follow directions after playing in natural settings. And, the greener the setting, the more the relief."[96]

BRIGHT SPOT:
RX FOR NATURE

Imagine taking your child to the doctor, and walking out with a prescription for a remedy to be taken three times per week. Except this prescription is not for medicine, but instead is for spending more time outdoors. Working with health care providers across the country, NEEF launched a program to help doctors and other health professionals' work with staff at nature centers, parks and wildlife refuges. In partnership with the USDA Forest Service, U.S. Fish and Wildlife Service, the National Audubon Society, the National Park Service, and the Bureau of Land Management, NEEF's Nature Champions to talk with young patients about the importance of getting outside and how to connect with local opportunities to do so.

Janet Ady, Senior Advisor to the U.S. Fish and Wildlife Service says that "By connecting health care providers and nature providers, we are creating a powerful force for both conservation results and healthy, smart, and curious kids. It's a natural connection."

Since the initiative has launched, NEEF, the U.S. FWS, and many other partner organizations, have been able to promote the connection between health and connecting kids to nature. As part of their program, NEEF provides pediatric health care providers with resources that include a PowerPoint presentation created by medical experts, a Children's Health and Nature Fact Sheet, prescription pads, patient brochures, and more.

Nature is good for adults too. When individuals increase their physical activity, conditions such as type 2 diabetes, cardiovascular disease, mental illness, and even life expectancy have all been shown to improve. Immersion in nature is shown to reduce pulse rate, blood pressure and stress levels.[97] But one doesn't even have to be "immersed" to experience the benefits of nature. Simply having views of trees out your window can have positive health benefits.[98] Whether a child or an adult, nature can be an aid in improving your health.

Many other organizations and agencies, including the U.S. National Park Service, with their "Healthy Parks, Healthy People" initiative, are helping others see the link between nature, healthy kids, and healthy communities.

Getting Americans Back Outdoors

Outdoor environmental education, which connects learners with nature, is a natural fit for addressing many of America's pressing health issues. Accordingly, the nation has seen a wave of support for such initiatives. The federal government is also supporting outdoor recreation and environmental education in new ways. In particular, the America's Great Outdoors Initiative hopes to recreate the links between people and nature. President Obama explained why the administration is focusing on reconnecting Americans to the outdoors:

> *Despite our conservation efforts, too many of our fields are becoming fragmented, too many of our rivers and streams are becoming polluted, and we are losing our connection to the parks, wild places, and open spaces we grew up with and cherish. Children, especially, are spending less time outside running and playing, fishing and hunting, and connecting to the outdoors just down the street or outside of town.*[99]

96 Kuo, F.E. (2001). *Green Play Settings Reduce ADHD Symptoms*. University of Illinois Landscape and Human Health Laboratory. http://lhhl.illinois.edu/adhd.htm.

97 Park, B.J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., & Miyazaki, Y. (2010). *The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan*. Environmental Health and Preventive Medicine, 15(1), 18–26. doi:10.1007/s12199-009-0086-http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2793346/.

98 Bratman, G.N., Daily, G.C., & Hamilton, J.P., (2012). *The impacts of nature experience on human cognitive function and mental health*. Annals of the New York Academy of Sciences, 1249:118-136. http://willsull.net/resources/BratmanHamiltonDaily2012.pdf; Kuo, F.E. (2001). *Coping with poverty--impacts of environment and attention in the inner city*. Environment and Behavior. 33(1):5-34. http://www.outdoorfoundation.org/pdf/CopingWithPoverty.pdf; Kuo, F.E., Sullivan, W.C. (2001). Aggression and violence in the inner city--effects of environment via mental fatigue. Environment and Behavior, 33(4):543-571. http://conservation.ufl.edu/urbanforestry/Resources/PDF%20downloads/Kuo_violence_2001.pdf.

99 Obama, B.H. (2010). *Presidential Memorandum—America's Great Outdoors*. The White House http://www.whitehouse.gov/the-press-office/presidential-memorandum-americas-great-outdoors.

After the launch of the initiative, Administration officials held listening sessions across the country to gain input for the development of the Great American Outdoors report, a blueprint for conservation action, and collected over 100,000 public comments. According to the White House Council on Environmental Quality, when implemented the initiative will result in:

- A new generation of great urban parks and community green spaces.
- Newly-restored river restorations and recreational "blueways" that power economic revitalization in communities.
- Stronger support for farmers, ranchers, and private landowners that help protect rural landscapes and provide access for recreation.
- The reinvestment of revenues from oil and gas extraction into the permanent protection of parks, open spaces, wildlife habitat, and access for recreational activities.
- A 21st century conservation ethic that builds on local ideas and solutions for environmental stewardship and connecting to our historic, cultural, and natural heritage.[100]
- A range of programs has been put in place to support the goals of America's Great Outdoors. For example, the Department of the Interior and the Department of Education have agreed to work together to strengthen programs that use public lands for education. In 2013, NEEF partnered with the National Fish and Wildlife Foundation, USDA Forest Service, and the Bureau of Land Management to offer Connecting Youth to the Outdoors Grants to support projects that connect young people to public lands for recreation, education, and volunteering.

BRIGHT SPOT:

DEPARTMENT OF THE INTERIOR EXPANDS EFFORTS TO ENGAGE YOUNG PEOPLE

In late 2013, Secretary of the Interior Sally Jewell laid out ambitious goals to engage the next generation through education, employment, and volunteer opportunities on public lands. Specifically, by 2017, the Department of the Interior will work to: develop or enhance partnerships in 50 cities to create opportunities for outdoor recreation for more than ten million young people; provide educational opportunities to at least ten million of the nation's K through 12 students annually; engage one million volunteers in support of public lands, effectively tripling the current numbers; and provide 100,000 work and training opportunities to young people.

"For the health of our economy and our public lands, it's critical that we work now to establish meaningful and deep connections between young people – from every background and every community – and the great outdoors," said Jewell. "There's no doubt that these goals are ambitious. That's why we're going to work with schools, private and non-profit partners and communities to leverage resources to help turn this vision into a reality."[101]

Research suggests that these and many other programs designed to reconnect children, and all Americans, to the outdoors may be beginning to gain traction. The 2012 Outdoor Foundation Outdoor Recreation Participation Report concludes that Americans are enjoying the outdoors in growing numbers. The report tracks Americans' participation in outdoor pursuits such as biking, hiking, walking, jogging, skiing, hunting, fishing, birdwatching, and others. According to the report, "in 2011, outdoor recreation reached the highest participation level in the past five years. Nearly half of the U.S. population enjoyed various forms of outdoor recreation. That equates to a total of 141.1 million Americans, millions more participants than 2010."[102]

100 The White House. (2012). America's Great Outdoors Initiative. The White House. http://www.whitehouse.gov/administration/eop/ceq/initiatives/ago.

101 Jewell, S.M.R. (2013). *Secretary Jewell Offers Vision for Conservation, Balanced Development, Youth Engagement in National Press Club Speech.* U.S. Department of the Interior. http://www.doi.gov/news/pressreleases/secretary-jewell-offers-vision-for-conservation-balanced-development-youth-engagement-in-national-press-club-speech.cfm.

102 The Outdoor Foundation. (2012). *Outdoor Recreation Participation Report 2012.* The Outdoor Foundation. http://www.outdoorfoundation.org/pdf/ResearchParticipation2012.pdf.

The report notes that "perhaps most significant, participation rates rose among America's youngest generations. Thanks to nationwide efforts to reconnect youth to the outdoors, more children, adolescents, and young adults got up and got outdoors in 2011." While youth participation in outdoor activities dropped from 2006 to 2008, the numbers have since stabilized and now show an upward trend. In particular, young boys reversed a downward trend in outdoor participation and added numbers for the first time since 2006. Female teenagers also turned outside in greater numbers, reaching the highest level of participation recorded in the report. In general, participation rates for all children ages 6-17 grew by one percentage point. Having kids in the house helps motivate parents to get outside, too: The report finds that adults with kids participate in outdoor recreation at higher rates than adults without kids.

So it appears that after several years of decline, American youth may be getting out in larger numbers. Participation rates, however, are not evenly represented. Caucasians have the highest rate of participation across age groups, with Asian/Pacific Islanders a close second, the Hispanic population not far behind and African Americans with lower rates. However, on average, those Hispanics who do participate in outdoor recreation tend to do it more frequently, with an average of 60 times per participant, the highest out of the four groups.[103]

The Outdoor Foundation credits recent efforts to connect kids to nature and the outdoors. A 2011 study from the Children and Nature Network finds that between 1,000 and 3,000 new nature-based opportunities for children have been established by the initiatives they surveyed. Children have new access to opportunities such as nature clubs, natural play areas, school and community gardens, trail projects, and others. In all, the survey suggests that these opportunities reached about 3 to 4 million youth. In 2009, the estimated audience for these initiatives was about 1 to 1.5 million, indicating significant growth. The study finds that many of these new opportunities have been offered to underserved youth.[104]

BRIGHT SPOT:
URBAN ECOLOGY CENTER BRINGS NATURE TO THE CITY

America's cities may not have expansive outdoor environments like national parks, but parks can be found in any city, and offer city residents opportunities to explore, relax, and learn close to home. In Milwaukee, Wisconsin, for example, the Urban Ecology Center offers city residents of all ages opportunities to use their city parks for recreation, education, and more. The organization operates a variety of education programs, youth and family programs, citizen science research projects, internships and volunteer opportunities, and more. Members can borrow canoes, camping equipment, skis, sleds, and more for free to explore the outdoors, or can use the facilities to gather for community potlucks, lectures, or education programs.

The Urban Ecology Center **started in Milwaukee's Riverside Park, which in the early 1990s was choked with invasive species, filled with litter, and plagued by crime. The park's neighbors, though, saw the potential in their city park, and came together to try to turn it around. Over a decade later, after countless cleanups and education programs led from a doublewide trailer in the park, the Center opened an award-winning community education center. After the success of the program in Riverside Park, the Center opened two more locations in the Milwaukee area to better serve students and communities in different parts of the city. As America continues to urbanize, organizations such as the Urban Ecology Center will become more and more critical in helping people maintain their connections to the natural world.[105]**

103 The Outdoor Foundation. (2012). *Outdoor Recreation Participation Report 2012*. The Outdoor Foundation. http://www.outdoorfoundation.org/pdf/ResearchParticipation2012.pdf.

104 Fleming, M.L. (2012). *Grassroots Leadership Survey: Findings of the 2011 Questionnaire*. Children & Nature Network. http://www.childrenandnature.org/wp-content/uploads/2015/05/CNNGrassrootsSurvey2011FINAL.pdf.

105 http://urbanecologycenter.org/.

The Bottom Line: Americans in the Great Outdoors

Spending time in nature brings multiple benefits for young people and adults. Not only do we know that spending time in nature can help make us healthier, but it can also help us form a connection with the natural world that can last a lifetime. However, in an increasingly urban world, with multiple distractions, how much time in nature is enough? What type of nature experiences will yield the greatest impact to creating a more environmentally literate society? Given the promise of nature and the link to environmental literacy, environmental educators should focus on efforts to:

- Commission more long-term research to understand how Americans spend time outdoors and the links between time outdoors, (including both the amount of time and the types of activities) and environmental literacy.

- Ensure that the existing research is available in a way that can best be used by practitioners and is incorporated in pre-service and in-service teaching for all educators (in formal and nonformal settings and for all ages).

- Develop a better understanding of how different audiences (reflecting a diversity of gender, race, ethnicity, culture, socio-economic status, and disabilities) think about and use natural areas and how to increase access to nature for all Americans.

- Create better strategies to help parents understand the importance of connecting kids to nature and the relationship between spending time in nature with health and wellness. Also emphasize the importance of promoting outdoor time as a social opportunity, a learning opportunity, and a play opportunity.

- Continue to build stronger partnerships with health care providers, the Centers for Disease Control, and others to ensure that health educators understand the health benefits of spending time in nature and share the information with their patients.

chapter

6

Environmental Literacy in the Corporate World

Courtesy of A Sense of Wonder Photography

CHAPTER 6

Environmental Literacy in the Corporate World

The corporate world will need to focus even more on how to integrate sustainability into all aspects of their work — responding to the demands of consumers, engaging employees in their sustainability efforts, and developing new talent for the future.

In the past decade, companies have begun promoting social good, including environmental protection, as a business strategy — not just to "do good." For example, companies are investing in innovative strategies to grow talent. Even with high unemployment, many companies struggle to fill positions with skilled workers because business is changing faster than our education system. Companies understand that teaming up with non-profits, foundations, and government to rethink how to educate future workers will build a more effective workforce and help the community at the same time.

Corporations are also increasingly reframing just what capitalism should look like. As the world's environmental and social problems have grown, companies are looking at both how to grow market share for their products and services and how to help people and the planet. Many companies are now focused on the triple bottom line: people, planet, and profit.

In this context, the corporate world will need to focus on how to integrate sustainability into all aspects of their work — responding to the demands of consumers, engaging employees in their sustainability efforts, and developing new talent for the future. Environmental educators can both foster and learn from the experience of the corporate sector, as some companies are developing innovative ways to bring environmental education to their workers. Collaboration between businesses and educators will be a powerful tool in expanding environmental literacy.

Sustainability Is Business as Usual

Corporate interest in sustainability has been growing for more than two decades, and the number and sophistication of internal sustainability education programs for employees has increased in parallel. For example, the GreenBiz Group Employee Engagement survey, conducted in March, 2014, revealed that nearly 75 percent of the 1,334 responding companies had a strong interest in educating employees about corporate sustainability goals.[106]

Sustainability programs that incorporate employee engagement components are increasingly recognized as drivers of business results. The same GreenBiz study found that 63 percent of companies with advanced sustainability employee education programs are harnessing sustainability as a foundation for innovation, new products, and new markets. One of the survey's most encouraging findings was that, among those companies, employees reported that they were highly motivated to incorporate sustainability into their jobs due to their concern for the environment and society. The survey also found that companies have been moving away from education programs based on online training modules to methods that are based on more human interaction such as green teams and employee networks.

Although the responsibility for the majority of employee sustainability education programs continues to rest with corporate social responsibility departments, there is increasing awareness of the critical role that human resources departments can play, and of the communication gap that often exists between sustainability and human resources professionals. But given their mutual interests, there is tremendous potential for the two disciplines to collaborate to foster a knowledgeable, engaged workforce that harnesses, and measures, the benefits of employee engagement in sustainability.

106 GreenBiz (2014): *Sustainability and Employee Engagement: The State of the Art*. http://www.greenbiz.com/research/report/2014/09/08/sustainability-employee-engagement.

BRIGHT SPOT:
SPOTLIGHTING SUSTAINABLE PRODUCTS FOR CONSUMERS

At one time, environment-conscious shoppers who wanted to make a statement with their shopping dollars had to do a lot of research to understand how products were made, what the companies' policies were, and what alternatives existed. Today, that same environment-conscious consumer can walk into almost any store in the nation and easily select products that align with his or her values simply by looking at the products' packaging. The past decade has seen a boom in labeling programs for environmentally or socially responsible products to help consumers quickly identify approved products. Take seafood, for example. While Americans have a huge appetite for fish and other seafood, a vast majority also want to feel good about the choices they make. To help guide consumers to ocean-friendly choices, a variety of labeling programs have emerged and now adorn seafood packages, or can be easily accessed online. The Marine Stewardship Council (MSC) operates the largest seafood labeling program, with corporations as large as McDonald's printing the MSC label on the packaging of their fish sandwiches. The Monterey Bay Aquarium and Blue Ocean Institute also offer popular seafood rating programs.

Of course, green labels are not restricted to seafood. Labels now help consumers find products that are certified organic, rainforest-friendly, produced without genetically modified organisms, locally sourced, fair trade, energy efficient, humane, recycled, recyclable, and more. Smartphone apps such as the GoodGuide go beyond labeling and allow consumers to scan a product's barcode and pull up ratings on the product's impacts on people and the planet.

There are now so many labeling systems that they may not be as useful as they once were, and not all products live up to their certification claims. Labels nevertheless reflect a growth in consumers' awareness and their power to drive change. It's also critical that environmental education continues to educate consumers to be aware of false labels that don't really signify a sustainable product, such as natural, all-natural, or fresh.

Capitalizing on Employee Engagement

In 2009, NEEF released *"The Engaged Organization,"* a report on environmental education in the corporate sector. Based on a survey of over 1,000 professionals interested in business and environmental issues, the report concluded that the nation has entered a new phase of engaging corporations in solving environmental problems. At the start of the environmental movement in the 1970s, a major focus was on regulating business and industry. In the 1980s, the focus shifted to convincing business leaders that sustainability contributes to the bottom line. In the third phase, leading companies recognize that greening their products and operations is a source of value and that all employees must be engaged in the effort to ensure its success.[107]

This trend is significant in terms of employee education and engagement. Many companies are using a number of tools and techniques to attract, engage, and retain employees, from having them complete a personal sustainability plan to asking for suggestions from the employees to help reduce waste, water, or energy use, and rewarding efforts to take part in community efforts focused on protecting the environment, including Earth Day Fairs and volunteering for specific projects such as cleaning up, replanting, and greening the community. For example, Toyota and Microsoft reward employees for donating time to environmental and social efforts in the community, with the companies matching volunteer time and donations to help protect the environment or address other social issues. Many companies also give awards to employees or teams who contribute to sustainability within the company. In the effort to engage employees around sustainability, employers have become environmental educators. Seventy-five percent of companies responding to the NEEF survey educate their employees about their company's sustainability goals. The study shows that employers value employees' knowledge around sustainability and the environment. Over half of those surveyed (65 percent) said they value job candidates' knowledge around the environment and sustainability, and more than three quarters (78 percent) think that kind of knowledge will be an even more important hiring factor in the next five years.

Perhaps the growth in employee engagement around issues of sustainability has made both employees and employers savvier about what programs can accomplish. According to Brighter Planet's 2011 "Greening the Workplace" report,[108] companies promoting sustainability among their employees grew by 5 percent from 2009 to 2011, (more than half of companies surveyed now promote sustainability frequently or very frequently). But the number of programs considered "very effective" dropped by 8 percent over the same time period. The report found that the most successful employee engagement programs enjoy upper-level leadership.

Not only are the most effective programs supported by the highest levels of leadership, but the Brighter Planet report also finds the most successful programs go beyond the traditional focus areas of waste and recycling, energy use, and commuting. Highly effective sustainability programs have branched out into business travel, purchasing, water use, and food. The research also revealed that organizations that offered employees a way to share ideas about issues of sustainability were six times more likely to have a very effective program.

NEEF's Engaged Organization report finds that companies are seeking more support in developing education programs. In particular, they point to the need for more educational information, training materials, third-party partners, effective metrics to measure their impact, and forums for sharing ideas and experiences. Unsurprisingly, companies named time, money, resources, and executive support as key barriers to engaging employees around sustainability and the environment.

107 NEEF. (2009). *The Engaged Organization: Corporate Employee Environmental Education Survey and Case Study Findings*. NEEF. http://www.neefusa.org/BusinessEnv/EngagedOrganization_03182009.pdf.

108 Brighter Planet. (2011). *Greening the workplace 2011: Engaging employees to benefit the planet and the bottom line*. Brighter Planet. http://www.climateaccess.org/sites/default/files/Brighter%20Planet_Greening%20the%20Workplace%202011.pdf.

Corporate Responsibility Strengthens Companies

Tim Mohin, director of corporate responsibility for Advanced Micro Devices and author of the book *Changing Business From the Inside Out: The Treehugger's Guide to Working in Corporations* [109] has been looking at trends related to Corporate Social Responsibility. He cites, for example, a 2008 PriceWaterhouseCoopers study that found that 88 percent of Millennials (born roughly between1980-2000) choose employers based on strong Corporate Social Responsibility (CSR), and 86 percent would consider leaving if the values no longer met their expectations. He also highlighted several other growing trends related to business and sustainability, including:

- An increase in new jobs for CSR professionals
- A link between CSR and engaged and satisfied employees. A Hewitt & Associates study looked at 230 workplaces with more than 100,000 employees and found that the more a company actively pursues environmental and social efforts, the more engaged its employees are.
- Corporate social responsibility leaders will be increasingly accountable for responsible behavior all along their supply chains.
- In comparing companies that have strong sustainability programs with companies that have poor ones, in the former morale was 55 percent better, business process were 43 percent more efficient, public image was 43 percent stronger, and employee loyalty was 38 percent better (from a survey from the Society for Human Resources Management)

BRIGHT SPOT:
BAXTER ENGAGES EMPLOYEES

"Baxter's aspirations as a healthcare company are tightly interwoven with our sustainability priorities. Just as our mission is to save and sustain lives, we are committed to helping our many global stakeholders thrive by creating lasting social, environmental and economic value in how we do business."

-- Robert L. Parkinson, Jr. Chairman and Chief Executive Officer, Baxter, July 2013 [110]

Baxter International is a global healthcare company with more than 48,000 employees worldwide. For the fourth consecutive year, Baxter ranked first in the healthcare category and 18th overall in the U.S. list of the 2012 Green Rankings produced by Trucost and Sustainalytics and published in Newsweek magazine. In 2009, employees in more than 70 facilities in 25 countries sponsored events that promoted earth-friendly activities and sustainable living while teaching employees about Baxter's commitment to creating a more sustainable world. The company's inaugural "Baxter World Environment Week" coincided with the United Nation's World Environment Day held each year on June 5. Employees conducted more than 200 activities at facilities worldwide. Many activities focused on encouraging employees to recycle, use alternative transportation, or learn more about environmental issues. More than 20 volunteer events allowed employees to log more than 500 volunteer hours cleaning-up local neighborhoods. Facilities also shared information with employees about how Baxter is reducing its own environmental impact. [111]

109 Mohin, T. J. (2012). Changing business from the inside out: a treehugger's guide to working in corporations. Berrett-Koehler Publishers.

110 Parkinson Jr. R.L. (2013). *Sustainability at Baxter-From the Chairman and CEO. Baxter*. http://www.sustainability.baxter.com/documents/reports/2012/2012SustainabilityReport.pdf.

111 Baxter. (2012). *Press Release 2012*. Baxter. http://www.baxter.com/news-media/newsroom/press-releases/2012/11_05_12_sustainability.page.

Growing a Work Force for the Future

Today, 65 percent of global companies and more than 80 percent of companies in fast-growth economies are having problems finding employees with the skills they need, according to HR firm Towers Watson. Attracting employees with critical skills will become even more challenging in the next decade.

Among the critical skills are those needed to help support company sustainability efforts: STEM, systems thinking, financial accounting that includes natural capital analysis, technical tasks, and outreach techniques, as well as the ability to work with multiple stakeholders representing diverse interests and backgrounds. Developing this talent will require infusing sustainability education into a diverse array of post-secondary education, from vocational training to college degree programs to business schools.

Many educators feel that we are missing an important opportunity for training future workers who have 21st century skills by not teaching more about environmental sustainability in technical and vocational education and training, also called TVET. Currently, nearly half of all high school students and about one-third of college students in the United States are involved in vocational programs as a major part of their studies. According to the Association for Career and Technical Information, more than 40 million adults — one in four — engage in short-term, postsecondary occupational training. In addition, more than 94 percent of high school students and 12 million postsecondary students take part in *Career and Technical Education* , which includes high schools, career centers, community and technical colleges, four-year universities, and other learning opportunities.[112]

Business schools can also play an important role in supporting sustainability education for tomorrow's business leaders. For example, the University of Michigan's Erb Institute offers dual MBA/MS degrees in Global Sustainable Enterprise. The program's mission is to turn out global business leaders that are expert in "harmonizing economic, environmental and social interests." Students complete coursework, engage in research, and take on practical projects that emphasize eight essential competencies: a global perspective; transformational leadership skills; systems/strategic thinking; ecological, scientific and technological literacy; ethics and social responsibility; cross-sector partnerships; entrepreneurship; and management fundamentals.

While the Erb Institute's program is one of the best in the nation for students interested in pursuing a career in corporate sustainability, it is by no means the only choice for sustainability-focused business training. But sustainability education at most business schools remains a specialty area, where students can opt into coursework or, in a few cases, specialized degree programs. Sustainability training has yet to break into the core coursework at most American business schools.

The jobs of the future will require higher levels of environmental literacy. Looking to effective sustainability leaders of today can offer some guidance on the best ways to prepare our workforce for the future. Research by Schwalb in 2011 focused on the key traits of sustainability leaders and found that they hold a deep commitment to the triple bottom line of people, planet, and profits. Sustainability leaders also approach issues with a systems-thinking style. Perhaps most important, sustainability leaders exhibit hope, courage, and integrity.[113]

112 Association for Career and Technical Education. (2014). *The 2014 ACTE-NRCCUA CTE Works*! Association for Career and Technical Education. https://www.acteonline.org/uploadedFiles/Assets_and_Documents/Global/files/CTE_Info/Research/2014_NRCCUA_ACTE_Research_Report_Final.pdf.

113 Schwalb, P. G. (2011). *Sustainability Leader Competencies: A Grounded Theory Study*. University of Nebraska-Lincoln. http://digitalcommons.unl.edu/aglecdiss/31/.

The Bottom Line: The Rise of Corporate Sustainability

Sustainability is becoming more institutionalized in the way companies do business. Corporations not only report more regularly on their sustainability efforts to reduce waste, conserve energy and water, and address growing environmental and social issues, but also build "natural capital" into their financial accounting and work to educate employees, consumers, communities, and shareholders about sustainability principles and the importance of protecting natural resources. At the same time, many businesses are expressing concern that it is difficult to hire employees with the skills and talent they need. What does this mean for environmental literacy? The following are recommendations for enhancing the environmental literacy of current and future employees, customers, and stakeholders:

- Provide better tools and gather best practices from among the efforts already underway in many companies to help businesses engage employees about corporate sustainability. Environmental education is not a core competency of most businesses, and they need support in providing effective education programs within their corporate cultures that build an employee's environmental literacy.
- Create more targeted strategies to enhance environmental education in vocational education and training and prepare young people to take on a suite of new skills needed in the workforce, from eco-tourism to eco-design and corporate recycling. Promote the value of high-quality vocational learning and opportunities for environmental apprenticeships and on-the-job training during high school.
- Continue to support efforts to build stronger partnerships between higher education institutions and businesses. Businesses need to demand that graduates have certain knowledge, skills, and motivation related to sustainability and the environment.
- Collaborate with businesses to identify effective consumer environmental education approaches and disseminate them.

chapter

7

Facing Environmental Threats

CHAPTER 7

Facing Environmental Threats

Global environmental threats are growing, and Americans' environmental literacy is not keeping pace. Americans care about the environment, but are not engaged and equipped to play a meaningful role in improving environmental quality.

Over the last half-century the United States has made huge strides in improving the environment and making air and water safer for people and wildlife. Environmental education played a role in the improvement by making people aware of the causes, consequences, and potential remedies. Yet threats are growing, both in the United States and globally, and the world's increasing population is accelerating those threats and complicating efforts to manage increasingly scarce resources. The United Nations' 2012 Global Environmental Outlook concluded: "Scientific evidence shows that Earth systems are being pushed towards their biophysical limits, with evidence that these limits are close and have in some cases been exceeded."[114]

This chapter focuses on broad environmental threats related to biodiversity, climate, water (freshwater and oceans), and forests. There are many more challenges, but these issues help illustrate both the threats we face as a global society, and also the opportunities to engage people in addressing these issues through education.

Education Is Part of a Suite of Tools for Engaging People in Environmental Issues

When it comes to addressing environmental and conservation threats, leaders have a range of tactics at their disposal: investing in research, improving technology, and creating regulations, to name a few. They also have another set of "social strategy" tools in their toolbox. Unlike technical or regulatory solutions, social strategies are focused on people. As we know, humans are both the source of and solution to many of the environmental threats we face. So engaging people in solving environmental problems is critical both for addressing current issues and preventing future ones.

Education, communications, and social marketing are examples of social strategies that can help people understand how to address environmental threats. From information on the web to public service announcements, communications help build awareness, explain options, and point to solutions. Social marketing uses the tools of commercial marketing to achieve positive social change and is often used to push people toward a specific action. Social marketing campaigns focus on specific problems and target behaviors that can help address them. It has been used effectively to encourage recycling and green consumer behavior, improve health, and support energy conservation, for example.

114 UNEP. (2012). *World Remains on Unsustainable Track Despite Hundreds of Internationally Agreed Goals and Objectives*. Global Environmental Outlook 5. http://www.unep.org/geo/pdfs/geo5/GEO5_report_full_en.pdf.

Environmental education can be a strategy for short-term engagement, but also takes a longer-term view. Unlike many other social strategies that target one specific behavior, environmental education has the potential to address not just the issue at hand, but also to affect how people think and act far into the future, when new environmental challenges emerge that we cannot even envision today.

Biodiversity

The causes of biodiversity loss are complex and interconnected. The Convention on Biological Diversity names five key drivers of biodiversity loss: habitat change, overexploitation, pollution, invasive species, and climate change. These pressures, while complex, are not insurmountable. Addressing those issues — whether through policy changes, technological innovation, or everyday actions and consumer choices — requires that people know about the issues, care about what is at risk, and are equipped with the information and motivation to do something.

Environmental education programs across the United States are working aggressively to educate people of every age about the drivers of biodiversity loss. In Everglades National Park, for example, educators have launched a comprehensive program to educate students in surrounding communities about the dangers of invasive species, and how students can help eradicate them. Invaders such as the Burmese python have made headlines, but over 300 exotic animal species and 140 exotic plant species threaten the park and its biodiversity. Park managers consider education programs to be a key tool in their arsenal to eradicate the species in the park, and more importantly, to help prevent new introductions. The park's "Don't Let It Loose!" online education program, for example, takes middle school students on a virtual field trip through the park to understand the impacts of invasive species.

Education programs are also helping to protect and restore habitats and prevent pollution. At the ARKive website,[115] for example, online games help users understand how to make healthy habitats for endangered animals. Users can construct habitats, along the way considering what species need in terms of space, food, shelter, and more. Many organizations offer resources for homeowners, business owners, and others to turn their backyards and public spaces into rich habitats for native plants and animals.

Pollution education programs also help address another pervasive threat to biodiversity. While smokestacks spewing toxic emissions might be what many people envision when they think of big polluters, the reality is that our collective impacts from "non-point pollution" — driving, fertilizing, painting, and many other everyday activities — represent a much larger source of pollution. Pollution remains a persistent threat, yet educators can point to successes that have helped to reduce or even eliminate pollution in communities.

Take, for example, teachers and students at Brikett Middle Elementary School in Lynn, Massachusetts. They faced an air pollution problem around their school, and took it on from their classroom all the way to the state legislature. On the busy streets that surround the school idling cars churn pollutants into the air. The students researched air pollution, the connection with idling cars, and took action. The students educated drivers and state lawmakers, who responded by passing legislation to reduce the maximum amount of time that cars can idle around a school. The accomplishment earned the students the top prize in the Disney Planet Challenge in 2012.

115 http://www.arkive.org.

Overexploitation of wild species represents another key threat to biodiversity. Perhaps nowhere is the threat more evident than in the worlds' fisheries. According to the Monterey Bay Aquarium, 90 percent of the world's fisheries are either fully exploited, overexploited, or have collapsed.[116] In response, the aquarium has launched a massive education campaign to help educate consumers about their role in both the causes of and solutions to the crisis. The aquarium's Seafood Watch program, in particular, helps consumers become active participants in ocean restoration by pointing them to sustainable choices at the seafood counter. The program has even developed a cookbook of recipes featuring sustainable seafood items, giving consumers even more tools for making good choices for the world's oceans.

BRIGHT SPOT:
PEOPLE AND PLOVERS

The Pacific coast population of the western snowy plover faces three primary threats: habitat loss and degradation, disturbance of nesting areas, and predation by native and non-native animals. As a result, the population was listed as threatened under the Endangered Species Act in 1993. Some conflicts with the birds stem from the fact that the coastal population breeds above the high tide line, often on beaches that people also find popular for recreational activities.

Agencies and organizations responsible for protecting the species along the U.S. Pacific coast have developed programs to reduce threats and assist with recovery. Species protection plans typically do not include outreach and education strategies. However, in areas where public beach access conflicts with bird conservation measures, efforts have met with the greatest success where volunteers have an active role in educating beachgoers about the issue.

Two such programs are in place at Coal Oil Point Reserve in Santa Barbara and Half Moon Bay State Beach, both in California. Signs on the beach at Coal Oil Point did little to prevent nest disruption (often unintentional), and predation from crows and skunks was on the rise. Symbolic fencing combined with a public education program to help beach visitors observe the plovers and understand why the fence was in place have resulted in a steady increase in the number of breeding birds, now holding steady at a carrying capacity between 20 and 30 pairs.

At Half Moon Bay State Beach, volunteer educators have improved the effectiveness of conservation measures including symbolic fencing and restrictions against dogs on the beach. Growing acceptance of regulations has reduced the number of dog disturbances and helped maintain an average of five nests per year along the four-mile stretch of beach. The U.S. Fish and Wildlife Service western snowy plover coordinator now considers education an essential component of recovery efforts.[117]

116 Monterey Bay Aquarium Seafood Watch. (2015). *Are We Too Good at Catching Fish?* Monterey Bay Aquarium Seafood Watch. http://www.seafoodwatch.org/ocean-issues/wild-seafood/overfishing.

117 National Audubon Society, the U.S. Fish and Wildlife Service, TogetherGreen, EECapacity, and the North American Association for Environmental Education. (2012). *The Case Study Collection.*

Climate

Climate change represents a global environmental threat that will require an array of approaches both to mitigate the impacts of changes that are already underway and to prevent further impacts by slowing the release of climate-changing gases. All of the approaches require public understanding, support, and, in some cases, participation.

According to the Yale Project on Climate Change Communication, in spring 2013, almost two out of three Americans (63 percent) believed global warming was happening, and just 16 percent believed it was not happening. But these numbers fluctuate yearly: in the preceding fall, the percentage of Americans who believed global warming was happening was 7 percentage points higher. And according to the same research group, Americans' knowledge of how climate change works was found to be insufficient to effectively address this issue. Just 30 percent of American adults and 25 percent of American teens have levels of knowledge that would earn them a passing grade.[118]

As a result, climate education has become a key priority among educators, who are developing a wide diversity of programs and materials to rise to the challenge of climate change. The Next Generation Science Standards — the national standards for science education that are expected to be widely adopted by the states — will include climate education for students before they graduate from high school, so demand for high-quality, science-based climate education materials and professional development opportunities for educators is only expected to grow in the coming years.

Government agencies such as NASA play a vital role in providing climate education to the public. These agencies are uniquely able to share timely data with the public because of their integral role in collecting global data on climate change. The NASA Innovations in Climate Education program, for example, brings together the data and educational resources of several government agencies, including the National Oceanic and Atmospheric Association (NOAA) and the National Science Foundation on a searchable website. NASA's educational resources are available for educators from preschool through higher education, and are also available online.

The NOAA Climate Stewards Education Project helps students feel more empowered by engaging students in finding solutions. Through the program, middle school students in Albuquerque, New Mexico, planned and participated in a model United Nations summit on climate change, drafting an international framework for global solutions to climate change. Post-program evaluations reveal that the experience helped students understand that their efforts to curb climate-warming emissions can make a difference. Younger students in a NOAA program in Maryland learned about climate change and decided to plant a school garden and begin composting their lunch waste. They used their new garden and composting project to educate others about how eating local can help cut down on greenhouse gas emissions.

The Alliance for Climate Education (ACE) has become a leader in reaching teens with positive messages about climate change and teens' role in addressing it. ACE offers interactive, school-wide presentations that help students understand the science of climate change, and inspire them to greater civic engagement. To date, ACE has reached over 1.5 million high school students with its presentations, and has supported nearly 40,000 students in taking on climate projects through action teams.

118 Leiserowitz, A., Smith, N. & Marlon, J.R. (2011). *American Teens' Knowledge of Climate Change*. Yale University. New Haven, CT: Yale Project on Climate Change Communication. http://environment.yale.edu/climate-communication/article/american-teens-knowledge-of-climate-change/.

Nonformal education institutions such as museums, zoos, and aquariums are important science education providers for adults and families, giving people opportunities to learn about science topics outside of schools. Many of these institutions integrate climate change themes into their exhibits and education programs. The New England Aquarium, for example, has developed a range of education resources at the aquarium and online to help visitors learn about how climate change is already affecting their region, and what they can do to help. Polling data suggest that much more education about climate change is needed for Americans of all ages, but environmental educators are beginning to build the infrastructure for large-scale efforts to educate Americans about this critical issue.

BRIGHT SPOT:
CLIMATE EDUCATION ON THE EVENING NEWS

Despite the urgency of environmental problems, environmental stories often fail to break into the daily news cycle. According to the Project for Improved Environmental Coverage 2013 Environmental Coverage in the Mainstream News ranking report, environmental stories represented just 1.2 percent of headlines in the 30 prominent national news organizations the report tracked in 2011 and 2012. On average, those news organizations were over three times more likely to include entertainment headlines than environmental stories. According to the report nearly 80 percent of Americans say they want better coverage of the environment in the news.[119]

In response to this need, a broad partnership of groups including the National Oceanic and Atmospheric Association, the American Meteorological Society, Climate Central, and NEEF are reaching out to the nation's weathercasters — trusted sources of information about weather and climate in their communities — with the training and tools they need to effectively educate their audiences about climate change.

Jim Gandy, chief meteorologist at WLTX in Columbia, S.C., is one weathercaster who doubles as a science teacher on the air. After learning about climate change and the impact it was likely to have on his community, he began including a short "Climate Matters" segment into his televised forecasts. Climate scientists from Climate Central provide research and graphics about how climate change was affecting the region. An evaluation of the program found that a year into his "Climate Matters" broadcasts, Gandy's viewers were more informed about climate change than viewers of other stations. Gandy credits his work with researchers for keeping the broadcasts accurate and useful. "If you're going to talk about climate science on the air," Gandy said in an interview with National Public Radio, you "need to learn about the real science, and not get it off a talk show radio program or a website."[120]

119 Project for Improved Environmental Coverage. (2012). *Environmental Coverage in the Mainstream News: We Need More*. Project for Improved Environmental Coverage. http://greeningthemedia.org/wp-content/uploads/Environmental-Coverage-in-the-Mainstream-News.pdf.

120 Gandy, J. (2013). *Forecasting Climate with a Chance of Backlash*. NPR. http://www.npr.org/2013/02/19/171832641/forecasting-climate-with-a-chance-of-backlash.

Freshwater and Oceans

Human and natural systems depend on clean, abundant water for survival, and both freshwater and marine ecosystems face severe threats. Coral reefs, among the richest ecosystems on Earth, are already struggling in warmer and more acidic oceans, both the result of climate change. Garbage, particularly non-biodegradable plastic, is accumulating in stupendous quantities in both the Pacific and the Atlantic Oceans. Closer to home, urgent crises erupt when the quantity or quality of freshwater is compromised. In summer 2013, for example, high water levels in Florida's Lake Okeechobee caused the Army Corps of Engineers to release water from the lake into canals and rivers that lead to the Indian River Lagoon on the state's east coast. The pulse of freshwater that this release carried down the waterways was filled with pollutants and nutrients that created toxic algae blooms suspected of causing die-offs of birds, mammals, fish, sea grasses, and more in the lagoon. With fishing trips cancelled and bathers ordered out of the water, local residents clamored for action, pointing to the dependence of the local economy on fishing and water-dependent tourism.[121]

Pollution from various sources threatens water quality: storm water runoff that carries motor oil, fertilizers, and pesticides into waterways; insufficient wastewater treatment that can leave potentially dangerous chemicals in the water supply; runoff from agricultural fields that carries high doses of nutrients that can cause blooms of algae or other unwanted plant life, and more. Scientists are still investigating the water-quality implications of hydraulic fracturing, or "fracking," for oil and natural gas, but citizens are alarmed at the possible implications.

While water managers in some areas grapple with the water quality, water managers in the West are considering their options in the face of a dwindling water quantity. The Colorado River supplies drinking water to more than 36 million people and water for irrigation to millions of acres of farmland. But the region has experienced a prolonged drought over the past decade, causing the water level in Lake Powell to drop 130 feet since the drought began in 2000, and further drops are predicted due to climate change and continued high water demand.

Water issues are certain to remain a major environmental threat in the coming century. Polling data indicates that Americans are more concerned about water quality than any other environmental issue. Gallup polls show that Americans' top three environmental concerns are all related to water quality, but the issue is less of a focus than it was a decade ago. Between 2000 and 2012, the percentage of Americans indicating that they worry "a great deal" about the pollution of drinking water dropped from 72 percent to 48 percent.[122]

Other research suggests Americans are not motivated to learn more about their sources of drinking water. A 2011 poll released by The Nature Conservancy revealed that, among Americans who do not get their water from a private well, 77 percent could not correctly identify the source of their drinking water.[123]

While environmental literacy requires much more than knowledge, it is difficult to imagine how citizens can become effectively engaged in protecting water supplies if they don't know the sources of their water. Environmental education has a major role to play in addressing the water crisis, helping people understand where their water comes from, the role it plays in the environment, and how to help keep it clean and plentiful. Already, a wide range of education programs do just that.

121 Audubon Florida. (2013). *Crisis in the Indian River Lagoon: Solutions for an Imperiled Ecosystem*. Audubon Florida. http://fl.audubon.org/crisis-indian-river-lagoon-solutions-imperiled-ecosystem.

122 Gallup. (2012). *Worry about U.S. Water, Air Pollution at Historic Lows*. Gallup. http://www.gallup.com/poll/153875/Worry-Water-Air-Pollution-Historical-Lows.aspx.

123 The Nature Conservancy. (2011). *More than Three-Quarters of Americans Don't Know Where Their Water Comes From*. The Nature Conservancy. http://www.nature.org/newsfeatures/pressreleases/more-than-three-quarters-of-americans-dont-know-where-their-water-comes-from.xml.

The Chesapeake Bay Foundation, for example, is tackling the issue of water quality in the Chesapeake Bay with a range of education programs to engage surrounding communities. From school programs and professional development for teachers to community shoreline cleanups and education programs, the Foundation uses a diversity of educational tactics to educate and inspire residents to help keep the Bay a healthy, vibrant ecosystem.

In Washington and Oregon, volunteers with Columbia Riverkeeper not only learn about the Columbia River, but also play an active role in protecting it by collecting valuable water quality data.[124] Citizen scientists monitor water quality across the nation, as well as freshwater species that depend on clean water. In California, for example, Otter Spotters volunteer to collect data on the state's river otters and report what they find to scientists.[125]

One of the nation's oldest and most respected water education programs is Project WET (Water Education for Teachers), which began by serving teachers, but has branched out to serve wider audiences with water education. Offering curriculum guides, activity ideas, training workshops, community events, and more, Project WET is a leader in helping people appreciate and protect our water resources. From partnering with public utilities to provide educational materials to customers to training corporations to boost sustainability initiatives, Project WET uses a mix of environmental education approaches to engage diverse audiences.

BRIGHT SPOT:
NOAA'S B-WET PROGRAM

In the Great Lakes region, students are teaming up with community partners to help develop management plans for a local river. In Hawaii, students are helping to assess and monitor coral reef health. In the Gulf of Mexico, middle school students blend art and science as they explore their coastal ecosystems on kayaks and create original works of art. These and hundreds of other environmental education programs have been funded through NOAA's B-Wet program, an environmental education grant-making initiative designed to help K-12 students connect with their watersheds and related coastal, marine, and freshwater ecosystems in ways that are locally relevant and involve first-hand experiences.

B-Wet is focused on seven areas across the United States: California, Chesapeake Bay, the northern Gulf of Mexico, Hawai'i, New England, the Great Lakes, and the Pacific Northwest. B-Wet funds projects that help students, teachers, and administrators have meaningful educational experiences in their watersheds. According to the Pacific Northwest B-Wet program, B-Wet projects boost teachers' confidence, students' enjoyment of learning, and students' and teachers' ability to understand and prevent ocean pollution.

An evaluation of the Chesapeake Bay B-Wet program found that students who participated in the programs learned about the bay, its ecosystems, and the issues affecting it. Importantly, the students also demonstrated an intention to act to help protect the watershed. The evaluation also revealed that the educational approaches most associated with greater stewardship and engagement with learning were: learning things that the students feel are important to them, hands-on learning, collecting and analyzing data, and learning outdoors.[126]

124 http://columbiariverkeeper.org.

125 The River Otter Ecology Project. (2015). *Otter Spotter Citizen Science Project. The River Otter Ecology Project*. http://www.riverotterecology.org/otter-spotter-citizen-science-project.html.

126 Kirwin, J.L., Kraemer, A.M., & Zint, M.T. (2007). *An Evaluation of National Oceanic and Atmospheric Administration Chesapeake Bay Watershed Education and Training Program Meaningful Watershed Educational Experiences*. NOAA Chesapeake Bay Office. http://chesapeakebay.noaa.gov/images/stories/pdf/Full_Report_NOAA_Chesapeake_B-WET_Evaluation.pdf.

The Conservation-Education Connection

Building environmental literacy can be an effective tool for conservation. Consider, for example, the recovery of the Lake Erie water snake, a misunderstood snake listed as threatened species in 1999. Living on small limestone islands in western Lake Erie, the snake is harmless, but many local residents mistakenly believed that the snake was poisonous, and most people simply disliked them. As a result, humans killed many Lake Erie water snakes, and those that remained also faced the additional challenge of decreasing coastal habitats.

The threatened species listing prompted the U.S. Fish and Wildlife Service to create an alliance of islanders, nonprofit groups, and government agencies to help the snake recover. The consortium focused on turning residents' fear of the snake into pride. The group started a newsletter about the snake, sponsored a poster contest for local students and used the winning design in a public-education campaign, and offered lawn signs that residents could display to show their support for the snake. A snake researcher from a nearby university even wrote an "Ask the Snake Lady" column in local newspapers. These education efforts — together with habitat protection plans — nearly doubled the snake's population between 2001 and 2010, allowing the species to be removed from the endangered species list in 2011.[127]

Because education can be a powerful tool for change, many conservation organizations include education as a key strategy in their efforts to save wild places and species. The National Audubon Society, for example, received a large grant from Toyota to create a program focused on engaging more people in conservation. The program features a fellowship program to build conservation leadership, and grants that engage new audiences in conservation action. For example, one TogetherGreen project in Atlanta engages Spanish-speaking youth to learn about and help protect migratory birds in their city. To date, TogetherGreen has engaged nearly 400,000 participants and has conserved more than 15.2 million gallons of water, planted almost 200,000 trees, and improved habitat throughout the country — from prairie restoration to energy audits.[128]

Likewise, institutions such as zoos and aquariums have embraced the role of education in helping to protect the wild species they exhibit. Research suggests that their educational efforts are paying off. The NEEF Benchmark Survey reports that 52 percent of adults consider parks, zoos, and nature centers trustworthy sources of information on environmental problems and issues.[129] According to the 2007 report, Why Zoos and Aquariums Matter, visiting zoos and aquariums causes people to reconsider their role in environmental problems, and to see themselves as part of the solution. Visitors also believe they experience a stronger connection to nature as a result of visiting a zoo or aquarium.[130] These results are significant because, with over 180 million visitors in 2012 alone, zoos and aquariums play a critical role in educating Americans about conservation and environmental issues.

127 U.S. Fish &Wildlife Service. (2015). Lake Erie Watersnake. U.S. Fish &Wildlife Service. http://www.fws.gov/midwest/endangered/reptiles/lews/le-facts.html.

128 Audubon. (2013). *Toyota Together Green*. Audubon. http://www.togethergreen.org/sites/default/files/TTG%20BTNs.pdf.

129 NEEF. (2013). *National Environmental Education Foundation Benchmark Survey Report*. NEEF. http://neefusa.org/pdf/NEEF_Benchmark_Survey_Report.pdf.

130 Falk, J.H.; Reinhard, E.M.; Vernon, C.L.; Bronnenkant, K.; Deans, N.L.; Heimlich, J.E., (2007). *Why Zoos & Aquariums Matter: Assessing the Impact of a Visit. Association of Zoos & Aquariums*. Silver Spring, MD. http://www.aza.org/uploadedFiles/Education/why_zoos_matter.pdf.

The Bottom Line: Facing Environmental Threats

Global environmental threats are growing, and Americans' environmental literacy is not keeping pace. Americans care about the environment, but are not engaged and equipped to play a meaningful role in improving environmental quality. Building environmental literacy can help directly address environmental threats by ensuring that people have the tools to contribute to solutions in whatever capacity makes sense in their own lives, and help them experience how individual actions can add up to meaningful social and environmental change. To that end, environmental educators need to:

- Track Americans' understanding, attitudes, and actions related to a variety of environmental threats; today, most of the research on Americans' environmental literacy is related to climate change, which is vitally important, but not the only issue we face.

- Develop better systems for linking conservation education to conservation outcomes, including demonstration of the impact of education and how it can lead to short- and long-term results, especially in combination with science, policy, and communication.

- Create more and better educational initiatives that promote civic engagement, giving people better tools for becoming engaged at the local, regional, or national levels on a variety of issues.

- Conduct research that documents the importance of education as a key strategy in achieving and sustaining conservation and environmental goals.

- Share this information by building multiple channels to disseminate key findings and identifying high-profile spokespeople.

chapter

8

Building Support for Environmental Education

Courtesy of A Sense of Wonder Photography

CHAPTER 8

Building Support for Environmental Education

Building environmental literacy means sharing stellar programs and practices widely, investing in research and development for environmental education, measuring success, and working collaboratively to achieve more cohesive, strategic, and effective impact.

With the growing realization of environmental education's power to influence knowledge, skills, and behavior, there is an increasing interest from many sectors of society to broaden current efforts and work collaboratively to achieve great impact. However, environmental education continues to struggle for funding and represents a tiny portion of overall environmental and educational philanthropic giving. Most environmental education in the United States is funded through foundations, government agencies, corporations, individual donors, and earned income. A number of organizations and agencies that support environmental education also conduct their own education programming. And most organizations working in environmental education pursue diverse revenue streams. For example, a nature center might get foundation, corporate, and individual support, but it might also raise money through paid programming and renting space for special events and other gatherings.

This chapter examines current funding sources, existing gaps in support, and offers recommendations for developing a new national model for collective impact to support environmental education.

Increasing Overall Support for Environmental Education Funding

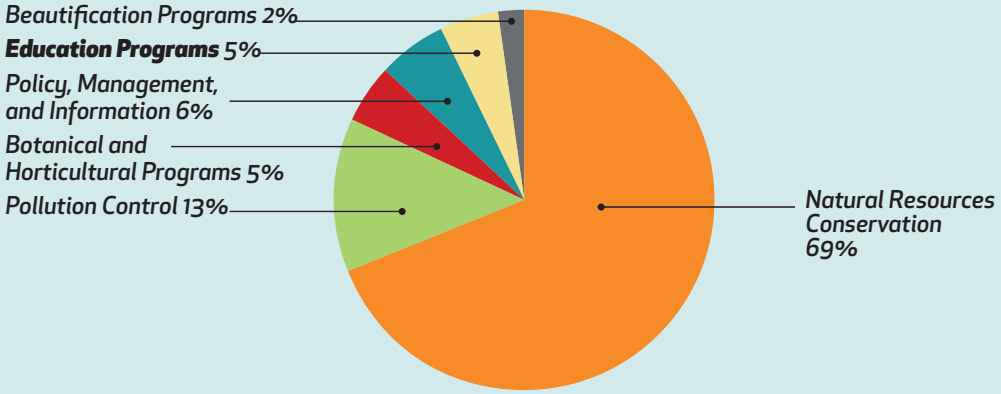
Teasing apart and tracking funding and impact in environmental education is challenging. A particular challenge is that education is often included as part of larger, issue-based environmental initiatives, and the percentage of the total project funds dedicated to education within these broader strategies often goes unreported. In particular, the areas of climate, health, waste, and water often include environmental education components, which are not always tracked separately. As a result, it is difficult to report exact figures related to environmental education giving. Better tracking of funding for environmental education together with sound measures of the impact of environmental education is critically important.

Environmental education represents a small fraction of overall environmental funding in the United States, according to data gathered over the past decade. Research by the Environmental Grantmakers Association (EGA), for example, has found that foundation funding in environmental education has been stuck at only 4 to 5 percent of overall environmental funding (see Figure 7).

Environmental education funding also represents a small percentage of overall environmental funding in the governmental sector. In 2011, for example, the U.S. Environmental Protection Agency (EPA), the most-recognized environmental education grantmaker in the governmental sector, provided $2.1 million through its education grants program. While this is a substantial sum, it represents only a tiny fraction of the agency's total grants of $1.8 billion.

More encouraging is the proportion of giving to environmental education through the corporate sector. From 2003 to 2007, corporate giving to environmental education increased substantially. In 2007, corporate grants for the environment valued about $104 million, and nearly 11 percent of those grants ($11.4 million) went to environmental education. In the past five years, interest in environmental education from the corporate sector has been on the rise, with some notable corporate donations earmarked for environmental education.[131]

Figure 7: Foundation Giving to Environment Subcategory, 2007 (from sample of 1,339 largest U.S. foundations



131 Environmental Grantmakers Association. (2009). *Environmental Education: A Strategy for the Future*. Environmental Grantmakers Association. https://people.stanford.edu/nmardoin/sites/default/files/documents/EE_Strategy_for_the_Future.pdf.

BRIGHT SPOT:

ALLIANCES FOR FUNDING ENVIRONMENTAL LEARNING

In October, 2012, more than 100 foundations, corporations, government agencies, and private donors gathered for the first-ever environmental education Funders' Forum sponsored by NAAEE, the Pisces Foundation, and the Environmental Education Funders Collaborative. Now called the Blue Sky Funders Forum, another gathering took place again at NAAEE's 2013 conference, suggesting that there is a growing interest in working collaboratively to increase overall impact in supporting the field of environmental education. Discussions at the Forum in 2013 focused on how to increase impact, fill gaps, leverage regional and local efforts, and more. The Forum is now a part of the Environmental Grantmakers Association as a working group established "to advance environmental education and facilitate collaboration among funders."

A number of local and regional funding collaboratives are also developing to support environmental education and learning. For example, the Environmental Education Funders Collaborative in San Francisco has been operating as a collaborative since 2010 and is working to increase impact by pooling funding, sharing information, and increasing support for environmental education in the Bay area. A number of other regional collaboratives are in the works as well, including one in the mid-Atlantic region, in New England, and in the Great Lakes.

Building Federal Support for Environmental Education

In 1990, Congress passed the National Environmental Education Act, which charged the EPA with providing support for building America's environmental literacy. From 1992 to 2011, EPA awarded more than $54 million in environmental education grants through the Act. That funding impacted many practitioners and communities through the Environmental Education and Training Partnership and now through the Expanding Capacity Through Environmental Education Project (read more about both programs).

The Act also established the National Environmental Education and Training Foundation (now called NEEF) an independent, non- profit organization designed to advance environmental literacy nationwide in partnership with the EPA and other federal agencies. The Act created NEEF to accept private funding on behalf of the EPA to further environmental education.

Despite its benefits for building environmental literacy, support for the Act has fluctuated over the years and Congress has never fully funded it. In 2013, the Act was not included in the federal budget until support was reinstated through advocacy efforts by the field. Greater federal commitment to funding the National Environmental Education Act is needed to create a stable base of funding for long-term work toward building environmental literacy on a national scale.

EPA, however, is not the only supporter or provider of environmental education in the Federal Government. Many other federal agencies, such as the National Science Foundation, NOAA, the U.S. Fish and Wildlife Service, the U.S. Park Service, and the USDA Forest Service, also provide funding for environmental education under a variety of programs and issue areas. Depending on the agency's mandate, it might offer or support ocean education, energy education, climate education, or other issue-specific education programs. The Department of Education provides some support for environmental education through the Green Ribbon Schools program and related efforts. Some agencies, such as the USDA Forest Service, have even developed strategic plans specifically

focused on building environmental literacy. This support comes in the form of in-house education programs or materials, such as the development of curriculum materials, teacher training programs, field trips or camp programs, training for non-formal educators, support for partnership efforts, and grant support for independent groups offering environmental education.

Federal funds for environmental education are difficult to identify and track, however, because often they are issue-specific, offered only once, or tied to specific strategies, partnerships, programs, or geographic locations. The Campaign for Environmental Literacy estimates that, at best, about 1.5 percent of federal spending on environmental research and development is dedicated to environmental education.[132]

Thus, the bottom line with federal funding for environmental education is that the news is mixed: there is a rise in interest and awareness within the Federal Government, yet the funds continue to be unstable, limited, issue-specific, and difficult to secure. With the current emphasis on government cutbacks, many public resources for environmental education and other issues are shrinking.

THE NATIONAL ENVIRONMENTAL EDUCATION ACT—23 YEARS OF FUNDING FOR EE TRAINING

A consistent issue in the environmental education field is one of capacity and training. Do educators have the tools and the time to deliver effective environmental education? Are enough educators aware of the benefits of EE and how they can incorporate it into their work? For 23 years, these questions have been addressed by funding from the Environmental Education and Training Program of the EPA's Office of Environmental Education. First through the National Consortium for Environmental Education and Training, then through the Environmental Education and Training Partnership (EETAP) and now through the Expanding Capacity in Environmental Education Project, this important funding has created initiatives, forged partnerships and brought new practitioners into the field[133].

From 1995-2011, EETAP, its partners and the funding from EPA helped create such initiatives as the Guidelines for Excellence, online courses from the University of Wisconsin–Steven Point, NAAEE Affiliate Workshops and Leadership Clinics, development of EE-Link and diversity initiatives that expanded environmental education's audience. According to *15 Years of the Environmental Education and Training Program: An Unexpected Journey*, by Lori Mann, these initiatives have changed the lives of teachers, administrators, state and local public servants and volunteers alike[134].

Looking towards the future, EPA awarded Cornell University, who, in partnership with NAAEE, was able to launch the Expanding Capacity in Environmental Education Project (EECapacity). This program builds off of the work of EETAP and "provides opportunities for professionals and volunteers to join in discussions about our environment and our communities, share success stories . . . and learn about successful practices from across the globe."[135]

132 Campaign for Environmental Literacy. (2007). *National Overview: Involvement of Federal Agencies in Environmental Education*. Campaign for Environmental Literacy. http://www.fundee.org/campaigns/nclb/brief5c.htm.

133 EE Capacity. (2015). EE Capacity History. EE Capacity. http://www.eecapacity.net/about-us/history.

134 Mann, L. (2011). 15 Years of the Environmental Education and Training Partnership: An Unexpected Journey. Environmental Education and Training Partnership. http://cms.eetap.org/repository/moderncms_documents/15_yr_article_5.25_web.1.1.1.pdf.

135 http://www.eecapacity.net/about-us/.

Building Support for Environmental Education Policy

In exploring how to enhance public support for environmental literacy, many experts point to the necessity of building more robust policy and advocacy efforts at national and state levels throughout the country. Currently, there is limited support for environmental education policy experts at any of the national organizations working in environmental education, and overall funding for policy support to enhance environmental literacy is estimated to be less than $1 million a year. In spite of limited funding, many environmental education organizations, including NAAEE and the Affiliate network, the National Wildlife Federation, the Campaign for Environmental Literacy, Project Learning Tree, the Chesapeake Bay Foundation, Outdoor Alliance for Kids, and others, support policy and advocacy, including collaboration on key strategies to advance environmental literacy. For example, a number of organizations have worked together to increase support for the National Environmental Education Act, the NOAA B-Wet funding, and other national initiatives. In addition, many leaders in the field, including the NAAEE Affiliate network, participate in monthly advocacy calls to learn what's happening in Washington, what type of support is needed, and how to coordinate state and national advocacy efforts.

In addition to working directly on shaping policy and advocating for support, there is a need to build capacity in the field and create a cadre of leaders who are trained in policy work and have the skills to advocate on behalf of environmental education. At a meeting of policy leaders in 2012, capacity building to help environmental educators learn advocacy skills was identified as one of the key needs in the field, along with finding additional support for policy and advocacy from funders. Presently, most of the funding for environmental education is focused on environmental programming, training, and outreach rather than policy and advocacy. This creates a powerful opportunity to look across sectors to determine how to enhance environmental literacy.

BRIGHT SPOT:

THE WISCONSIN NATURE ACTION COLLABORATIVE FOR CHILDREN

Every quarter, Elise Hansen, the director of the Schlitz Audubon Nature Preschool, looks forward to joining her colleagues from across the state for the regular meeting of the Wisconsin Nature Action Collaborative for Children (WiNACC). The group has come together to create collective impact to address a problem that's affecting children across the United States: nature deficit.

WiNACC's members are as varied as the reasons for children's disconnection from nature. The group is composed of a diverse set of individuals and organizations that can affect children's exposure to nature across the state of Wisconsin, including: universities, nature centers, landscape architects, school district representatives, special education representatives, early childhood education associations, and others. The groups are organized under the sponsorship of the University of Wisconsin, which provides coordination, communication, and marketing support.

The groups that comprise WiNACC also have agreed on a common set of goals, and work actively toward them. The goals relate to increasing adults' familiarity and comfort in the outdoors, providing professional development for teachers in developmentally appropriate nature education, creating outdoor nature spaces for children, and creating networking opportunities for professionals to share ideas. WiNACC has made significant progress toward its goals, especially related to creating more opportunities for professional development and networking across the state.

"Each of us is committed to WiNACC's larger goals, and we find ways to support those goals within the work that we do at our own organizations," explains Elise Hansen. "Working for collective impact has helped us stretch our budget. By working together as part of a larger collaborative, we can do more."

Building Infrastructure for Effective Environmental Education

Efforts to build overall literacy in the United States are still more fragmented than ideal: different players often operate more or less independently. Leaders in the field need a more unified vision for where it is going, and a common understanding of the specific roles that the different actors will play in getting there. Bringing more unity to environmental education will require better infrastructure, including support for collective impact at the community level, state level, and national level.

Historically, there has been less interest among the funding community in supporting the development of infrastructure, with far more interest in on-the-ground activities that directly educate people, especially young people. Funders need to be informed about the essential nature of activities such as:

- research to increase learning in the field;
- efforts to track funding and effectiveness;
- face-to-face meetings to promote collaboration;
- online tools for communication;
- data gathering to track progress;
- national and regional testing and polling;
- professional development and quality assurance; and
- policy support to increase overall public support.

As it stands, for example, no mechanisms exists to measure Americans' levels of environmental literacy, to track changes over time, or to learn how different interventions promote the development of environmental literacy. Without this critical data, educators have limited ways to gauge their progress. These and other infrastructure-building functions represent a critical need for environmental education. At the same time, environmental educators need to be open to support for innovation as well as cross-sectoral collaboration with new partners, including business, NGOs, and government.

Creating an Ambitious, Effective, and Compelling Communication Strategy for the Field

Environmental educators need to support strategic, creative communication efforts to promote the field's key underpinnings, and highlight its impact on creating a committed and engaged citizenry. In the last decade, many campaigns and communication efforts showcased the value of environmental education and its impacts. However, most such efforts focus on a specific component of environmental education such as the "connecting kids to nature" movement or on a specific program, such as Audubon and Toyota's TogetherGreen program. Overall, the field has had limited national and regional communication efforts designed to support the value of environmental education and its contributions to fostering environmental literacy.

One factor limiting communication campaigns is cost. Most environmental education providers do not have funding to hire professional strategic communication firms that conduct campaigns for social causes. As a result, the awareness of the value and impact of environmental education is not what it could be among community leaders, politicians, parents, and other audiences. Other reasons include the need for more professional development for education professionals to develop skills needed to create communication strategies for their programs and for the broader field. Training in social media and other media strategies, techniques for developing effective communication strategies, and the ability to articulate the value and impact of environmental education would also help boost the communications capacities of environmental educators and the field as a whole.

The Bottom Line: Building Support for Environmental Literacy

Building environmental literacy means sharing stellar programs and practices widely, investing in research and development for environmental education, measuring success, and working collaboratively to achieve more cohesive, strategic, and effective impact. Achieving these goals will not be possible without greater overall support for the field, decreasing fragmentation and increasing effective collaboration. The key steps are:

- Implement an annual tracking system to understand how much financial support the field is receiving, including public and private support.
- Encourage financial support for building the infrastructure of the field, including efforts to share best practices, decrease fragmentation, and encourage collective impact.
- Encourage support for new and innovative partnerships that expand the reach of environmental education to broader, less engaged audiences
- Encourage local and regional collaborations that are working to fill gaps, increase collaboration, and work strategically to achieve environmental literacy goals within communities and at regional levels.
- Increase support to hire policy specialists at key organizations to help promote local, state, regional, and national EE policy efforts, including advocating for increased public support for environmental education.
- Increase support for communication efforts on behalf of the field, building on the success of current strategies and linking communication strategies to the success of advocacy campaigns and other key initiatives in the field.

chapter

9

Building Sustainable Communities

CHAPTER 9

Building Sustainable Communities

Education is one piece of larger efforts to work toward sustainability goals for entire communities. Educators often find that their goals intersect with those of other groups in ways that make alliances between different types of groups possible, and can make their combined efforts more effective.

On May 22, 2011, an EF-5 tornado, the most powerful and violent category of tornado, hit the town of Joplin, Missouri. The storm left more than 158 people dead, more than 1,000 injured, and the damages totaled more than $2.8 billion, making it one of the deadliest and costliest tornadoes in history. But something positive came out of this terrible tragedy: a desire to rebuild the city with sustainability in mind.

Building on the experience of Greensburg, Kansas, which was hit by a tornado in 2007, Green Town Joplin is working to recover as sustainably as possible and to serve as a model for other communities. The initial focus is on "green" buildings, which are designed to save businesses, homeowners, and renters money and ultimately, to keep money in the community. But Green Town Joplin is also exploring how education and outreach, including highlighting the natural treasures that surround the town, can help build the GreenTown movement, promote social entrepreneurs, and turn Joplin into a more sustainable community.

Transforming neighborhoods, communities, and cities into places that embody sustainable living is one of the most exciting trends in the country. This chapter looks at the role of environmental literacy in helping people think more ecologically, with civic engagement and humanity in mind, and focus on how to protect the environment while ensuring access to jobs, education, health care, and all the other attributes of a happy, healthy life.

What is a Sustainable Community?

According to the Institute for Sustainable Communities, a sustainable community is one that is economically, environmentally, and socially healthy and resilient. It meets challenges through integrated solutions rather than through fragmented approaches that meet one of those goals at the expense of the others. And it takes a long-term perspective — one that's focused on both the present and future, well beyond the next budget or election cycle.

As a result, a sustainable community manages its human, natural, and financial resources to meet current needs while ensuring that adequate resources are equitably available for future generations. It seeks:

- A better quality of life for the whole community without compromising the wellbeing of other communities.
- Healthy ecosystems.
- Effective governance supported by meaningful and broad-based citizen participation.
- Economic security.
- A sustainable community's success depends upon its members' commitment and involvement through:
  - » Active, organized, and informed citizenship;
  - » Inspiring, effective, and responsive leadership; and
  - » Responsible, caring, and healthy community institutions, services, and businesses.

Learning for Whole Communities

Environmental educators once talked about helping people learn about nature and the environment so that they could help protect it. There was an implicit focus on nature education and individuals as the unit of change. Today, the focus is shifting from single environmental issues and individuals to whole communities. Community-level learning and change implies that people are learning together through their social interactions, and that education and the environment are deeply intertwined with other important aspects of community life, such as economic development or political engagement.

Research suggests that the environmental education community is gaining interest in working at the community level. A 2012 analysis of environmental education research literature, surveys, and interviews with environmental education researchers and practitioners found that environmental education is undergoing a shift in focus beyond individuals to communities and refocusing on collective and community learning and collective action.[136]

The environmental education field has responded with several initiatives to build the capacity of community groups to deliver effective environmental education. Through the National Project for Excellence in Environmental Education, NAAEE is developing environmental education guidelines for community groups. And the EPA-funded EECapacity project brings youth- and community-development professionals together with environmental education professionals to network and share ideas through an ambitious program to create community-level change across the nation.

136 Ardoin, N. M., Clark, C., & Kelsey, E. (2013). *An Exploration of Future Trends in Environmental Education Research.* Environmental Education Research, 19(4), 499-520.

Guidelines for Excellence: Community Environmental Education

Communities large and small, urban, suburban, and rural, rich and poor, face multiple stresses — from poverty and crime to pollution and flooding to economic struggles. These stresses can threaten community well-being. The Community Environmental Education Guidelines are designed to help connect community well-being and environmental quality through the power of education and action. For example, research shows that planting more trees is linked to reducing crime, spurring economic development, reducing asthma, and promoting mental health.[137] Education programs can help communities understand the value of trees, how and where to plant, how to nurture trees after planting, and more. Gardens and environmental restoration projects are another example of how improving environmental quality can enhance community life. Research has shown that neighborhoods with community gardens are less violent and have more positive social interactions among residents. Streamside and park restoration projects can create opportunities for learning job skills and bringing communities together, as well as providing space for young people to connect to nature for health, creative play, and stewardship.

There are hundreds of examples of exciting community initiatives that weave together environmental quality and community well-being. In the South Bronx, youth in the after-school program at the non-profit organization Rocking the Boat build historic wooden rowboats, take community members out onto the Bronx River during Community Row Days, and take action to improve the environment through planting bioswale gardens and monitoring oyster survival on artificial reefs they install in the New York City estuary. In Washington D.C., teen leaders at GroundWorks-Anacostia remove trash from Bandalong Litter Trap weirs placed in the Anacostia River, and advocate for a city-wide ban on plastic bags.

The Guidelines will include recommendations for how educators can work more effectively in communities, with an eye on improving both the quality of life and the quality of the environment — a key goal for environmental education.

Akiima Price, lead on the project, defines community environmental education as a process for enhancing community's wellness through thoughtful environmental action. It fosters collaborative learning and action, taking into account the social, cultural, economic, and environmental conditions of a community. She says that "Community environmental education is most effective when efforts are focused on the participatory processes that develop authentic relationships, foster community leadership, enhance social capital, and strengthen a community's capacity for improvement." (For more on the guidelines, see http://communityee.net/.)

137 Troy, A., Morgan Grove, J., & O'Neil-Dunne, J. (2012). *The Relationship between Tree Canopy and Crime Rates across an Urban–Rural Gradient in the Greater Baltimore Region*. Landscape and Urban Planning, 106(3), 262-270.

Building Coalitions for Community Change

Education is one piece of larger efforts to work toward sustainability goals for entire communities. Educators often find that their goals intersect with those of other groups in ways that make alliances between different types of groups possible, and can make their combined efforts more effective. In Cleveland, Ohio, for example, a variety of groups have joined forces to tackle the problem of asthma in their community. Called the Greater Cleveland Air and Asthma Alliance, the group's mission is to improve the health of residents of Northeast Ohio, but their work goes far beyond prescriptions and doctor's offices. Because of the link between asthma and air quality, their work focuses on reducing air pollution and improving the community's sustainability.[138]

Community gardens and farmers markets are examples of organizations that may come together primarily for social or economic concerns, but also provide significant opportunities to build environmental literacy. The same holds for training programs focused on preparing people for green jobs.

Community-based environmental education can also support opportunities for intergenerational learning. With these kinds of approaches, community residents from young to old can learn from each other. In Boulder, Colorado, for example, city planners set out in 2012 to transform a several-block area into the "social, civic, and environmental heart" of the small city, and they aimed to do it with collaboration from across the community. Preschool teachers in the area who used the space with their students learned about the plans, and involved their preschool students and their parents in submitting ideas that the design team ultimately adopted.[139]

Environmental Education Creating Sustainable Communities

Education will play a critical role in making the vision of sustainability a reality. Educators are already helping residents engage in planning and using new tools for sustainability.

As cities' populations have grown, city planners have been challenged to contain the growth in ways that do not threaten surrounding natural areas, farmlands, historic sites, and other valuable land. In many cases, this has meant creating urban plans that concentrate populations in city centers while preserving green spaces outside of cities. A challenge in this kind of model, however, is maintaining enough green space and wildlife habitat within city boundaries so that wild plants and animals can continue to thrive, and human residents can continue to develop bonds with the natural world. Education programs such as the Cornell Lab of Ornithology's "Celebrate Urban Birds" can help urban residents appreciate wild animals within city boundaries. The Celebrate Urban Birds program involves urban residents in observing birds, assessing green spaces for birds, and participating in cultural and community events about birds. To date, the program has partnered with nearly 5,000 community organizations to help city residents appreciate and protect their avian neighbors.

Like containing urban sprawl, transportation poses challenges to urban planners. From the logistical challenge of crowded roadways to the environmental impacts of cars, traditional methods of transportation are often incompatible with a sustainable future. But new models of transportation, including car or bike sharing programs, new public transport options, energy-efficient cars, and other tactics all require public demand to generate traction and achieve results. Creating that demand often falls on the shoulders of educators, who are tasked with helping the public understand the need for new forms of

138 American Lung Association. (2015). *Greater Cleveland Air & Asthma Alliance*. American Lung Association. http://www.lung.org/associations/charters/midland-states/program-information/asthma/asthma-coalitions/Cleveland-asthma-coalition.html.

139 Shaffer, L., Bauer, A. & Hall, E. (2013). *Children as City Planners: A story of civic engagement from Boulder, Colorado*. Exchange, July/August 2013, 70-75.

transportation, and helping them make more sustainable choices in how they get around. In Georgia, for example, the Clean Air Campaign aims to reduce air pollution and traffic congestion in the state through education programs. The group sponsors the annual "Get There Green" contest, which invites high school students to become transportation planners for their schools, and submit their transportation plans in competition with other schools. The group also offers education materials for commuters and workplaces so that adults can get involved, too.[140]

While transportation planning affects quality of life by reducing congestion and air pollution, it also is tied to climate change, another key issue in greening communities. While the Federal Government has been slow to respond to the challenge of climate change, local governments have found themselves forced to face the realities of changes that have already begun. Educators have geared up to provide residents with experiences that help them understand the challenge of climate change, play a role in addressing it, and prepare for the future in their communities.

Whether it's in adapting to climate change, stemming sprawl, transportation planning, or maintaining people's connections to nature in an urbanizing world, environmental education is playing a vital role in helping Americans prepare for a sustainable future.

BRIGHT SPOT: PORTLAND

Portland, Oregon, known for its beautiful natural environment, is also known for its sustainable values. Mother Nature Network, Moyers and Company, and other surveys rank it as the #1 Green City in the United States for everything from its green transportation and sustainable food sources to a focus on renewable energy, composting, and environmental education.[141]

In 1979, Portland created an urban growth boundary (UGB) to reduce urban sprawl, increase city density, and protect farmland. The increased density with the UGB has resulted in the improvement of Portland's downtown area. Had the city been allowed to expand, it's possible that instead of rejuvenating the existing area, another would be created and could possibly detract from the centrality and history of the city. The downtown area provides residents with a third place; somewhere they can go besides work or home to engage in the community.

Density has also had a positive impact on transportation. Portland considers itself a "20 minute city," in that you can get anywhere within the city limits in under 20 minutes. Public transportation is highly effective, and as a result, both car usage and the carbon footprint are decreasing. And over 800,000 acres of farmland have been preserved because of the UGB. The amount of farmland lost per year to development has decreased significantly. This preservation keeps the city beautiful, and provides a local food supply.[142]

But the UGB hasn't solved all of the city's challenges. In 2012, Portland adopted the Portland Plan as a strategic vision for moving forward to respond to some of Portland's most pressing challenges, including unemployment, income disparities, environmental concerns, health issues, and others. The plan emphasizes prosperity, education, health, and equity. With all their efforts, officials in Portland believe that sustainability can't happen without civic engagement and a focus on increasing collaboration between the government and the people to create a sustainable vision for the city.[143]

140 http://www.cleanaircampaign.org/.

141 Karlenzig, W. (2007). *How Green is Your City?* New Society Publishers.

142 Portland Plan. (2015). 20 Minute Neighborhoods. Portland Plan. http://www.portlandonline.com/portlandplan/index.cfm?a=288098&c=52256.

143 Portland Plan. (2015). About the Portland Plan. Portland Plan. http://www.portlandonline.com/portlandplan/index.cfm?c=47906.

Using Food to Build Communities

In the poorest congressional district in America, students are envisioning a better future, and working with Bronx educator and administrator Stephen Ritz to grow it. Students are growing edible plants in their school with what they call "living walls," in which plants are grown vertically up walls. These plants not only supply nutritious foods to hundreds of students in the school, but they also provide job training, making the Bronx students one of the youngest nationally certified workforces in America. Attendance at the school has jumped from 40 percent to 93 percent, and in addition to learning, students are also able to earn a living wage for their work in growing food.

Ritz believes that students should not have to leave their community to find better opportunities for education and jobs, but instead should be able to "live, learn, and earn" in their community. His solution — growing edible plants — reflects a major trend across the nation. Gardens and local agriculture have emerged as a tactic to tackle problems including economic disparity, environmental degradation, declining public health, climate change, and disconnection from nature and community.

Researchers at the Colorado School of Public Health and Denver Urban Gardens have conducted detailed evaluations of the impacts of community gardens in the Denver, Colorado area, and they cite the following key findings:

- 100 percent of community gardeners stated that their main reasons for gardening were to be outside in nature and to get their hands dirty.
- More than 50 percent of community gardeners meet national guidelines for fruit and vegetable intake, compared to 25 percent of non-gardeners.
- As well as eating better and being more active, gardeners are more involved in social activities, view their neighborhoods as more beautiful, and have stronger ties to their neighborhoods.
- Community gardens promote stronger neighborhood leadership, outreach, and volunteerism.
- 88 percent of people who do not garden want to see gardens in their neighborhood.

Community gardens are an area where public health, environmental, cultural, civic and other professionals find common ground because of the ways that these spaces provide environmental, health, economic, and social benefits for communities.

BRIGHT SPOT:

REVITALIZING THE LOWER NINTH WARD THROUGH RE-IGNITING AGRICULTURE IN THE COMMUNITY

The Lower Ninth Ward has a rich agricultural history. Many older residents can recall a time when fruit trees grew throughout the neighborhood and nearly everyone had backyard gardens. Today, as is common throughout the country, most people do not grow their own food and rely on supermarkets. But in the Lower Ninth Ward, there is no supermarket, and the neighborhood-to-supermarket distance is nearly double the New Orleans average. There is also a growing fear that the 2010 oil spill in the Gulf could have long-term effects on the food system.

Jenga Mwendo was like many, sitting on the sideline of the environmental movement, imagining what could be but not putting much effort towards making it happen. The birth of her daughter in 2004 and the devastation of her neighborhood by the levee breach during hurricane Katrina the following year changed her forever, inspiring her to make a difference in her community and the world. Instead of remaining on the sidelines, Jenga decided to take action. In 2007, she returned home to the Lower Ninth Ward, and began transforming her wrecked neighborhood into a vibrant, healthy, sustainable environment.

Since then, Jenga has revitalized the Ernst Community Garden, planted over 150 free trees for residents, secured fruit trees for three community sites, led the charge to turn an empty lot into a vibrant green space, and founded an urban gardening organization called the Backyard Gardener's Network.

Jenga became a TogetherGreen Fellow, a program supported by Toyota and Audubon. For her project, Jenga sought to expand the Backyard Gardener's Network and create a thriving, close-knit community of growers in the Lower Ninth Ward and beyond; communities in which anyone interested in gardening feels encouraged, empowered and supported to produce food for self, family and the larger community. To realize her goal, Jenga reached out to local community groups to increase volunteerism in the gardens. These initiatives were so popular, Jenga and the Backyard Gardener's Network built a second garden, called the Guerrilla Community Garden, and a community center to host a tool lending library, educational resources, community events, and seed storage.

Mapping Community Assets to Build on Local Strengths

Many communities have used a process called asset mapping to design educational programs that address the priority concerns of the people who live in local neighborhoods and communities. Asset mapping is focused on addressing issues in a community by starting with the positive and looking at what strengths and resources the community has, rather than starting with a list of what isn't available. There are many types of asset mapping approaches. One approach starts with a "community asset" map and is designed to involve people over time in their community as co-creators and co-learners in defining the desired outcomes of the community and the issues and how to address them. In this approach, a community asset map is a work in progress and continually updated and revised as more information becomes available.[144]

The Kellogg Foundation developed a manual that helps potential applicants consider community assets in developing proposals. These include local residents (their skills, experiences, passions, capacities, and willingness to contribute to the project, including residents who are sometimes "marginalized"). They also recommend looking at local volunteer associations, clubs, and networks, local institutions (from businesses to NGOs), physical assets (the land, the buildings, the infrastructure), and economic assets (what people produce and consume, businesses, and informal economic exchanges.

Community asset-mapping is being used as a tool in community environmental education programs throughout the country and around the world to ensure that any programming starts with what the community has and builds on those assets in an inclusive and participatory process.[145]

144 McKnight, J.L., & Kretzmann, J.P. (1993). *Building communities from the inside out: A path toward finding and mobilizing a community's assets*. Evanston, IL: Center for Urban Affairs and Policy Research, Northwestern University. http://www.abcdinstitute.org/docs/abcd/GreenBookIntro.pdf.

145 Kretzmann, J. P., McKnight, J.L., & Puntenney, D. (2005). *Discovering community power: A Guide to Mobilizing Local Assets and Your Organization's Capacity*. Asset-Based Community Development Institute, School of Education and Social Policy, Northwestern University. http://www.abcdinstitute.org/docs/kelloggabcd.pdf.

Education for Community Engagement

Jamie Merisotis, President and CEO of Lumina Foundation, has argued that the best path toward a prosperous future is through education. In a recent blog, Merisotis explains:

> *In his book* Triumph of the City, *economist Edward Glaeser said, 'Human capital, far more than physical infrastructure, explains which cities succeed. The share of the population with a college degree is used to estimate the skill level of a place, and no other measure does better in explaining recent urban prosperity. As the share of the population with college degrees increases by 10 percent, per capita gross metropolitan product rises by 22 percent.'*[146]
>
> *That's a powerful indicator to city leaders on where they should invest, and research has shown time and time again that there is a direct correlation between thriving cities and postsecondary education. What we mean by postsecondary education is all types of high quality post-high school credentials, including certificates, associates degrees, bachelors and beyond. Increased attainment delivers stronger local economies, greater individual earning power and better quality of life.*

At the same time, long-term studies of children who have had access to high-quality early childhood education programs has shown that early education can also have dramatic positive effects on people, communities, and economies. From early childhood through adulthood, research tells us that people, and in turn communities, benefit immensely from education.

Communities will not achieve their sustainability goals without the direct engagement of people, and that engagement requires education. People need the skills and motivation to learn about, care about, and act on what they learn. That kind of engagement requires not just education about environmental issues, but also education for community engagement. Education, in all its forms — including formal education in classrooms, informal education through community organizations, and higher education and job training programs — must remain closely tied to the communities in which it's delivered.

Although community-based education can be difficult for pre-K-12 teachers to incorporate in this era of high-stakes, standards-based testing, many teachers have found that involving students in community projects can engage students in ways that traditional, classroom-based teaching cannot. At the Aka'ula School on the Hawaiian island of Molokai, students and teachers use the PRISM curriculum (Providing Resolutions with Integrity for a Sustainable Molokai) to investigate community issues, and help find solutions. In describing the school's creation, leaders explain, "We were dedicated to cultivating inquisitive, exploratory learning and to teaching young people how to use their skills and voices to make a difference." And the students are making a difference. In 2010, for example, the students participated in the visioning process for the Molokai Community Plan, investigating issues such as whether the island should have an ATV track, whether Molokai's wetlands should be documented, what kinds of educational native gardens residents might like, and so on. Research completed in 2003 suggests that the PRISM approach not only helps the community, but also improves students' critical thinking and problem solving skills. In addition, students participating in the program were reported to be more mature, poised, self-assured, and had greater leadership ability.[147]

In higher education, community colleges have long provided education tied to the needs of the communities in which they operate. As more companies work toward sustainability goals, they are facing greater demands for workers trained in green jobs. Johnson Controls is a global corporation with operations around the world, and has its headquarters near Milwaukee, Wisconsin. As boomers retire, Johnson Controls needs thousands of new workers trained to help the company succeed in a new green economy.

146 Glaeser, E. (2012). *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: The Penguin Press.

147 Molokainews. (2010). Aka'ula PRISM Symposium Offers Environmental Workshops. The Molokai News. http://themolokainews.com/2010/12/02/akaula-prism-symposium-offers-environmental-workshops/.

Recognizing the need to create a pipeline of new talent, the company has funded the creation of a 2,500-panel solar farm at Milwaukee Area Technical College so that students can become skilled in the solar industry. These kinds of community connections help build skills in sustainability, generate jobs, and keep corporations competitive in the green economy.

Other groups, such as O'Conner House, are working outside of classrooms and in communities helping engage citizens more productively in civic life. Inspired by former Supreme Court Justice Sandra Day O'Connor's commitment to solving social and political problems, this Arizona nonprofit's vision is "To create an Arizona where important policy decisions affecting our future are made through a process of civil discussion, critical analysis of facts and informed participation of all citizens." O'Connor House includes the program SpeakOut AZ, which engages a variety of community groups across the state in networking to reach local citizens in order to help them become engaged in civic life in the state. In this era of political polarization, many people need to refresh their learning around critical thinking and civil discourse in order to more effectively work together to find solutions to all kinds of social and environmental issues. These kinds of community-based education programs also serve as reminder that building environmental literacy — which includes not just knowing about the environment, but also being engaged in civic life in order to move from ideas to action — is a lifelong process and extends from early childhood through our entire adult lives.

The Bottom Line: Building Sustainable Communities

Environmental education has always focused on how to build healthier and more sustainable communities, but a growing body of research focuses on the community level to address social and environmental issues, and reveals how to create stronger and more stable communities that provide enormous gains for people and the planet. Given the power and promise of communities, the field should focus on efforts to:

- Step up professional development programs that focus on engaging whole communities and how environmental education can address environmental and social challenges with an inclusive approach to problem solving.

- Develop evaluation measures that help the field track community-level impacts, as well as the impacts on individuals.

- Conduct research to better understand how environmental literacy is both affected by and affects community factors.

- Promote efforts to expand innovative community partnerships that create impact and showcase the value of having multiple organizations, disciplines, and individuals involved in community change.

chapter

10

Conclusion

Courtesy of A Sense of Wonder Photography

Conclusion

Environmental education has matured over the past 60 years. From addressing early concerns over pesticides and pollution to the current threats from climate change, loss of biodiversity, and human population growth, environmental education is up to the task. Environmental education can engage people of any age, ethnicity or economic backgrounds in mounting complex and intertwined global environmental and social issues.

Environmental education today takes place in zoos and aquariums, museums, nature centers, preschools, universities, online, in places of worship, in businesses — everywhere people work, play, and learn. Leaders in the field work at all levels, from federal, state, and local governments to non-profit organizations and community groups, universities and businesses, and individuals with big ideas and big hearts. Educators tap into more than five decades of research, expertise from national and state organizations devoted to supporting and strengthening environmental education, and thousands of innovative programs in public and private sectors.

Today larger investments in environmental education have allowed environmental educators to propel society forward, scaling up efforts to address short- and long-term societal issues. Advances in engineering, science, technology, human relations, business, and public policy will require an environmentally literate citizenry and workforce with 21st century skills.

Four key strategies will enhance environmental literacy. Some will be harder than others to implement. Some are already underway, but need a boost in recognition and sustained funding. Others just need a commitment from the leaders in the field for implementation through increased collaboration, better messaging, and new sources of financial support.

Innovate

This report's key finding is that environmental educators need to foster more of a culture of innovation. The field requires new approaches to reach new audiences and cultivate new sources of support for environmental education initiatives. The good news is that innovative ideas abound; the challenge is more effectively disseminating innovative practices among educators.

Innovation requires experimentation and risk, while recognizing that although some experiments fail, they are still worthwhile. Those can be difficult lessons for practitioners, their employers and funders. But while it may be more comfortable to rely on established techniques and principles, some may no longer address the rapidly changing environmental, social, economic, and political circumstances facing communities and nations across the globe.

While fostering innovation within their own field, environmental educators need to connect to emerging trends in education, conservation, sustainability, business, faith, and more. This strategy ensures continued relevance, integrates environmental education with broader solutions to pressing issues, and expands the funding base.

To take just one example of how environmental educators can tap into innovation in related fields, consider the recent growth in interest in early childhood education. This growth coincided with a national focus on the importance of outdoor play for healthy child development. Environmental education supports this trend and enhances early childhood education with opportunities to connect children with nature. Environmental education offers nature-based curricula, professional development, and networking opportunities for early childhood educators. Important efforts are underway, but more are needed to reach early childhood educators and education centers.

Collaborate and Connect for Impact

Many environmental educators are already thinking broadly about how to align their efforts with other educational fields (especially STEM related), as well as other professions and sectors to increase their impact. But we need to expand this thinking throughout the field. A key to extending environmental education's reach will be recognizing and capitalizing on opportunities in non-formal settings and in a wide range of organizations.

STEM education has taken center stage in U.S. schools from kindergarten through higher education. Environmental education enhances STEM education by linking disciplines through interdisciplinary approaches and offering opportunities for real-world problem solving. Using the environment as a lens for teaching STEM can also increase environmental literacy. The field should continue to forge connections with STEM education, and communicate how environmental literacy contributes to the goals of STEM education.

Environmental educators can also work with businesses in several important ways. As the country recuperates from the Great Recession and resulting job losses, governments and the private sector are looking for new opportunities for high-quality, long-term employment. More people are realizing that 21st century jobs are likely to be different from the jobs of the last century. Many more companies and career paths will have sustainability at their core, with an increased focus on so-called "green jobs." These jobs, in fields such as renewable energy, sustainable farming, and green building, require a highly trained workforce. That means that environmental education needs to be a part of professional training from vocational schools to community colleges to business and medical schools.

From its very founding, the field of environmental education has focused on helping people achieve a balance between social and ecological systems so that both can thrive. Too often, though, environmental education has appeared more concerned about the environment than people. The field must do more to demonstrate its commitment to community development, economic development, environmental health, and other social goals that are integral to sustainable development. Environmental quality depends on social and economic strength, and vice versa.

Environmental literacy helps build 21st century job skills. Higher education is increasingly working to build sustainability education into its curricula and across its campuses. However, those preparations must begin long before young people enter college or vocational training. Environmental education should demonstrate that environmentally literate citizens have the knowledge and skills that companies today and in the future will need.

At the same time, many traditional jobs are getting a sustainability makeover, as companies realize the benefits of sustainability for their bottom lines. In such companies, the trend is toward all jobs becoming green jobs. Environmental educators can help businesses develop better tools to educate employees about corporate sustainability and its economic and ecological sense. Because environmental education is not a core competency of most businesses, environmental educators can play a role providing effective education programs to increase employees' environmental literacy.

The connection to business practices is just one example of how environmental education, while an important discipline in its own right, can be integral to broader movements and varied disciplines. Since it is based on a sustainability and interdisciplinary platform, environmental education is well positioned poised to connect with a broad range of societal sectors for increased impact

While, businesses are just beginning to see how environmental education can help their bottom lines, many conservation organizations, faced with a challenge of saving a disappearing species or protecting a quickly vanishing wild place, have often overlooked the contributions that education can make to their missions. Most conservation organizations turn first to scientists and policy makers to build a strategy. Certainly, science and policy are critical in conservation. But people are the root cause of most conservation challenges, and people are also the solution.

Engaging people in conservation requires a set of what experts call "social strategies" for conservation, and can include communications, social marketing, and education. And, increasingly, these strategies are being employed to help protect wildlife and wild places. But not often enough. Environmental education in particular is not deployed as a conservation strategy, or not used as effectively as it could be.

Conservation professionals may simply be unaware of what environmental education is and what it can (and cannot) help them accomplish. Many have misconceptions of what the field is about. More training opportunities for conservation professionals, and better tools for integrating environmental education into conservation plans, will help orient them to the field of environmental education and consider how it can help them reach conservation goals.

Strengthen the Core

While the environmental education community needs to become more outwardly focused in how it thinks about building environmental literacy, it also needs to pay attention to its core.

At the most fundamental level, this means demonstrating the value of environmental education and literacy to society and funders. Creating a stronger national movement to increase environmental literacy takes funding — and working smarter to strategically use the available resources. Environmental education is currently funded by a mix of foundations, corporations, government, and individual donors, as well as earned income from programs. In terms of total amount, most funding for environmental education comes from local, state, and federal government. But many programs receive substantial support from foundations and corporations, as well as individual donors who often give locally to programs and organizations they care about.

Environmental education represents a small part of the overall philanthropic pie —especially giving that is focused on core support for the field. Environmental funders tend to focus on addressing specific environmental issues, such a biodiversity or clean water, and don't fund specific environmental education initiatives. Education funders, on the other hand, tend to focus on education reform, overall professional development and improving basic education initiatives — often not seeing the overlap with environmental education.

Every recommendation in this report requires a substantial commitment of funding. At the same time, the environmental education community needs to do a better job of articulating what the needs are and what the impacts of increased funding would be and how to collaborate with other sectors to achieve common goals of addressing social and environmental challenges.

In addition to supporting environmental education as a critical component of issue-based environmental strategies, such as reducing the threat of climate change and loss of biodiversity, the philanthropic community should be encouraged to fund core work in building literacy and the infrastructure of the field. For example, the field needs a national, web-based database set for sharing best practices, case studies, innovative teaching and learning, and other opportunities for sharing ideas. This is one of the most cost effective strategies available to the field, yet it does not yet have broad support.

A significant challenge for the field is that environmental educators currently do not know how much funding actually goes to support their efforts. Part of the problem is that there is no national tracking system to assess trends in public and private giving. An annual survey is needed to track public and private funding for environmental education. The Environmental Grantmakers Associations tracks overall environmental funding from foundations, but identifying how much is spent on environmental education can be difficult because it depends on how individual foundations define environmental education. In many cases, environmental education is part of grants that fund specific environmental issues (climate change, biodiversity, water, etc.). In other cases education is considered part of community outreach or communication. In addition to foundation giving, the field needs a systematic way to track government and corporate funding, and individual donors to get the full picture of environmental education support.

Strengthening the core of environmental education also requires building connections between efforts at the community, state, and national levels. For example, there is a tremendous opportunity to support environmental literacy by developing and implementing state environmental literacy plans (ELPs) that were created to ensure that every student achieves basic environmental literacy as part of their preK-12 education. Currently, more than 26 states have completed ELPs and 23 states are in the planning and writing phase. Educators need a comprehensive strategy for getting a plan developed, approved, funded, and fully implemented in every state.

Successful programs like ELPs and the Green Schools Movement need to be expanded at a faster rate, and more broadly. Environmental educators have over 50 years of experience, and there are approaches that are proven to improve environmental literacy. Practitioners need to use existing evidence-based environmental education research to inform their initiatives, connect some of the initiatives that have been developed in isolation and work to build a more systematic and comprehensive approach, and need to conduct the necessary research to fill in gaps in understanding.

Make Environmental Education Relevant to New Audiences

Environmental education must continue to involve new audiences and demographics, both participants and educators, faith-based, sports groups, among others. Effectively raising the nation's level of environmental literacy requires reaching all people living in the U.S. with information, ideas, tools, and resources that are interesting and important to them. That will require environmental educators to become savvier about understanding their audiences and what interests and motivates them.

The recent growth in research on Americans' knowledge, attitudes, skills, and actions related to climate change has revealed different ways that Americans' think about this issue. That information is helping the field better tailor climate-change education and communications to specific audiences. More of this kind of research is needed to understand how people's interests, knowledge, skills, and actions vary by age, geographic area, race, ethnicity, and other factors so that education programs around a variety of environmental issues can better target learners with the information they need.

Educators working with all audiences also require more professional development opportunities. There are huge opportunities to step up professional development activities, working with the Next Generation Science Standards and the Common Core Standards, preservice educators, corporations (focusing on employee engagement), the religious community, and many others. Advocates of environmental education need to promote more collaboration among federal and state agencies and formal and nonformal organizations in order to engage educators and program managers, from preservice teachers to project leaders in conservation and environmental agencies. Training must focus on new thinking and trends in the field, from how to best use technology to advance environmental education to building cultural competency and values-based communication.

Broadening the reach of environmental education must build on greater diversity within the field itself, so that the field better represents the diversity of its audiences. Leadership in the field of environmental education is transitioning from an older, mostly white cadre to a younger, more diverse one. The field of environmental education, as well as the environmental movement as a whole, must represent the changing demographics of the country and needs more people of color in all aspects of environmental leadership.

At the community level, environmental educators should work closely with local leaders to support goals that encourage community well-being, from clean air to community gardens. Environmental education can contribute to a range of community goals, but only if those connections are made explicit. And by tying into community goals, environmental education programs become more relevant, and their impacts can be more readily appreciated.

While most Americans care about global issues, they do not always see the impacts of those issues on their daily lives. Community-based education, on the other hand, usually focuses on issues that are easy to see, and that can be addressed. Community-based programs also can be targeted to specific populations, so that the educational programs are relevant to their audiences. The NAAEE guidelines for providing environmental education in communities will help in this effort, but more needs to be done across the field to support community-based education with training, financial assistance, networking opportunities, research and evaluation, and more.

Reaching wider audiences demands new partnerships as well. Environmental educators are not the only people who can help Americans build their environmental literacy. Other kinds of educators (both traditional and nontraditional) can teach the public. More partnerships with weathercasters, doctors, nurses, sports groups, religious groups, youth development groups, and corporations can help expand environmental education's reach to more audiences, using educators that people trust.

Partnerships between NGOs, government, corporations, and foundations also will be vital to the growth of environmental education. For example, a number of corporate funders have stepped up to help provide support for innovative programs, from Toyota funding TogetherGreen (a partnership between Audubon and Toyota), as well as Samsung at NEEF, UL at NAAEE, and LEAF (a partnership between The Nature Conservancy and Toyota).

New technology will be another important tool for environmental education over the coming decade. Technology holds tremendous potential to build environmental literacy and civic engagement. In particular, wise use of digital tools such as social media do not distract people from nature but can connect likeminded people, inform them about their communities, provide support for action, and provide feedback and encouragement. Although there are excellent examples of ways that environmental educators are using digital media, the field has yet to widely adopt these tools, and it should become a higher priority for both practice and research.

Americans have embraced the digital revolution — people work, play, learn, and connect online. Digital technologies already play an important role in building environmental literacy, and that role is likely to grow. Environmental education can stay relevant by embracing the educational opportunities that digital technologies can bring, and moving quickly to adapt to new, evolving technologies. Environmental literacy can be built with mobile applications that enhance outdoor exploration, social networking programs that let people connect and share experiences and ideas, online courses that raise questions and spur discussions, digital textbooks that allow deeper explorations of ideas, crowdsourcing applications that allow more people to become researchers and problem solvers, and more. The environmental education field should invest more resources in the development and evaluation of digital tools for learning and sharing best practices in technology-based approaches. We also need to develop criteria for how and when to use technology in environmental education and how to make decisions about the technology investments that will lead to the most impact.

The final component to ensuring relevance to wider audiences will be a more robust pipeline for young people to find career opportunities in the field. Just as the private sector invests in programs to nurture talent for its workforce, the environmental education field also needs to think about its future workforce, and the future of the environmental field's workforce more broadly. This means that the field must not only focus on building environmental literacy among young people, but also on making them aware of careers that can be rewarding for both themselves and the planet. While individual career development programs exist across the country, the field should support these efforts more broadly as a common goal.

This report demonstrates that, at the start of the 21st century, Americans care about the environment and its future. Environmental concerns are driving consumer decisions, business strategies, and community action. Families are concerned that their children have sufficient access to nature and the outdoors. And social media and other online tools are helping people connect and get involved in keeping their communities healthy. But we have to do more.

To truly deliver on environmental education's promise of advancing social, economic, and environmental change, we are calling for an approach to environmental education that is more forward-thinking than it has been in the past.

Our nation is more diverse, urban, and electronically connected than ever, and those trends will continue. Formal education is shifting rapidly, with the introduction of new education standards, new tests of achievement, and new electronic tools for learning. Outside of schools, the ways that people gain and share information has changed dramatically, just in the last decade, and will continue to rapidly evolve. We can't rely only on old ways of thinking about how we reach society with information, ideas, and opportunities to connect and take action.

As a field, we must anticipate the interests, motivations, and needs of all Americans in every sector of society, and act nimbly to deliver education programs that enrich all learners. We need to be much more diverse and inclusive in our leaders, our ranks, our messengers, and our programs. Making these changes will require creativity, innovation, and collaboration to bring in new ideas, resources, and talent. It will also require more money. We must speak with a unified voice about the value of environmental education to make the case for why it should be funded more comprehensively. We know that environmental education makes our children smarter, our communities healthier, our economy stronger, our democracy more active, and our society more prosperous. We need more voices from all sectors to tell this story. And we hope that the bright spots, resources, and findings in this report help inspire forward thinking, collaboration, and greater impact to create a more sustainable future for all of us.

NEEF, a national leader in environmental education, was chartered by Congress in 1990 to partner with the EPA to advance environmental literacy nationwide. NEEF's vision is bold: By 2022, 300 million Americans actively use environmental knowledge to ensure the well-being of the earth and its people. To achieve its vision, NEEF offers scientific, unbiased, factual information through its own communications platforms, as well as a network of trusted professionals and affinity communities that, with their relationships and credibility, amplify environmental messages to national audiences. NEEF also implements environmental education investments in areas that best connect with everyday life: health, weather/climate and nature where we live, learn, work and play. Learn more at NEEFusa.org – or follow NEEF on Facebook & Twitter @NEEFusa.

The USDA Forest Service (http://www.fs.fed.us/) is a multi-faceted agency that manages and protects 154 national forests and 20 grasslands in 44 states and Puerto Rico. The agency's mission is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. The USDA Forest Service has an elite wildland firefighting team and the world's largest forestry research organization. USDA Forest Service experts provide technical and financial help to state and local government agencies, businesses, private landowners and work government-to-government with tribes to help protect and manage non-federal forest and associated range and watershed lands. The USDA Forest Service also works through partnerships with public and private agencies to plant trees, improve trails, educate the public, and improve conditions in wildland/urban interfaces and rural areas, and to promote sustainable forest management and biodiversity conservation internationally.