

Chapter 3

Information and Education



Information and education, in both formal and nonformal spheres, have a tremendous potential for increasing citizen awareness and ability to engage in decisions affecting their lives. Key to this strategy is managing information better, expanding access to the decision process, measuring progress toward societal goals more comprehensively, and incorporating accounting measures that educate and enable decisionmakers and individuals to make decisions that are more economically, environmentally, and socially sustainable. Additionally, the country's formal education system must be reformed to better address sustainability, and nonformal education forums and mechanisms tapped to promote opportunities for learning about sustainability.

THE CHALLENGE OF a new century offers the opportunity to create an educational, outreach, and informational system geared to the demands of a changing world, starting with basic and advanced skills and moving to job training and civic engagement. Equipping citizens with skills and knowledge will enable them to participate productively as members of local, national, and global communities. Continuing educational opportunities throughout people's lives--both in formal and nonformal learning settings--will enable them to adapt to changing economic conditions and respond to the need for environmental protection. Building a knowledge of the interdependence among economic prosperity, environmental protection, and social equity will help citizens understand, communicate, and participate in the decisions that affect their lives.

Information to Improve the Quality of Life

Quality of life in a free society is determined by the collective decisions of its individual citizens acting in the home, the workplace, and together as members of the community. To make decisions that will help achieve the nation's economic, environmental, and social goals and improve the quality of life, people in all sectors of society need a solid grounding in the core academic subjects and access to lifelong educational opportunities, as well as accurate information about sustainable development. With education and access to quality information, citizens, government, and businesses are likely to find more efficient and equitable solutions to

problems, to reach decisions that use economic and natural resources more efficiently, and to participate effectively in decisions concerning their families and communities.

Widely available information will become increasingly important as the United States moves to a new framework that places greater responsibility on individuals and the private sector to work cooperatively in making decisions that promote a balance among economic, environmental, and social issues. Informed decisions will create a more market-based regulatory framework--one that is more effective and flexible and less intrusive than the present system. The informed involvement by all government levels, the private sector, and individuals is needed to take such actions as:

- Establishing baselines for setting pollution reduction targets;
- Identifying risks and priorities;
- Developing innovative solutions;
- Understanding the consequences of individual actions; and
- Measuring progress toward economic, environmental, and equity goals.

Managing Information for Sustainable Development

Accurate information is vital to sound decisionmaking, and the federal government has an important continuing role in helping to ensure the quality and integrity of public information, whether generated by government or the private sector. Citizens--both as private individuals and as members of the business community--depend on the quality and timeliness of information to alert them to hazards and to make informed decisions that promote economic and social welfare. As sustainable development focuses attention on new environmental, social, or economic concerns, government must perform this critical management function more effectively to ensure the quality and timely availability of new kinds of information.

Government already has collected an abundance of information, but often it is not available to policymakers or the public in a form they can use. This is the case with natural resources information, a subject explored in chapter 5, "Natural Resources Stewardship." A critical management issue is thus to improve the availability and usefulness of government information. Also, duplicative data collection should be eliminated, and data coordination and management should be improved. This will reduce costs and ensure that valuable information is not lost or wasted.

The federal government is already participating in collaborative efforts with the public, the private sector, and nongovernmental organizations to improve information management. These efforts should be expanded to include priority setting for data collection and analysis, identification of the most useful formats for dissemination, and additional mechanisms to help ensure that communities can obtain the information needed to guide sustainable development at the local level. At the same time, the federal government should work with the private sector to inform the public about consumer choices through disclosure of appropriate information in such areas as health, safety, the environment, and the social impact of products and services.



POLICY RECOMMENDATION 1

BETTER INFORMATION MANAGEMENT

Improve the collection, organization, and dissemination of information to reduce duplication and streamline reporting requirements while giving decisionmakers information related to economic, environmental, and equity goals.

ACTION 1. The federal government working with state and local Governments, private businesses, and the public--should thoroughly review and revamp how it collects, organizes, and disseminates data on economic, environmental, and social conditions and on demographic and health trends. The outcome should be improved coordination among federal agencies to better meet the needs of information users.

ACTION 2. Federal agency information system plans and programs should be included in agency submissions under the Government Performance and Results Act (GPRA).¹ Rather than manage their information-gathering and -processing activities by such elements as cost and the number of personnel involved, agencies have been directed under GPRA to manage programs according to their outcomes or products. This approach should be used to ensure that money spent by the federal government on information leads to the production and dissemination of information that meets the needs of the public and policymakers.

ACTION 3. The federal government should lead an effort to reduce duplication of information by integrating the efforts of various authorities. The U.S. Environmental Protection Agency (EPA) has launched a major effort to consolidate its reporting requirements into a one-stop format, initially through a Key Identifiers Project that will eliminate the burden on individual business facilities to report the same information multiple times on separate forms.^[2]

ACTION 4. All levels of government should coordinate their programs on comprehensive regional inventories and assessments of environmental, economic, and social indicators of progress.

Strengthening Scientific Information

The ability to achieve sustainable development depends on scientific knowledge of the Earth's natural systems and the ways in which human activities affect these systems.

Accurate information built on basic scientific research establishes the foundation of knowledge needed for sound decisionmaking by individuals, businesses, government, and society as a whole. It helps people understand and predict changes in the environment, manage and restore natural systems, prioritize the potential risks associated with environmental problems, and take advantage of opportunities from technological developments. The private sector uses science to develop new technologies, production processes, and goods and services. In addition, baseline scientific data are critical to developing community-based sustainable development strategies.

POLICY RECOMMENDATIO N 2

BETTER SCIENCE FOR IMPROVED DECISIONMAKING

Strengthen the base of scientific knowledge and increase its use by decisionmakers and the general public.

ACTION 1. Government, the private sector, the scientific community, and nonprofit organizations should support or conduct long-term, independent scientific research to help decisionmakers understand sustainability issues, including the relationship among human and natural systems, human health issues, and emerging global problems such as global climate change and the loss of biodiversity.

ACTION 2. The federal government should promote international cooperation on scientific research related to sustainability.

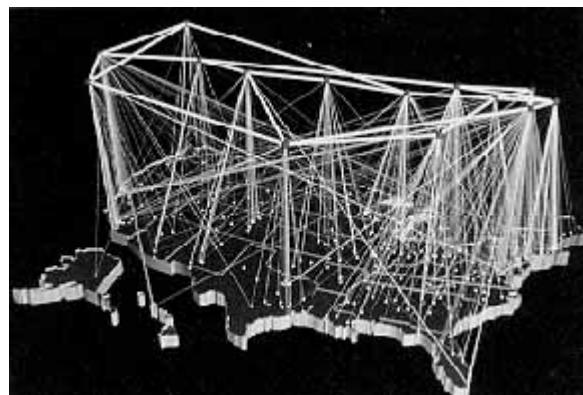
ACTION 3. Current scientific research should be disseminated broadly and in ways that help policymakers, individuals, businesses, and communities make decisions that promote sustainable development.

ACTION 4. Government and the private sector should support and encourage research to improve risk assessment and cost-benefit analysis and to enhance their use as two tools among many in policymaking.

Expanding Access to Information

Information can be a powerful tool in making institutions accountable, building trust, and empowering citizens to take greater responsibility for economic and environmental improvement. Sustainable development requires that communities have the ability to compile and link disparate sets of data to create the information bases needed for effective decisionmaking.

For example, in the late 1980's the federal government for the first time required firms to



disclose publicly the total quantities of hundreds of chemicals they released into the environment. The disclosures of toxic releases under the Emergency Planning and Community Right-to-Know Act quickly led to voluntary reductions--more than 40 percent in the first five years--and contributed to dialogue between companies and communities.^[3] Many companies now voluntarily report far more broadly on environmental performance and invite community representatives to observe, evaluate, and help improve company operations. Implementation of the Emergency Planning and Community Right-to-Know Act demonstrates that complex data can be made available to the public in a manner useful to society. By illustrating a company's commitment to stewardship, these voluntary disclosures of Toxic Releases Inventory data also build credibility and public support for a more flexible regulatory process. Trust in open processes and broad disclosure and dissemination of information are central to sustainable development.

Information--coupled with public education - is central to harnessing the power of the marketplace to reinforce more sustainable practices. For example, accurate product information, such as consumer product labeling and financial disclosure requirements, helps people make informed decisions regarding their personal and financial well-being. Accurate ecosystem data allow communities and regional areas to plan and carry out sustainable development strategies.

More efficient use of energy and materials by households is essential to making the United States more sustainable. The energy and natural resources used in American households have a significant impact on sustainability. With accurate information, consumers are more likely to make choices that save economic and environmental resources. Households also affect product design and manufacturing decisions through their purchases in the marketplace. If individuals are aware of the benefits and buy products that are cleaner to produce, use, and dispose of, they will reward the manufacturers, distributors, and retailers of those products by purchasing them. As individuals develop more environmentally and economically responsible consumer practices, they often become more aware of and active in bringing about the changes that local and national institutions need to make so society can reward those who use resources efficiently.

Sustainable development must be inclusive, and the Council believes that the nation cannot be divided between information "haves" and "have-nots" without major social inequities. Some individuals and communities have little access to information and lack the skills and training to make use of it. The issues of affordability and access to the National Information Infrastructure must be squarely addressed as key components of sustainable development. Further, training and community capacity-building are key components for widespread assumption of responsibility for sustainable development. Schools, libraries, nongovernmental organizations, governments, and the private sector are all central players in providing the necessary training and in building and sustaining the capacity of all communities to use information to support wise decisionmaking.

POLICY RECOMMENDATIO N 3

IMPROVED ACCESS ACTION 1. New collaborative and flexible regulatory approaches

TO INFORMATION

Adopt open information policies and practices, recognizing that disclosure and active dissemination of information should be the rule, not the exception. Adopt policies that increase access to public information for all segments of society and encourage the development of the National Information Infrastructure by the private sector in ways that improve access for all.

require open processes to identify and communicate baseline measurements and improvements in environmental performance. All sectors must ensure that the new environmental management system recommended in chapter 2, "Building a New Framework for a New Century," provides sufficient access to information so progress can be tracked and verified.

ACTION 2. Individual, government, and business purchasers should ask suppliers to provide information on environmental characteristics of products and should factor these considerations into their purchasing decisions.

ACTION 3. The federal government should encourage agencies to ensure that the standards and formats used to provide access to public information are consistent throughout the government so that members of the public and policymakers can effectively search within and across agencies for information.

ACTION 4. The federal government, the private sector, and local communities should promote widespread public access to computers, computer skills training, and information available through computer networks such as the Internet to allow access to sustainable development information.

POLICY RECOMMENDATIO N 4

INFORMATION FOR SUSTAINABLE LIVING

Endorse and promote awareness of the economic, environmental, and social benefits of sustainable practices--such as more efficient resource use in government, the private sector, and the home--and encourage local governments, businesses, and community groups to engage people in making these

ACTION 1. The federal government should encourage and facilitate the creation of and access to information and data on sustainable development and sustainable living, such as ways to use resources more efficiently.

ACTION 2. Local governments, businesses, and community groups should create demonstration projects that increase citizen awareness of the effect sustainability has on the quality of life. These demonstration projects should help individuals identify opportunities to use resources more efficiently and achieve lasting measurable results.

improvements.

Measuring Progress Toward National Goals

Thick books of statistical tables, piles of computer printouts, or databases buried in government computers are not the forms in which information is most accessible or useful. Development of simplified formats for presentation and reporting of information would help all sectors of society reach more fully informed decisions. Such indicators of performance can be powerful tools for measuring progress toward national goals for sustainable development. They can enable the public and policymakers alike to assess readily whether policies are working and the nation is moving in the desired direction.



For example, use of a daily clean air index in a city increases awareness among citizens about local air quality and enables them to take steps to protect themselves and their children. Where local air quality poses health threats such as asthma, community advisories increase awareness and promote individual, community, and private sector solutions to reduce the risks to vulnerable groups.

This report has identified priority national goals for sustainable development and potential indicators of progress toward those goals. Some are based on information that is easy to identify and capture; others will require more work to allow effective measurement. Still others may change or be replaced as understanding grows of the underlying scientific, economic, and social options associated with sustainable development goals.

The federal government can draw on existing resources without creating a new organization to establish indicators. The Council notes that an interagency process is already under way within the executive branch to identify and develop indicators. Moreover, the information technology revolution provides new opportunities for decentralized dissemination and flow of information.



Regular reports should be made on national indicators of performance and progress toward the goals of sustainability. The federal government should link this indicator effort to work on information bases and indicators already being done. The national indicators and the information used to create them should be made widely available and accessible, particularly to regional and local governments and organizations creating their own indicators.

**POLICY
RECOMMENDATIO
N 5**

**INDICATORS OF
PROGRESS**

Develop indicators of progress toward national sustainable development goals and regularly report on these indicators to the public.

ACTION 1. The federal government should continue and intensify the current interagency effort to develop national indicators of progress toward sustainable development. This should be a collaborative effort that involves the private sector and nongovernmental organizations.

ACTION 2. Federal agencies should regularly provide information in a useful format to other levels of government and private sector entities that are also working to create sustainable development indicators.

ACTION 3. State, county, and local governments should create their own indicators of sustainable development.

OREGON BENCHMARKS -- INDICATORS OF PROGRESS

In 1989, Oregonians faced unprecedented population growth, a diversifying economy, and a resource crisis in both the timber and salmon industries. The 1990s were sure to be a time of transformation and upheaval. Change was inevitable, but citizens hoped to guide the direction of change toward a shared vision of the state's future.

They set their sights high. "We want to be a state at well-educated, competent people living in thriving communities, working in a well-paying, competitive economy, and enjoying a pristine environment," according to the Oregon Progress Board, a group formed by the state legislature and chaired by the governor. The group was created to keep Oregon focused on its vision of the future and to assess trends affecting this vision. The Oregon Benchmarks represent one such tool.[\[4\]](#)

How do benchmarks work? just as blood pressure, cholesterol levels, and weight serve as indicators of a patient's health, Oregon has selected benchmarks to serve as indicators of the state's well-being. Oregon's 259 benchmarks are organized according to core and urgent indicators. Core indicators examine primary and long-term issues for the state: family stability; capacity; enhanced quality of life and the environment; and promotion of a strong, diverse economy. Urgent indicators examine critical issues facing the state, such as endangered wild salmon runs and rising teen pregnancy rates. The two sets are closely linked. According to the Oregon Progress Board, "Failure to reach urgent benchmarks in the near term threatens our ability to achieve other, more fundamental, benchmarks years down the road." Each year, the board collects public

comments, refines its benchmarks, and updates the data.

"The Oregon benchmarks are about vision, commitment, priorities, and measuring our goals," observes Barbara Roberts, Oregon's governor from 1991 until 1995. "We turned a strategic plan into a new way of thinking and working. Our state has learned the true meaning of collaboration. We know we need each other to reach our benchmarks. We test our work against measurable results that recognize that our efforts are not about categories or levels of government, but rather about citizens well-served and problems solved."

Improving National Income Accounts

The United States tracks how well the economy is performing through national income accounts, which give decisionmakers valuable information. One of the most common measures of the nation's financial health is the gross domestic product (GDP), a national income indicator that measures the dollar value of all products and services bought and sold in the economy. Most countries have adopted similar measures. GDP is an immensely valuable gauge of how American economic markets perform and, therefore, of whether the country is better or worse off in a financial sense.

It is an incomplete and imperfect measure, however, of how well-off the nation is in terms of sustainable development goals. It does not account for environmental quality or cultural and social resources. GDP treats natural resources simply as something consumed to produce other economic goods and services. It does not measure the cultural or spiritual wealth of a nation, nor does it illustrate how economic wealth is distributed among the individuals within a society. And, in general, it provides little insight into how well a nation is safeguarding the economic, educational, and cultural opportunities of future generations.

For example, current national accounting procedures treat use of natural resources as an addition to GDP and thus as economic growth. But using natural resources at a faster rate or in ways that preclude replenishment also imposes a cost on the economy. There would be, for example, fewer forests, fish stocks, or minerals to consume later. Better accounting of the costs of using natural resource stocks would encourage better management of present and future consumption of these resources.

If the United States is serious about sustainable development, it needs to generate better tools for measuring the public value - including the economic value - of the things that are important to the nation. Without these tools, society will not have the information it needs to know how well the country is doing and what remains to be accomplished. While national indicators of public well-being will never be capable of measuring all factors fully, such as measuring the cultural and spiritual wealth of a society, they will provide better measures and fuller information on which to base choices and important decisions than are presently available.

National indicators of public well-being will build on the information identified, gathered, and disseminated in addressing the national goals and their indicators of progress. In the interim, national income accounts can be improved to reflect several other elements of economic prosperity that are inherent in the Council's recommended goals for sustainable development.

POLICY RECOMMENDATIO N 6

SUPPLEMENTAL NATIONAL INCOME

Establish a supplemental system of satellite national income accounts that provides integrated measures of the economy, the environment, and the natural resource base.

ACTION 1. The federal government should continue to develop methods to measure quantity and quality of renewable and nonrenewable resources, such as forests, lakes, minerals, and fish populations. These measurements should include the economic value of degrading or restoring air, water, and soil quality. Agencies should work closely with academic experts and resource producers, users, and other stakeholders in this effort.

ACTION 2. Decisionmakers should begin to consider the implications of satellite income accounts as measures that expand on information from GDP and the net domestic product when making choices that affect the economy and/or the environment.

ACTION 3. The U.S. Department of Commerce should work with other nations on behalf of the United States to ensure that these new accounting methods are eventually standardized among countries.



Broadening Business Accounting Practices

Many businesses are integrating environmental concerns into all facets of their operations to increase their competitiveness in the global marketplace and to address public concerns about the environment. Environmental accounting can provide the information to help them identify opportunities to reduce both production costs and potential environmental threats through more effective environmental management.

Companies spend money to meet environmental objectives, whether on a voluntary or mandatory basis. Environmental costs include capital expenditures for pollution control equipment and salaries for staff who specialize in this area. Companies also spend money on the environment in other areas, such as operations and maintenance, labor, research, and marketing.

Unfortunately, standard business accounting practices bury the lion's share of environmental costs in non-environmental accounts and fail to trace costs back to the activities that generate them. As a result, managers often make crucial business decisions - what products to manufacture and what technologies and materials to use - without all the relevant facts. With a better understanding of a firm's actual environmental costs, managers and workers can identify opportunities to increase profits by using materials and energy more efficiently and so better protect public health and the environment.

Those who practice environmental accounting realize it is not a one-time exercise relegated to the periphery of a company. To ensure lasting benefits, it must be incorporated into ongoing business practices, including strategic planning, product development, and capital budgeting.

POLICY RECOMMENDATIO N 7

ENVIRONMENTAL ACCOUNTING

Develop and adopt accounting practices that link environmental costs with the products, processes, and activities that generate them to provide better information for business decisions.

ACTION 1. National business associations can work with their memberships to develop and adopt voluntary sustainable business practices, including accounting for the consequences of environmental practices and profitability.

ACTION 2. National business associations can provide technical assistance to small and medium-sized companies that are interested in identifying the range of costs associated with environmental management and innovative ways to reduce these costs while increasing environmental protection and economic productivity.

ACTION 3. Colleges and universities that offer degrees in accounting and business administration can offer courses on environmental accounting.

Education for Sustainability

Education for sustainability is the continual refinement of the knowledge and skills that lead to an informed citizenry that is committed to responsible individual and collaborative actions that will result in an ecologically sound, economically prosperous, and equitable society for present and future generations. The principles underlying education for sustainability include, but are not limited to, strong core academics, understanding the relationships between disciplines,

systems thinking, lifelong learning, hands-on experiential learning, community-based learning, technology, partnerships, family involvement, and personal responsibility.

Access to information is crucial in a democracy; but that information is useful only if citizens can put it into a framework of knowledge and use it to solve problems, form values, and make choices. That is where education comes in. Education for sustainability can give people the tools, skills, and experience they need to understand, process, and use information about sustainable development. It will help them make individual and collective decisions that both benefit themselves and promote the development of sustainable communities. And it will provide a means for creating a more highly skilled and globally competitive workforce and developing a more informed, active, and responsible citizenry. These objectives make it clear why education for sustainability is an integral part of the Council's long-term strategy for rebuilding communities and the country for the 21st century. How can education for sustainability be accomplished?

Education for sustainability must involve everyone. Education should flow from school to community and back again. Educators at all levels should reach beyond school walls, as many successful programs already do, to involve parents, industry, communities, and government in the education process. Colleges and universities should work with schools and communities - to deliver information, to identify questions for research, and to provide direct services to help solve community problems. For their part, communities should take a stronger interest in educating their citizens for sustainability, recognizing that current and future generations will need to be well-educated on this topic in order to bring about a sustainable future.

Education for sustainability must be a continuous process with widespread application. It thrives in all types of classrooms, exposing students to local, state, national, and international issues through hands-on, experiential learning in alternative educational environments - such as wading through streams to do water quality testing, volunteering in the community, or participating in school-to-work programs. Because sustainability is all-encompassing, learning about it cannot and should not be confined to formal settings such as schools, universities, colleges, and training institutions. Nonformal education settings, such as museums, zoos, extension programs, libraries, parks, and mass media, provide significant opportunities to complement and build on classroom learning. This means that formal and nonformal educators must work together to produce an educated citizenry.

Education for sustainability is about connections. Educating for sustainability does not follow academic theories according to a single discipline but rather emphasizes connections among all subject areas, as well as geographic and cultural relationships. Rather than weaken the rigor of individual disciplines, education for sustainability offers an opportunity to strengthen them by demonstrating vital interrelationships. For example, Dartmouth College requires students to take an international leadership course stressing business and environmental components. The Kellogg School at Northwestern University sponsors an elective course that involves a spring-break trip to places like Costa Rica to research such initiatives as the ecotourism industry and paper production from the waste products of banana processing. The Crouse School of Management at Syracuse University has a mandatory course focusing on what business students need to know about the environment; it also offers courses on land development law and

environmental law as part of the business school curriculum. Students must strive to achieve high standards within the core disciplines, even as they develop an understanding of the connections across these disciplines. Further, education for sustainability involves a consideration of diverse perspectives, including those of ethnic groups, businesses, citizens, workers, government entities, and other countries.

Education for sustainability is practical. While delving into many disciplines, education for sustainability helps students apply what they learn to their daily lives. It engenders a sense of efficacy. Part of sustainability education is learning citizenship skills and understanding that citizens do have the power to shape their lives and their communities in light of their vision of a healthy and prosperous future.

Education for sustainability is lifelong. Continual efforts should be made to institute programs about sustainability in nonformal educational settings, including the workplace and community centers and through the media. A citizenry knowledgeable about the benefits of sustainable living will have the capacity to create and maintain lasting change. Benefits to the individual include an understanding of and ability to participate in the social and economic changes that will affect their lives. For example, many communities have used planning processes that engage citizens in defining a desired future plan for their community. Using their plan, citizens work to achieve a sustainable future for themselves and their children.



An educated public is one of America's most powerful resources to meet the challenges created by increasing environmental, economic, and social demands. Our policy recommendations address both formal and nonformal educational settings and acknowledge the lifelong nature of effective education. These recommendations also address an array of crosscutting issues that relate to formal and nonformal education alike - such as technology, partnerships, equity, and international concerns. Together, these recommendations form a comprehensive educational strategy that promises to help lead the nation to a more sustainable future.

FRIENDS OF THE FUTURE

Seventh-, eighth-, and ninth-grade students from the St. Francis of Assisi School in Louisville, Kentucky, have created a voice for themselves and other youth in the state by forming Friends of the Future (FoF). With their teacher, Sheila Yule - who, according to one student, "pulls everything together and is the core of the group" - Friends of the Future members have set an ambitious local, state, and international agenda.

- Locally, they are examining what they can do as individuals and as a group to protect and enhance the environment and their community. Students regularly conduct environmental testing and have alerted the city council to a variety of water quality problems in their community;

- in fact, they have helped prompt legislative changes to address the situation.
- Across the state, FoF members are working in partnership with a consortium of schools and universities, state agencies, and students from other environmental groups to develop strategies to better organize and incorporate environmental and sustainable development education into the Kentucky school curriculum.
- FoFs international mission is to raise awareness of the United Nations' Agenda 21 and of the role youth need to play in the discussion on sustainable development. Through the sponsorship and support of the U.N. Environment Program, FoF published the book, *We Got the Whole World in Our Hands: A Youth Interpretation of Agenda 21*, which documents the proceedings of the 1992 U.N. Conference on Environment and Development. The book puts Agenda 21 into simple language - easy for younger readers to understand. The students presented their version at the national Earth Summit in Louisville in May 1993.

Reforming Formal Education

In the 1960s and 1970s, environmental education focused on natural resources conservation; in the 1980s, this curriculum was broadened to emphasize ecology and pollution control as well. Today, environmental education is evolving toward education for sustainability. Education for sustainability is not an add-on curriculum -- that is, it is not a new core subject like math or science. Instead, it involves an understanding of how each subject relates to environmental, economic, and social issues. Educating for sustainability promotes both high standards of achievement in all academic disciplines as well as an understanding of how these disciplines relate to each other and to the concepts of environmental quality, economic prosperity, and social equity. But how should education for sustainability be transferred from conceptualization to practice?

Educators -- working in partnership with communities, businesses, and other stakeholders -- can make education for sustainability a reality. Specifically, for various levels of formal education, they should define the skills and knowledge students will need in order to understand how various human actions affect the environment, economy, and equity. This understanding will be achieved most effectively if teachers make these connections to core academic subjects. Educators can encourage students to discuss these effects and form their own opinions. To this end, materials that incorporate hands-on learning methods -- which can be highly effective in fostering an appreciation of complex, real-world issues -- and that promote an understanding of how subjects relate to each other need to be developed. Finally, measures should be established to evaluate student progress in this area.

Because it is a relatively new concept for teachers as well as for students, education for sustainability needs to be incorporated into teacher preservice and in-service education programs.

Wisconsin's preservice teacher certification programs, for example, include environmental education objectives; the state also has a large in-service program in environmental education. Both have elicited strong support from students, teachers, and school administrators. The Environmental Literacy Institute at Tufts University provides environmental literacy training to secondary school teachers and university faculty. The institute exposes participants to current educational theory, teaching strategies, assessment techniques, and information retrieval methods. Its nine-day participatory learning course covers such topics as life-cycle assessment, design for environment, cost-benefit analysis, market-driven technological innovations, and responsible industry practices. Today, teachers and professors in subjects ranging from English to engineering are incorporating environmental principles into their courses. Such programs offer examples of incorporating sustainability into educational training and teaching programs.

Colleges and universities also play a strategic role in educating for sustainability. Not only can these institutions develop curricula that integrate sustainability concepts, they can also incorporate these concepts into a wide range of activities, including research projects, career counseling, administrative procedures, procurement practices, academic curricula, and other university services. Through a partnership with the EPA, The George Washington University in Washington, D.C., is doing just that: sustainability concepts underlie much of its administrative and curriculum activities. The results of practical research or model greening projects conducted at universities and colleges also can be shared with the community and other school systems. Blueprintfor a Green Campus, a collaborative effort of universities and colleges nationwide, describes ways to make sustainability a central focus of educational programs and to provide community and regional forums to discuss sustainability.[\[6\]](#)

POLICY RECOMMENDATIO N 8

FORMAL EDUCATION REFORM

Encourage changes in the formal education system to help all students (kindergarten through higher education), educators, and education administrators learn about the environment, the economy, and social equity as they relate to all academic disciplines and to their daily lives.

ACTION 1. Parents and representatives from states, schools, educational organizations, community groups, businesses, and other education stakeholders should identify the essential skills and knowledge that all students should have at specified benchmark grades for a basic understanding of the interrelationships among environmental, economic, and social equity issues. This could serve as a model for states and communities to use in setting their own requirements for academic performance.

ACTION 2. State officials, school administrators, and other educators and stakeholders should continue to support education reform; emphasize systems thinking and interdisciplinary approaches; and pursue experiential, hands-on learning at all levels, from elementary and secondary schools to universities, colleges, community colleges, and technical schools.

ACTION 3. Colleges and universities should incorporate education about sustainability into preservice training and in-service

professional development for educators of all types, at all levels, and in all institutions.

ACTION 4. Schools, colleges, and universities should promote curriculum and community awareness about sustainable development and should follow sustainable practices in school and on campus.

GLOBAL HANDS-ON LEARNING

Students, parents, teachers, and school administrators met on the grounds of Jamestown Elementary School in Arlington, Virginia, awaiting the arrival of Vice President Al Gore, who was visiting the school to launch another GLOBE (Global Learning and Observation to Benefit the Environment) site. GLOBE, started by the Vice President in 1994 and supported by several federal agency partners - the National Science Foundation, the National Oceanic and Atmospheric Administration, the U.S. Environmental Protection Agency, the U.S. Department of Education, and the National Aeronautics and Space Administration (NASA) - is designed to link teachers, students, and scientists around the world in a study of the environment. Says Jamestown principal Nicki Smith, "GLOBE is going to revolutionize education."



So how does GLOBE work? Basically, it is a hands-on scientific experiment. Teachers are trained to help students test soil, gauge air and water temperatures, study plant species and clouds, and measure the height and diameter of trees. These data are then posted on the Internet via the World Wide Web for use by students, scientists, and NASA. "It's exciting, electrifying," says

Joseph Squeo, a fifth-grade teacher at Royle Elementary School in Darien, Connecticut, who is one of 12 teachers in that state being trained to run GLOBE programs at their own schools. "This program is unique because it makes students and teachers a part of a scientific experiment. We have ownership. We can get involved and be a part of the scientific study of the Earth. We're going to be doers and participants, and that is what is going to appeal to kids today."

To date, more than 2,500 schools in the United States and 32 partner countries have signed up as GLOBE sites. In order to be ready for the program's kick-off on Earth Day 1995, they planned and prepared for more than a year. Preparations included teacher and student training and creation of the necessary computer and telecommunications infrastructure in their schools.

Scientists are already benefiting from the information collected by the students. "We don't have the time or the capability or the research funding to do the work these students are doing," William Lawrence, a research scientist at the University of

Maryland, remarks. Says Neal Pettingill, an 11-year-old Jamestown student involved with the program, "You're not just doing it to learn stuff, but you're actually helping scientists figure out what they need to help the Earth."

Providing Opportunities for Learning Outside the Classroom

People of all ages can learn about sustainable development in a variety of ways, including museums, zoos, libraries, extension programs, the media, their places of work, and community organizations. These nonformal educational settings can expand awareness and put concepts about sustainability in a familiar context. To be most effective in doing so, nonformal educational institutions need to work closely with formal educators to identify those areas in which schools are inadequately preparing students and to help fill those gaps and develop appropriate materials. This section highlights several nonformal settings that can play a key role in lifelong learning about and citizen involvement in sustainability.

Raising public awareness is central to any plan to move the nation toward sustainability. If citizens are to reverse such negative trends as urban sprawl, loss of biodiversity, and decreasing voter turnout, they must understand the issues and have accurate and accessible infon-nation about sustainability. In general, people rely on the mass media for their news and information. A 1995 Roper poll found that 72 percent of survey respondents obtained most of their news and infon-nation from television, 38 percent from newspapers, 18 percent from radio, and 8 percent from magazines.[\[7\]](#) Therefore, it is crucial that the mass media be knowledgeable about sustainability and able to translate it into a language that everyone can easily understand.

A national extension service, which collects and disseminates information on particular topics of interest, could be used to meet the research, technology transfer, and community needs generated by those interested in charting a sustainable course. It could make information on sustainability widely available to the public, schools, media, communities, and businesses and could clarify and infuse sustainability issues into the nation's environmental, economic, and social agendas. Various federal agencies have developed extension services that can serve as models for a Sustainable Development Extension Network: the U.S. Department of Agriculture's Cooperative Extension Service, the National Oceanic and Atmospheric Administration's Sea Grant program, and the National Aeronautics and Space Administration's Space Grant program. Alternatively, the existing Cooperative Extension Service could be restructured to focus on interrelated issues in communities, agriculture, forestry, manufacturing, and other economic sectors.

Community organizations offer another way to teach citizens about sustainability. Across the country, people are working in community groups to plan for sustainability. In Portland, Oregon, Chattanooga, Tennessee, and Seattle, Washington -- just to name a few examples -- citizens are participating in community "visioning" exercises. Through these, they typically envision a safe and healthy community with parks, walking and bike paths, good schools supported by parents and community organizations, affordable and clean housing, recreational facilities, museums, and libraries. They envision clean, energy-efficient transportation to replace traffic jams and road

noise; and clean, safe, and friendly streets. These planning exercises are powerful tools in creating a sustainable future. By enabling communities to plan proactively -- rather than function reactively -- and by providing the information and technical expertise that communities need to realize their sustainable development plans, all citizens can help transform their neighborhoods into safe, healthy, and economically prosperous communities. Chapter 4, "Strengthening Communities," provides a detailed discussion about local initiatives, including community planning and goal setting, and training issues.

Educating youths and adults in the skills needed for the jobs and careers of the 21st century is a major ingredient in sustainable development. As jobs around the world become increasingly technology- and information-oriented, only those countries with an educated, skilled workforce will be able to achieve economic stability - the stability that in turn continues to provide jobs paying liveable wages. Thus, as the next century approaches, all citizens will need access to job training and retraining opportunities throughout their work lives. This makes the workplace another important venue for nonformal learning about sustainability. For example, school-to-work opportunities offered through partnerships between industry and educators can help provide young people with the knowledge, skills, and career information they need for the future. Employers and educators should work together to determine and plan for current and future employees' education, training, and continuing education needs.

COLOR ME GREEN

"People say, we're only children. People say, what can we do. Can't you see we are the future, and right now we're depending on you?" These are the words of songwriter Mike Nobel. They are powerful to read, but just imagine the impact when a group of students known as the Color Me Green singers put these words to music. Mike Nobel's songs and the Color Me Green singers are part of the Color Me Green campaign in Portland, Maine, to build awareness of environmental, community, and intergenerational issues.

Now in its third year, the award-winning campaign has been made possible by an enthusiastic partnership involving the local television station 6ALIVE, businesses, state regulatory agencies, environmental groups, educators, parents, and students. The campaign features four components: Nobel's songs, produced as music videos and aired as public service announcements; a series of "Ecotips," individual actions that people can carry out in the community; "Earth Notes" which describe current issues, such as what industries are doing to become more environmentally responsible; and a public education program that disseminates a Color Me Green school kit to schools throughout the state.

The Color Me Green campaign has been a huge success. The National Association of Broadcasters awarded it first place at the 1994 Service to Children Awards, and said that the campaign, "reflects the best of what America represents." And the fame of the

Color Me Green singers is spreading. The group's recordings and videos have been circulated around the world and have received international acclaim. As one of their songs says, "Cause everything we do today can change our tomorrow. And maybe when kids lead the way, the whole world will follow."

Color Me Green^C lyrics copyrighted by Nobel, Gorham, Maine, 1993.

**POLICY
RECOMMENDATIO
N 9**

**NONFORMAL
EDUCATION AND
OUTREACH**

Encourage nonformal access to information on, and opportunities to learn and make informed decisions about, sustainability as it relates to citizens' personal, work, and community lives.

ACTION 1. Nonformal educators should encourage lifelong learning about sustainability through adult education programs, community and civic organizations, and nonformal education programs -- such as those sponsored by museums, zoos, nature centers, and 4-H clubs -- so that individuals can make well-informed decisions.

ACTION 2. Media strategists and sustainable development experts should develop an integrated approach for raising public awareness of and support for sustainability goals, conveying information on indicators of sustainable development, and encouraging people to adopt sustainable decision-making in their daily lives.

ACTION 3. A new or expanded national extension network should be developed to provide needed information to enhance the capacity of individuals and communities to exist sustainably.

ACTION 4. Local and state governments should continue to extend their partnerships with community organizations and other levels of government to support community sustainability planning processes and periodic assessments.

ACTION 5. Employers -- in partnership with all levels of government, community organizations, businesses, educational institutions, and others -- should develop training programs to create a workforce with the skills and abilities needed to adapt to changes brought on by the national and global transition to sustainability.

Strengthening Formal and Nonformal Education for Sustainability

A variety of political, technological, academic, and social factors affect the success of any educational undertaking. Many of those factors affecting education for sustainability can be addressed through partnership, perspective, and access.

Local, state, and federal governments; parents, teachers, and schools; environmental organizations; and business associations should form partnerships to coordinate educational programs focusing on sustainable development. Such coordination should reduce duplication of efforts, increase availability of resources, and enhance stakeholders' knowledge and ability to make the decisions that will help their communities thrive.

Sustainability requires that learners of all ages be prepared for today's ever-changing, increasingly technological society. Computer-based instruction and hands-on experience can foster achievement in technological disciplines and increase employment opportunities. Consequently, in both formal and nonformal educational settings, equitable access to technology must be ensured.



Educating for sustainability requires that learners have an understanding and appreciation of the international forces that affect their lives.

Environmental problems such as air pollution and pollution of the oceans are global in scale since ecosystems and ecological processes do not adhere to human-made boundaries. At the same time, economic and social forces are becoming increasingly globalized. For these reasons, achieving sustainability will require cooperation on an international scale. If today's students are to be ready to make tomorrow's decisions, they must

be able to understand the links not only among various subject areas but especially between local and global conditions.

Individuals from diverse backgrounds must have equal access to education for sustainability. Equally as important, their voices must be heard and their input included in the educational process. As the demographics of America's schools and communities change, it is essential that students learn to function in a multicultural society by understanding issues from various perspectives, resolving conflict creatively, and synthesizing new ideas from diverse points of view.

PARTNERSHIP FOR PROTECTION

"There are so many brilliant ideas, but they're like shooting stars because people do not figure out ways to make them sustainable," says Steve Hulbert, owner of on Olympia, Washington, car dealership and a member of the Council's Public Linkage, Dialogue, and Education Task Force. "A sustainable idea must have support and resources at all levels, otherwise the idea fizzles and fades."

So when Steve Hulbert had a good environmental protection idea, he knew its success would depend on strong partnerships with stakeholders from all walks of life. Olympia's watersheds affect many concerns, over the years, however, their viability has been increasingly threatened by human encroachment and activities. He joined with the Global Rivers Environmental Education Network (GREEN) and community members to develop a program that involves youth, businesses, educators, resource professionals, nonprofit organizations, neighborhoods, and government in monitoring the condition of the area's watersheds. The program's goal is to take watersheds from assessment to problem identification to rehabilitation to sustainability.

As part of this program, students from the North Mason School District are working with officials of the State Department of Natural Resources to assess the effects of heavily used recreational trails in the Hood Canal/Tahuya State Forest Watershed. Other partners in the program include the Puget Sound Water Quality Authority, the Washington State Department of Ecology, the Interagency Committee for Outdoor Recreation, the Washington state legislature, the Olympia Department of Natural Resources, and the U.S. Fish and Wildlife Service. These partners supply the resources and financial support while community organizations, businesses, and parents provide the volunteers. Together, they have also established an information network that allows resources, knowledge, and expertise to be shared.

Steve Hulbert's idea has turned into a full-scale program that uses national, state, and local resources not only to educate students about forest ecosystems, the connection between watersheds and the forest, and the effect that humans can have on both, but to empower the whole community to work together to take protective actions.

POLICY RECOMMENDATION 10

STRENGTHENED EDUCATION FOR SUSTAINABILITY

Institute policy changes at the federal, state, and local levels to encourage equitable education for sustainability; develop, use, and expand access to information technologies in all educational settings; and encourage

ACTION 1. Federal, state, and local governments should form partnerships with private sector organizations, businesses, professional societies, educational institutions, and community groups to develop and implement coordinated strategies supporting education for sustainability.

ACTION 2. The public and private sectors should support the development of and equitable access to enhanced multimedia telecommunications technologies and improved clearinghouse capabilities that promote an understanding of sustainability.

ACTION 3. Educators in both formal and nonformal learning programs should help students understand the international factors that affect the nation's transition to a sustainable society.

understanding about how local issues fit into state, national, and international contexts.

ACTION 4. Formal and nonformal education for sustainability invites and involves diverse viewpoints, and that everyone -- regardless of background and origin -- has opportunities to participate in all aspects of the learning process. This will ensure that education for sustainability is enriched by and relevant to all points of view.

[1] Government Performance and Results Act of 1993, 31 U.S.C. 1115-19 (1995).

[2] U.S. Environmental Protection Agency, *Reinventing Environmental Regulation*, report presented to President Bill Clinton and Vice President Al Gore (Washington, D.C., 1995).

[3] Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11001-50 (1994).

[4] For more information, see Oregon Progress Board, *Oregon Benchmarks: Standards for Measuring Statewide Progress and Institutional Performance*, report to the 1995 legislature (Salem, Oreg., 1994).

[5] Daniel Sitarz, ed., *Agenda 21: The Earth Summit Strategy to Save Our Planet* (Boulder, Colo.: Earth Press, 1993), pp. 266-67. The U.N. Conference proceedings are documented in Group Project by the Youth of Louisville, Kentucky, *We Got the Whole World in Our Hands: A Youth Interpretation of Agenda 21* (Louisville, 1993).

[6] Campus Green Vote, *Blueprint for a Green Campus: The Campus Earth Summit Initiatives for Higher Education*, project of the Heinz Family Fund (Washington, D.C., 1995).

[7] The Roper Organization, *America's Watching, Public Attitudes Toward Television*, poll commissioned by the Network Television Association and the National Association of Broadcasters (New York, 1995), p. 17.