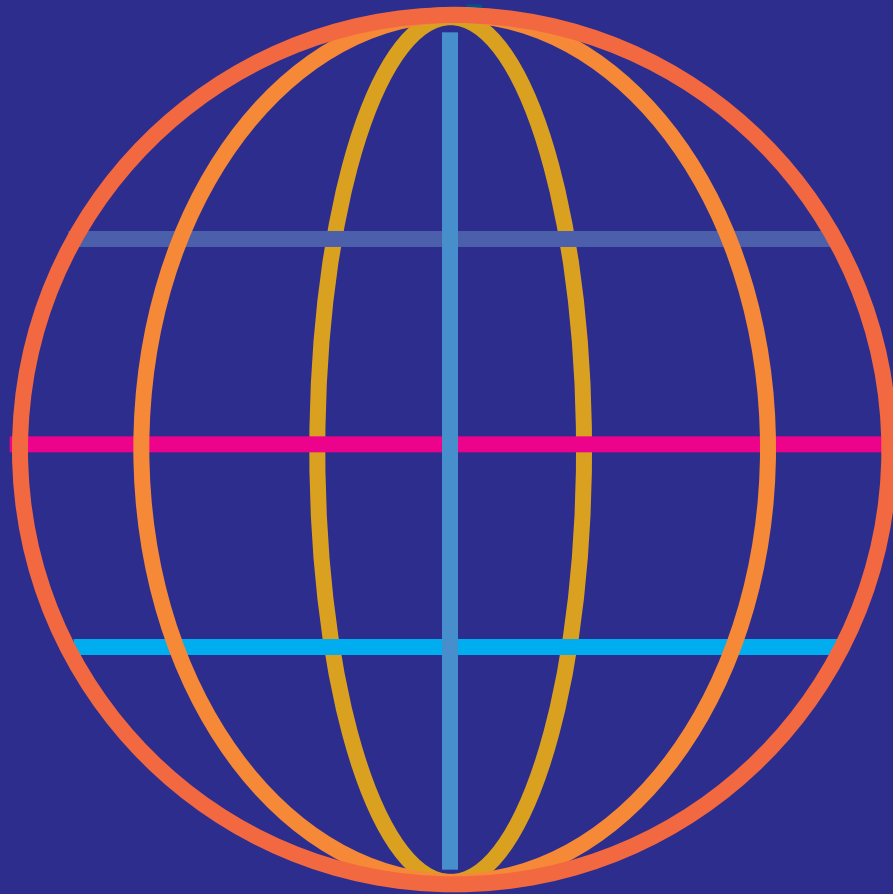


EARTH DAY 96
ENVIRONMENTAL EDUCATION



GLOBAL

I S S U E S

AN ELECTRONIC JOURNAL OF THE U.S. INFORMATION AGENCY

APRIL 1996

Welcome to “Global Issues”, the second in the Electronic Journal series of the United States Information Agency (USIA). “Global Issues” is published by USIA’s Office of Thematic Programs and edited by its Global Issues and Communications Team for USIA’s international audience.

It is most fitting that this edition address Earth Day and Environmental Education. There is probably no more important issue for the future of the globe than the environment. And no occasion is more important in recognizing that issue than April 22, Earth Day.

This Journal, admittedly, only mines the surface of a wealth of information on Earth Day and environmental education.

For an extensive amount of additional information, including documents, articles, internet sites, etc., from both the public and private sectors, readers are urged to please visit the Earth Day 1996 and the Environment Issues and Resources pages on the USIS homepage at <http://www.usia.gov.usis.html>.

Earth Day 1996 can be found under “Special Events and Hot Topics”; Environment Issues and Resources under “Current Issues and Events”.

Future editions of “Global Issues” will address one or more of the global issues listed on the back cover of this edition. As “Global Issues” is intended to be an evolving journal, the Global Issues and Communications Team welcomes any comments and/or suggestions readers might have concerning its style or content in this and all future editions to:

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GLOBAL ISSUES

An Electronic Journal of the U.S. Information Agency

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FOCUS

BY TIMOTHY E. WIRTH, UNDER SECRETARY OF STATE FOR GLOBAL AFFAIRS

THE GLOBAL ENVIRONMENT: PROGRESS AND CHALLENGES



As we begin the second half of the last decade of the 20th century, hopeful signs are emerging in our understanding of and response to the global challenges that will determine the opportunities we pass to our children and grandchildren in the 21st century.

All over the world cross-cutting, global issues increasingly define the major challenges of the future and must define the overriding mission of the international community in this time of profound global change. Nations are beginning to recognize their opportunity and their responsibility to look beyond the crises of the moment toward the underlying causes that are making the world ever more complex and redefining the priorities for long-term national security and global prosperity.

To meet these challenges the United States has placed the challenge of sustainable development — economic, social and environmental progress — at the top of its international priorities. This kind of integration is imperative to ensuring that the United States and its global partners are able to promote the world of shared prosperity and peace we desire.

Through sustainable development the economies of the world can attempt to meet the needs of today's generations without compromising or stealing from future generations. Understood and pursued, the idea of sustainable development can integrate and harmonize the enormously powerful economic and environmental forces at work in today's world.

Sustainable development offers a vision that views the challenge of protecting and understanding our biological resources as an enormous opportunity for cataloguing our inheritance and prospecting for products from nature's wonder.

This vision embraces the quest for knowledge — to unlock the mysteries of the oceans, the atmosphere and the biosphere: to understand how they work individually and how they interact collectively — a wondrous opportunity.

It is a vision that sees clearly the opportunity of global trade and the necessity for nurturing and extending the family of democratic, free market economies so that poverty is vanquished and human misery eliminated, and basic human needs sustained in every nation.

And there are encouraging signs of hope:

Here in the United States, two decades have passed since passage of the National Environmental Protection Act, the Clean Air Act, the Clean Water Act, the Endangered Species Act and a host of measures at the federal, state and local level. As a result, the air Americans breathe is cleaner, our rivers more fishable and swimmable, our wilderness system more expansive.

Similarly, private industry has changed dramatically, responding to the public will and to new markets. The result is not only numerous examples of creative strategies to prevent pollution, but also enhanced industrial efficiency, productivity and competitiveness.

Internationally, major progress has been made to address the unmet health needs and explosive population growth rates of the past. Global cooperation has been essential in the phase out of chemicals that erode the Earth's protective ozone layer. Remarkable strides have been made in economic and environmental progress on behalf of all nations, large and small, rich and poor.

Science and medicine, for example, have helped contain and eliminate prevalent infectious

diseases. Measles, smallpox and polio — major global problems only 30 years ago — have been all but tamed in virtually every region of the world, and the international community is now working to develop a single children's vaccine that will inoculate the young against a host of easily preventable diseases.

These efforts have demonstrated clearly that it is within our capability to respond to the best information scientists are providing about the health of the environment and the state of the world. And the critical glue making this possible has been partnerships — scientists with policymakers, public with private sectors, developed and developing nations.

But many challenges remain that will test the partnerships of the past and require the building of new coalitions for the future.

First, rapid population growth must remain at the top of the agenda for sustainable development. Fortunately we have a remarkable agenda, the Program of Action agreed upon at the International Conference on Population and Development in Cairo, Egypt in 1994. It reflects the core values and important lessons learned over the past 25 years: that comprehensive efforts — from making family planning and reproductive health services universally available to sharply expanding the education of girls and focusing on child survival, strong families and local participation — are essential to international efforts to ensure that people everywhere are able to determine freely the number and spacing of their children.

Part and parcel of this strategy is the promotion of the social, political and economic rights of women — extraordinarily important resources for growth and change. The return on these initiatives — in terms of stability, environmental quality and economic productivity will outweigh the costs for generation after generation.

Basic health services would be a another wise priority for the community of nations, and can be achieved at relatively little global cost. As just one example, we must work together to share ideas and construct a global surveillance and response network to cope with emerging and re-emerging infectious diseases. A partnership between the research community and the private

sector will be essential if we are to develop inexpensive and effective diagnostics for communicable diseases and improve the preparation of medical and public health practitioners to recognize and combat infectious diseases.

The elimination of four major, easily preventable diseases — measles, tetanus, whooping cough and polio; eradication of iodine and Vitamin A deficiencies and the global availability of oral rehydration therapy are all achievable early in the next century. Successfully done, these measures alone would save 3-4 million lives annually and perhaps eliminate upwards of 20 million early childhood deaths, ease immeasurable, unnecessary suffering and make a significant contribution to lowering pressures for larger families.

Greater understanding and integration of environment and economics will also contribute importantly to sustainability. Getting the prices right is a vital task. Nations, including the United States, can no longer assume that we bear no cost for fouling the air or depleting our resources. Instead, we need to find ways to internalize those costs and allow the marketplace to help determine the most efficient means of achieving our environmental goals related to climate change and other major challenges to the global environment.

Addressing hunger and promoting food security will challenge numerous sectors — research, agriculture and government alike. The Green Revolution of the past quarter century has helped provide basic foodstuffs for growing populations, but while population continues to grow, arable land does not. In fact, land degradation and increased crop vulnerability — the price for the intense use of fertilizers and chemical pesticides — loom as major challenges for the future.

Finally education and research will be fundamental if we are to have the knowledge and wisdom needed for sustainability. Our schools and colleges need information on the fundamental systems of life and the intricate relations of civilization and nature. Even greater efforts are needed to foster enlightened publics able to understand the many elements of sustainable development. The new educational and communications technologies will help meet

the challenge, but there is no substitute for committed study by people of all ages.

To avoid stealing from our children's future, we must make it clear that sustainable development is a worthy challenge and an incredible opportunity. We must demonstrate that hope and hard work are the antidotes to fear and resistance to change. We must meet major challenges with renewed creativity and the

powerful force of ingenuity. We must transform the debate from one that often frames scientific issues as obstacles to ways of the past and instead views them as opportunities for new ideas, new products and a better quality of life for the future.

Timothy E. Wirth is the Under Secretary of State for Global Affairs and a former U.S. Senator from Colorado.

BY JERRY STILKIND

ENVIRONMENT NOW INTEGRAL COMPONENT OF U.S. FOREIGN POLICY



U.S. Secretary of State Warren Christopher has outlined a strategy that officials say will make environmental protection for the first time one of the central features of U.S. foreign policy.

"We are determined to put environmental issues where they belong — in the mainstream of American foreign policy," Christopher said in a speech on April 9.

To accomplish this, Christopher said he has instructed U.S. embassies to incorporate environmental objectives in their work with other governments and to strengthen cooperation among U.S. agencies that manage overseas aid programs.

"We will raise these environmental issues on every occasion where our influence may be useful. We will bolster our ability to blend diplomacy and science and to negotiate global agreements that protect our health and well-being," he told an audience at Stanford University in California.

A State Department official, in a briefing after the speech, said in reply to a question that not much opposition is expected in the developing world to the new U.S. thrust.

Many developing countries, particularly the larger ones, have argued in international conferences that they face such severe economic hardships that they cannot protect the environment as well as the industrialized countries would like them to. The developing countries point out that the industrialized world greatly harmed its environment over the past 100 years and still emits the great bulk of pollutants each year.

The department official said that attitudes are changing in the developing world as

environmental problems worsen. The official cited discussions last year with India that led to a common identification of environmental problems, and another such agreement with Brazil.

Developing countries also maintain that they need special financial help to overcome some of their environmental problems but they understand the need for environmental protection, the official said. Therefore, not a great deal of resistance is expected when U.S. officials raise the level of concern about the environment overseas, the official said.

Christopher justified the new emphasis on environment in U.S. diplomacy by citing two national security issues. One issue, he said, is that some environmental problems — such as the trapping of greenhouse gases that may warm and change the climate of Earth — spill across national boundaries and could affect the health and jobs of Americans.

Another issue is that political and economic stability in many countries may depend on natural resources. "Nowhere is this more evident than in the parched valleys of the Middle East, where the struggle for water has a direct impact on security and stability," he said.

Christopher outlined four ways in which his department will try to bolster the international profile of the environment — globally, regionally and bilaterally with other nations, and jointly with business and nongovernmental organizations.

Globally, international negotiations on a range of issues should be concluded in 1997, which he said may make it the best year for the environment since more than 100 heads of government met at the 1992 Earth Summit in Rio de Janeiro, Brazil.

One set of negotiations seeks to trim emissions of greenhouse gases — mostly carbon dioxide produced by the burning of coal, oil and wood — early in the next century below 1990 levels.

Another set of negotiations is aimed at strictly regulating the export and import of toxic chemicals, including pesticides, that can poison people, water and the land.

An intergovernmental panel on forests is holding yet another series of meetings to develop a consensus on how to conserve the world's forests.

Christopher announced that toward the end of 1997, the State Department will invite governments to a conference on improving compliance with international agreements "to ensure that those agreements yield lasting results, not just promises."

Regionally, Russia, the Ukraine and some other parts of the former Soviet Union have such common problems as nuclear contamination, soot-filled skies and heavily polluted rivers. U.S. programs have been helping with such heavy burdens, Christopher said.

In Africa, U.S. aid is helping several countries with land erosion problems. "Our Greater Horn of Africa Initiative, for example, addresses the root causes of environmental problems that can turn droughts into famines, and famines into civil wars," Christopher said.

He announced that environmental hubs will be set up in some embassies to help with regional natural resource problems and to help U.S. industry sell the innovative technology that could contribute to the solution of the problems.

Bilaterally, Christopher cited work with

Canada and Mexico to solve such joint problems as water and air pollution.

President Clinton will be attending a Nuclear Safety Summit in Moscow with Russian President Boris Yeltsin and other government leaders later in April to promote the safe operation of nuclear reactors and the proper storage of nuclear materials.

Vice President Al Gore is expected to meet later in April with Chinese leaders to increase cooperation on environmentally sound development projects in such areas as energy and agriculture.

The last of the four elements in the new environmental strategy is to increase partnerships with U.S. businesses and nongovernmental groups. U.S. industry has the products and the expertise to get a large share of the estimated \$400,000 million market for environmental technology, Christopher said.

U.S. nongovernmental groups have played important roles in furthering international environmental goals, and he promised to increase cooperation with these organizations.

He also announced that the State Department will issue an annual report on Global Environmental Challenges beginning on Earth Day, April 22, 1997. "This report will be an essential tool of our environmental diplomacy, bringing together an assessment of global environmental trends, international policy developments and U.S. priorities for the coming year," he said.

The prepared text of Christopher's speech can be found on the Internet on the U.S. Information Service's environment page at <http://www.usia.gov/topics/environ/christop.html>

Jerry Stilkind writes on the environment and other global issues for the U.S. Information Agency.

BY JIM FULLER

ENVIRONMENTAL EDUCATION: KEY TO PLANET'S FUTURE



School children make precise measurements of air temperature and precipitation at hundreds of schools and share the data with environmental scientists; volunteers turn a former missile site into an environmental education center with nature trails and bird migration checkpoints; and disadvantaged youngsters discover the diversity of plants and animals in their own urban neighborhoods. Environmental education programs like these are being adopted in the United States and other countries to deal with tough environmental problems ranging from contaminated water to endangered species.

Today there are hundreds of U.S. environmental education programs in school districts, universities, community organizations, businesses, city parks, zoos, museums, and nature and science centers. The trend toward environmentalism is among the most popular in education, with at least 30 states now mandating that public schools include environmental education in their primary and secondary curriculums.

"In the past 25 years, environmental education has helped the people of this country reach a new understanding," says Carol Browner, administrator of the U.S. Environmental Protection Agency (EPA). "Today, more Americans than ever before understand that to ensure a good quality of life for ourselves and our children, we must act as responsible stewards of our air, our water and our land."

Until this century few thought that humans — living on a seemingly limitless expanse of land with plenty of water — could cause irreparable harm to the environment. But today governments and ordinary people around the world struggle with coastal erosion, oil spills and the contamination of drinking water, while issues like population growth, deforestation, acid rain and the possibility of rapid climate change raise difficult choices for the future.

The era of modern environmental policy may have begun with the first Earth Day on April 22, 1970 — a year that also marked the founding of the EPA. At that time the nation became alarmed when thousands of leaking barrels of toxic chemicals were discovered at Love Canal, New York; when the water in the city of New Orleans became so contaminated that people could not drink it; and when the Cuyahoga River in the city of Cleveland, Ohio, caught fire as a result of pollution.

Since that Earth Day in 1970, the U.S. Congress has enacted nearly 40 major federal environmental laws addressing a wide range of issues, including clean air, clean water, energy conservation, hazardous wastes, and herbicides and other pesticides. In addition, dozens of national wilderness areas, wild and scenic rivers, parks and wildlife refuges have been expanded or created.

Browner, in an *EPA Journal* article, says there has been tremendous progress in protecting public health and the environment, with some of the nation's most polluted water, like Lake Erie and the Potomac River, making remarkable recoveries

"We no longer have rivers catching on fire," she says. "Our skies are cleaner. And U.S. environmental expertise and technology are in demand throughout the world."

However, while the nation has made tremendous strides, Browner emphasizes that more must be done to meet the environmental challenges of the next 25 years and that the most important tool for dealing with assaults on the environment is education.

Senator John Chafee, chairman of the Senate Environment and Public Works Committee, says environmental education must come from the

bottom up — through local communities, grade schools, high schools, colleges and universities.

“The best way to encourage environmental protection is to demonstrate how environmental degradation hurts each one of us,” he writes in the *EPA Journal*. “And that means education.”

Environmental Education Dates Back to Last Century

Education programs focusing on conservation and other related fields have existed since the late 1800s. Conservationists in the state of Wisconsin laid the groundwork for a more formal approach in the early 1930s with passage of the first statute to mandate that conservation education be taught in the state’s public schools and that teachers in science and social studies receive instruction in the conservation of natural resources. To this day the state’s teacher-training and grants programs in environmental education continue to lead the nation.

The National Wildlife Federation, a non-governmental organization, and the departments of education in the states of Ohio and Florida were also pioneers in the field, initiating groundbreaking programs in the 1940s.

“Environmental education has been around for more than a hundred years, depending on how you define it,” says Ed McKrea, executive director of the North American Association for Environmental Education, the world’s largest association of environmental educators.

“The more modern versions can be traced back about 25 years to the first Earth Day. The basic goal of these initiatives is to create an informed and motivated citizenry that can work towards improving and maintaining environmental quality.”

In 1975, an international workshop in Belgrade, Yugoslavia, proposed a global framework for environmental education called the “Belgrade Charter.” The charter states that the goal of environmental education should be to develop a world population that is concerned about the environment and has the knowledge and commitment to work toward solutions of current problems and the prevention of new ones.

Two years later representatives from 70 nations attended an environmental education conference in Tbilisi, Georgia — the largest conference ever held on the subject — to define objectives based on the Belgrade Charter that could be implemented by all countries. These objectives included such things as helping social groups and individuals acquire a basic understanding of the environment and the skills needed to identify and solve environmental problems.

U.S. programs based on these objectives, which have been adopted by local and federal governments and non-governmental organizations, include training teachers, providing school curriculum materials, and offering outdoor field education opportunities for students.

GLOBE Program Known Around the World

One of the most famous programs is called GLOBE, which stands for Global Learning and Observation to Benefit the Environment — a hands-on, school-based program launched on Earth Day 1994 by Vice President Al Gore. The program involves students making environmental measurements, such as air temperature and soil moisture, at thousands of locations around the world and sharing their data via the Internet. Scientists at a data center combine the information from the many GLOBE schools with that received from other sources, such as satellite instruments, to form pictures of environmental conditions around the world.

More than 2,000 schools in the United States have already signed up for the program and more than 100 countries have expressed interest in having students participate. The United Nations General Assembly has adopted a resolution supporting the program. Russia became the first formal GLOBE international partner in December 1994. In the United States, the GLOBE program is funded and administered by six federal agencies.

Another major environmental education program involved some 10,000 children in 100 countries who worked in 1993 to create a children’s version of Agenda 21, the ambitious program adopted at the 1992 Earth Summit in Rio de Janeiro for achieving sustainable

development in the 21st century. The children's version, called "Rescue Mission: Planet Earth," translates the 40-chapter summit document into an environmental action manual for kids. There are currently about 270,000 copies in print in 14 languages, making it a bestseller among books sponsored by the United Nations.

A sustainable society, defined as one that satisfies its needs without diminishing the resources needed for future generations, has become the over-arching goal of environmental education. Sustainable development will be the main theme for the U.N.-sponsored International Congress on Environmental Education and Training in 1997.

Many Programs Funded by EPA Grants

In 1990, Congress passed the National Environmental Education Act, allocating \$65 million over five years to create an Office of Environmental Education within EPA, and charging the agency with responsibility for coordinating federal environmental education initiatives. The act also authorized creation of a national grants program to provide funding for educating students, individuals and communities in all 50 states about air and water pollution, watershed and ecosystem protection, and a host of other pressing issues.

"Since 1992, we have awarded over 1,000 grants worth about \$11 million, reaching down into grass roots levels with workshops and materials for both formal and nonformal educators," says Michael Baker, acting director of EPA's Environmental Education Division. "While most grants are awarded at the elementary school level, we've also given grants to non-profit organizations, universities, graduate schools and business schools."

Baker says that while a grant can be as much as \$25,000, most of the funding takes the form of small grants of \$5,000 or less.

"And we get incredible feedback from teachers and grantees who receive even small grants of \$5,000," he adds. "It's like we've given them \$5 million because it's made such a big difference in their community."

Examples of projects funded by EPA include an

institute in New York that trains community leaders from low-income and minority neighborhoods in how to reduce the exposure of citizens to water and air pollution, lead poisoning and hazardous wastes.

Another program, called "Save Our Migratory Birds," teaches middle school students in the United States, Mexico, Canada and Argentina how to protect local habitats used by migratory birds. This project emphasizes the global nature of environmental issues by focusing on birds that link countries through their seasonal migrations. The project was implemented with the assistance of non-profit organizations in all four countries.

In the state of Rhode Island, education grants have funded a university project to teach middle school students about global climate change, an Audubon Society effort to teach elementary school children about the effects of pollution on Narragansett Bay, and a study by the Zoological Society that monitors water conservation in both Rhode Island and the South American country of Colombia.

EPA funds were also used to turn a former missile site located on an island near Lake Erie into an environmental education center. After contaminated waste water had been removed from the old missile silos and they were filled in, volunteer workers marked off nature trails and bird migration checkpoints. Today the island is used for field trips by students from 35 school districts in the nearby major city of Detroit, Michigan.

EPA also sponsors a fellowship program that encourages college students to pursue professional environmental careers. Under this program, students from more than 210 participating universities are given an opportunity to conduct actual environmental projects designed by EPA scientists. Out of a field of more than 1,000 entries, the fellowship program was named "One of America's Top 100 Internships" by a Princeton University publication.

In the same legislation that created EPA's Environmental Education Division, Congress authorized creation of the National Environmental Education and Training Foundation, a nonprofit organization that raises private money to match certain federal funds for environmental education programs.

NAAEE Oversees Global Network

Another driving force in environmental education is the North American Association for Environmental Education (NAAEE), a network of professional educators and students working throughout the United States and in more than 40 nations worldwide to help people develop knowledge about the environment.

The organization, whose annual budget has grown from \$65,000 to \$2.5 million since 1989, is creating a set of national environmental education standards, something that experts believe has been needed for a long time. These standards, being developed in cooperation with other organizations, will rate educational materials and identify what's important for students and educators to know in order to be environmentally literate.

Last year, EPA called on NAAEE to coordinate the Environmental Education and Training Project — a major grant-funded consortium of universities and federal agencies that will over the next three years develop “model” education materials for teachers, conduct teacher training workshops, and expand an electronic data base of the latest education programs.

“We expect to reach over 30,000 teachers in the first year alone,” Baker says. “So it’s a broad-based program — one that involves putting grants into the hands of those who do the actual work in environmental education.”

NAAEE has also placed major emphasis on urban and multi-cultural environmental education. A key component of this effort is the VINE Network — a program that uses volunteers to help 8- to 12-year-old students, especially disadvantaged children, discover the diversity of plants, animals and habitats in their own urban neighborhoods. By 1994, VINE programs had been established in 11 cities across the country, with 48 percent of the participating youngsters living at or below the poverty level and 55 percent representing ethnic and cultural minorities.

NAAEE has also been fighting for “environmental justice,” a term that describes adequate protection from environmental hazards for every citizen regardless of age, race, gender or

social class. It’s been found that neighborhoods with high rates of poverty are often saddled with a disproportionate number of possible environmental hazards, such as industrial and sewage-treatment plants, and hazardous-waste incinerators. Growing concerns voiced by community action groups in 1994 forced federal agencies to ensure that poor and minority communities are not discriminated against when decisions are made about where such facilities are placed.

The association, in cooperation with the EPA, the Smithsonian Institution and the Agency for International Development (A.I.D.), also supports active programs in countries around the world.

For example, NAAEE works closely with the Environmental Education and Information Center in Kiev, Ukraine. The center, located at the National University of Kyiv Mohyla Academy, specializes in providing training seminars on environmental management and providing technical support for other environmental initiatives.

The NAAEE’s Training Institute focuses on environmental education courses for participants from developing countries.

“You can go into some countries and find really active programs that in some ways are better than our own,” McKrea says. “In other countries you can find almost nothing because the emphasis is on survival and production as opposed to environmental quality. The extent of environmental education depends a lot on the average income of the country and the overall health and quality of life.”

McKrea says India probably has more environmental education programs than any country in the world, but it lacks a coherent national program to pull them together. He says Thailand’s ministry of education is currently developing just such a national plan.

“There is some environmental education activity in the Middle East — in countries like Jordan, Lebanon and Egypt,” he says. “And if you throw in the nature clubs in East Africa, which include a lot of environmental education, countries like Kenya, Tanzania and others in the region actually have pretty active programs.”

The U.S. Peace Corps is heavily involved in environmental education, with more than 1,000 volunteers working directly on environmental projects in more than 90 countries. In Uganda, volunteers work with officials in national parks to manage protected areas for gorillas and other wild game; in Nepal, where deforestation is causing severe soil erosion, volunteers have helped replant 500 hectares of forest; and in Kazakhstan, a volunteer is using his 15 years of experience as an environmental control officer in the Detroit steel industry to help local industries clean up their air pollution.

Non-Governmental Organizations a Major Player

Non-governmental organizations also weigh in heavily in the environmental education effort, with many national organizations earmarking over \$500,000 annually for such programs. For comparison, environmental education budgets for the federal agencies range from \$1,500,000 at the U.S. Forest Service to \$7,000,000 at the EPA.

The World Wildlife Fund, one of the largest conservation groups in the world, has initiated a major biodiversity education program to try to close the gap between what scientists know about the issue and what educators, students and the general public know. The program includes production of a biodiversity primer for middle-school students that highlights careers in the field, and working with zoos, aquariums, nature centers, botanical gardens and museums to set up workshops and institutes to help educators and the public understand biodiversity issues.

Conservation International, another major non-governmental organization, sponsors a program that allows elementary school students to adopt a Philippine Eagle by contributing funds that are used to protect the bird, which is a highly endangered species in the Philippines. Another program involves the distribution of a teaching kit that includes a video on saving the rain forests. Over 500 schools have received the teaching kits over the last three years.

But despite the progress in environmental education over the last 20 years, some experts express concern that a lack of funding and interest will limit activity in the future. EPA's Baker, for example, says it is by no means certain, during the current period of U.S. budget cuts, that the agency's environmental education division will continue to be funded in the fiscal year that begins October 1997.

"The first step is getting Congress to reauthorize our budget," he says. "Then what's important is that a federal agency be given the lead on environmental education. We hope it continues to be EPA. But like everyone else we're having to take our reductions."

Judy Braus, director of environmental education at the World Wildlife Fund, says that too many people, especially federal and state government leaders, don't feel that environmental education is a priority. Nor is it a priority, she says, in most school curriculums — including at the university and adult education levels — in teacher in-service training programs or in courses designed to train political and business leaders. A recent survey of 2,000 science and social studies teachers found that they spent less than one-half hour teaching about the environment every week.

"Because it's not a priority, it doesn't receive the funding or recognition needed," Braus says. "Until we require schools — elementary, secondary and universities — to assess environmental literacy, it will be pushed to the back burner."

But Senator Chafee insists education is the key to the impressive environmental successes made by the nation.

"We must make environmental education a part of our lives," he says. "If education is encouraged, citizens will understand and take on their roles as stewards of this Earth....We have only one planet to ride on — let's pass it on to future generations in better condition than we found it."

Jim Fuller writes on science, technology and environment issues for the U.S. Information Agency.

ENVIRONMENTAL LITERACY AND THE COLLEGE CURRICULUM



As the Associate Dean of the College of Natural Resources at the University of Wisconsin-Stevens Point, I share responsibility for the largest undergraduate natural resources program in the country. The 1,750 majors in our college can choose among 30 different academic programs and nearly 200 environmentally related courses. These students are receiving intensive environmental literacy instruction. However, they are a minority.

While many institutions offer environmentally related minors or majors, they do not require even basic instruction in environmental literacy. Thus, the vast majority of students are not enrolled in programs focused on the environment; most never even enroll in a general environmental studies course. This article focuses on reaching these students with environmental literacy instruction.

Call to Action

Colleges and universities have been challenged to increase their role in developing an environmentally literate citizenry. Agenda 21, the blueprint for action adopted by the world's leaders at the 1992 United Nations Earth Summit, calls for aggressive measures to strengthen the environmental education received by the world's citizens. Universities are specifically asked to play a prominent role in preparing citizens to analyze and resolve environmental issues.

In a similar vein, the Council of State Governments' 1994 book of Suggested State Legislation includes model environmental education legislation that is recommended for adoption by state legislatures. The model legislation states: "Universities, colleges and vocational institutions are required to implement programs that encourage environmental literacy and provide opportunities

for environmental stewardship among the student population." To accomplish this, universities are directed to implement "an environmental studies course requirement for all graduates, or the development of an integrated general education program that accomplishes environmental literacy through its integration in a variety of courses."

What Should Be Taught

Much has been written over the last 25 years about environmental literacy and strategies for achieving it. In the early 1980s, Harold Hungerford from Southern Illinois University, Ben Peyton from Michigan State University, and I worked together to develop a set of environmental education instructional goals. Our goals have been used around the world for curriculum development and research. We believe that instruction aimed at enhancing environmental literacy must aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated to working individually and collectively toward achieving a dynamic equilibrium between quality of life and quality of the environment. In other words, environmental literacy needs to focus on developing responsible environmental behavior.

Harold Hungerford and Trudi Volk from Southern Illinois University reviewed the pertinent literature and concluded that we can maximize college-level opportunities to develop responsible environmental behavior if we proceed along the following lines:

- o Teach environmentally significant ecological concepts and the environmental interrelationships implied by these concepts
- o Provide carefully designed and in-depth opportunities for learners to achieve some level of environmental sensitivity that will promote a desire to behave in appropriate ways.

- o Provide a curriculum that will result in an in-depth knowledge of issues; that will teach issue analysis and investigation skills as well as provide the time needed for the application of these skills; that will teach the citizenship skills needed for issue remediation and give opportunities for the application of these skills.
- o Provide an instructional setting that increases learners' belief that they can make a difference by acting in responsible ways.

Faculty from a variety of colleges and universities have considered what should be taught in order to develop environmentally literate graduates. In *Achieving Undergraduate Environmental Literacy*, a report of a 1990 Pennsylvania System of Higher Education Faculty Development Forum, the following goals were recommended for undergraduate environmental literacy:

- o Students must develop an understanding of how humans relate to natural systems and the importance of making wise decisions regarding the use of natural resources and maintaining human habitat fit for life and fit for living.
- o Students must develop a knowledge and appreciation of local and global environmental issues.
- o Students must develop a firm knowledge of fundamental scientific principles so that they can understand the consequences of human actions on natural systems.
- o Students must develop reasoning and problem-solving skills that lead to responsible decision making and action regarding the interaction between humans and the environment.

Faculty and administrators desiring to strengthen the levels of environmental literacy among their students should consider the curricular recommendations of Hungerford and Volk and the goals identified by the Pennsylvania forum participants.

Approaches Being Used

A variety of approaches are being taken by universities to strengthen their environmental literacy instruction.

At Tufts University, an Environmental Literacy Institute (TELI) was established in 1990. The Institute trains faculty to integrate environmental concepts and issues into college courses. Faculty members participate in summer workshops to help them generate ideas for incorporating environmental literacy in their courses. Examples of resulting course revisions: an English course using novels such as *Grapes of Wrath* to discuss how the environment relates to culture; a drama professor involving students in role playing using environmental themes; and a mechanical engineering course in which students focus on getting more energy efficiency out of a machine, thereby consuming fewer resources. The sixth annual TELI faculty development workshop was held May 31 through June 9, 1995.

In June 1992, Harvard University emulated Tufts by creating the Heinz Professorship to encourage Harvard faculty members who are not specializing in the environment to integrate environmental elements in their courses. Similar positions have been created at several other universities. While the approaches taken by Tufts and Harvard create opportunities for non-majors to take environmentally oriented courses, they do not reach the majority of college students in America. This can only be accomplished by requiring environmental literacy instruction in the general education curriculum.

The importance of addressing environmental literacy in the general education curriculum was described by George Dennison, President of the University of Montana. Dennison stated: "All institutions should seek to infuse environmental content into the curriculum, including general education programs. The vast majority of students will not pursue environmental programs or majors, but will gain their understanding of environmental issues and problems from their general education and elective courses. If we intend to have an effect upon ecological literacy, we must do so through curricular diffusion and general education."

University of Wisconsin-Stevens Point Model

At the University of Wisconsin-Stevens Point (UW-SP), the general education curriculum is

being used to enhance the environmental literacy of our students. In 1990, Chancellor Keith Sanders appointed a broad-based Curriculum Task Force to determine whether the existing general education requirements adequately prepared students to address societal needs and expectations. The task force reviewed the literature to determine trends in university general education requirements. They examined the requirements at scores of other universities and held a series of hearings to solicit faculty input.

After nearly two years of study, the task force identified 14 competencies described as "Skills and Knowledge for UW-SP Students of the 90s and Beyond." Environmental literacy was identified as one of the competencies to be expected of all UW-SP graduates.

Next, the faculty committee responsible for general degree requirements was asked to determine whether the existing requirements adequately addressed each of the 14 competencies. Regarding environmental literacy, they concluded that the existing requirements did not. Consequently, the committee developed, and the UW-SP Faculty Senate and Chancellor Sanders approved, a new environmental literacy requirement for all students. This means that environmental literacy is included with critical thinking, writing, speaking, civic literacy, and scientific literacy as part of the basic education provided to UW-SP students to help them function in the 21st century

To graduate from UW-SP, students must complete a three-credit Environmental literacy (EL) course. The following criteria apply to EL courses: An EL course may be proposed by any department, EL courses should not have prerequisites, interdisciplinary treatment of issues is required, team teaching and cross-disciplinary teaching are encouraged, and EL course proposals must clearly show how the course is structured to achieve EL objectives.

The goals recommended in the Pennsylvania report, *Achieving Undergraduate Environmental Literacy*, were used as a starting point in developing the UW-SP EL objectives. For a UW-SP course to be approved for EL credit, the course should provide students with the ability to:

- o Describe the relationship of human society to natural systems and how the two have affected each other.

- o Analyze a wide variety of historic and current environmental issues, ranging from local to global importance.

- o Describe the ecological, political, social, and economic implications of selected environmental issues and assess alternative solutions to those issues.

- o Identify, describe, and evaluate their own individual impacts on the environment.

The box at the end of this article shows courses meeting the UW-SP environmental literacy requirement. Most environmental literacy courses are open to students from any major. Some, such as "Introduction to Environmental Study and Environmental Education," are targeted to special populations—in this case, prospective teachers, who learn not only content but also instructional methods.

Will the environmental literacy requirement at UW-SP raise the environmental literacy of graduates? I believe it will. Future graduates should be more environmentally knowledgeable and, above all, skilled and dedicated to working individually and collectively toward achieving a dynamic equilibrium between quality of life and quality of the environment. To ensure that this happens, efforts will be made to help the faculty understand and apply the strategies recommended by Hungerford and Volk to maximize environmentally responsible behavior. The application of these strategies coupled with instruction focused on the environmental literacy objectives should result in graduates who are environmentally literate and responsible.

The hope is that increasing numbers of colleges and universities will follow examples described here and take steps to incorporate environmental literacy instruction in their general education curriculum. There is no other instruction more basic than that which focuses on perpetuation of both environmental quality and the quality of life.

Environmental Literacy: A Course Catalogue

American Environmental History-Students analyze the ways in which one generation of decisions regarding nature limit the future decisions or precipitate reactions that move the human-nature interactions in a different direction.

Urban Environmental History-Students evaluate the ways activities within American cities have placed demands on resources. They also examine the ways urban development altered public perceptions of wilderness, nature, and human society, and the ways these attitudes have influenced urban sanitation, conservation, preservation, industrial development, and resource allocation.

The Physical Environment Under Stress-Students apply physical geographic principles and processes to understand selected human impacts on atmosphere, water, land, and biota. They are involved in detailed, interdisciplinary analyses of several environmental problems, including their causes, consequences, and solutions.

Environmental Ethics-Students examine and evaluate philosophical, religious, and scientific concepts and values that have structured human attitudes toward the environment. A wide variety of environmental issues are explored, and

students identify, describe, and evaluate their individual impacts on the environment. Readings such as *The Sand County Almanac* are required.

Introduction to Environmental Study and Environmental Education-Students analyze natural, social, and economic factors influencing the quality of the environment. Ecological relationships and principles are studied and their relation to population growth, pollution, resource allocation and depletion, conservation, technology, and urban and rural planning. An overview of K-12 environmental education content and methods is also included.

Politics and the Environment-Students learn the interrelationship of politics and the environment. They read *Tragedy of the Commons* and consider the role of government in dealing with environmental regulation. The National Environmental Policy Act and other environmental legislation is examined. Students also analyze organizations attempting to influence environmental policy and evaluate their own attitudes regarding environmental policy.

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COMMENTARY

BY DAVID W. ORR

EDUCATING FOR THE ENVIRONMENT



In *Earth in the Balance*, Vice President Al Gore proposes to make “the rescue of the environment the central organizing principle for civilization.” If the environment and the human prospect that depends on it are to be rescued, however, those now being educated will have to do what the present generation has been unable or unwilling to do: stabilize world population, reduce the emission of greenhouse gases that threaten to change the climate (perhaps disastrously), protect biological diversity, reverse the destruction of forests everywhere, and conserve soils. They must learn how to use energy and materials with great efficiency. They must learn how to run civilization on sunlight. They must rebuild economies in order to eliminate waste and pollution. They must learn how to manage renewable resources for the long term. They must begin the great work of repairing, as much as possible, the damage done to the Earth in the past 150 years of industrialization. And they must do all of this while they reduce worsening social, ethnic, and racial inequities. No generation has ever faced a more daunting agenda.

A constituency able and willing to do these things must be educated into existence. That constituency must be smarter, better informed, more creative, and wiser than earlier generations. It must comprehend systems and patterns. It must be far-sighted, yet practical. It must be able to tell the difference between ecological sense and nonsense. And it must be politically effective.

Much of the current debate about educational standards and reforms, however, is driven by an overarching belief that we must prepare the young only to compete effectively in the global economy; that done, all will be well, or so it is assumed. But there are better reasons to reform education that have to do with the rapid decline in the habitability of the Earth. The kind of

discipline-centric education that enabled us to industrialize the Earth will not necessarily help us heal the damage caused by 150 years of industrialization. In his 1993 book, *Preparing for the 21st Century*, Paul Kennedy reaches broadly similar conclusions, calling for “nothing less than the re-education of humankind.”

But we still educate the young for the most part as if there were no planetary emergency. It is widely assumed that environmental problems will be solved by technology of one sort or another. Better technology can indeed help, but the crisis is not first and foremost one of technology. Rather, it is one within the minds that develop and use technology. The disordering of ecological systems and of the great biogeochemical cycles of Earth reflects a prior disorder in the thought, perception, imagination, intellectual priorities, and loyalties inherent in the industrial mind. Ultimately, then, the ecological crisis has to do with how we think and with the institutions that purport to shape and refine the capacity to think. The ecological crisis, in other words, is a crisis of education, not one in education; tinkering won't do.

Despite all of the clear evidence of spreading environmental problems, this message has not made much headway in the vast majority of colleges and universities. In the words of Dartmouth's Noel Perrin, “Most colleges act as though they have all the time in the world ... neither trustees nor the administration seem to believe that a crisis is coming” (quoted in an October 28, 1992 article in the *Chronicle of Higher Education*). Historian Jaroslav Pelikan in *The Idea of the University* goes farther to question whether universities will ever “address the underlying intellectual issues and moral imperatives of having responsibility for the earth and to do so with an intensity and ingenuity matching that shown by previous generations in obeying the command to have

dominion over the planet." Why should institutions of higher education, full of smart and learned people, be so slow to respond to the largest issues on the human agenda for the coming century? There are, I think, three primary reasons, none of which is new.

First, we have organized both curriculum and research by fragments called disciplines, sub-disciplines, and departments, each of which deals only with small pieces of the total picture. This is fine until we need to understand patterns and whole systems, which is the business of no single discipline, department, or specialized field.

As a result, larger trends and patterns tend to be ignored within a discipline-centric context. For example, from newspapers, journals, and books the following "random" facts recently crossed my desk:

male sperm counts worldwide have fallen by 50 percent since 1938 and no one knows exactly why;

human breast milk often contains more toxics than permissible in milk sold by dairies

at death human bodies often contain enough toxics and heavy metals to be classified as a hazardous waste;

so too, the bodies of whales and dolphins that recently washed up on the banks of the St. Lawrence River and the Atlantic shore;

fungi have declined throughout the world and no one knows why;

the same is true of populations of amphibians worldwide, even where the pH of rainfall is normal;

roughly 80 percent of European forests have been damaged by acid rain;

according to Paul Hawken in *The Ecology of Commerce*, U.S. industry creates some 11.4 billion tons of hazardous wastes each year from mining and manufacturing; and

ultraviolet radiation reaching the ground in Toronto is now increasing at 5 percent per year.

From the perspective of any single discipline, these facts appear to be random. In truth they are not random at all but part of a larger pattern that includes shopping malls and deforestation, glitzy suburbs and ozone holes, crowded freeways and climate change, overstocked supermarkets and soil erosion, a gross national product of \$6.5 trillion and Superfund sites, technological wonders and insensate violence. In reality, there is no such thing as a "side effect" or an "externality." These things are threads of a whole cloth. The fact that we see them as disconnected events or fail to see them at all is evidence of a failure to educate people to think broadly, perceive systems and patterns, and live as whole persons.

There is a second and related reason having to do with the rise of discipline-based professionalization. Whatever the gains in standards and quantity of knowledge, the net effect of professionalism has been to narrow scholars' intellectual focus and encourage conformity with standards set by the elite in a particular field. Publication and research have come to be valued more highly than good teaching and service to the institution or the community. The full costs of professionalization, according to Alan Mermann of the Yale School of Medicine, include the failure to engage problems in the local community and a crippling "alienation from each other and from what is healthy for ourselves."

The scholars described by Merniann tend to think of themselves as professionals, part of the established order, not critics of it. For the consummate professional scholar, under constant pressures to secure large grants, the rule of thumb is that if it has no obvious and quick professional payoff leading to tenure, promotion, higher salary, or higher standing in the profession, don't do it. The ideal of the broadly informed, renaissance mind has given way to the far smaller idea of the academic specialist. The resulting narrowness, "methodolatry," and careerism have rendered many unwilling and unfit to ask large and searching questions. In addition, whereas intellectuals once addressed the public, professional scholars now talk mostly to each other about matters of little or no consequence for the larger society. Moreover, the professionally induced fear of making a

mistake or of being thought to lack rigor has rendered much of the professoriate toothless and confined to quibbles of great insignificance. One sure way for a young professor to risk being denied tenure is to practice what philosopher Mary Midgley calls “the virtue of controversial courage” the very reason for which tenure was created.

Third, colleges and universities have not yet responded with “intensity and ingenuity” to the environmental crisis because their leaders have not been bold and visionary enough. This explains in part why institutions of higher education, in Stan Rowe’s words, have shaped themselves “to an industrial ideal—the knowledge factory.” Few of these (mostly male) shapers of the modern university bothered to question the foundational assumptions of higher education that dated back to Descartes and Bacon, the disciplinary structure of knowledge, the growing dependence of higher education on corporate and government funding, or the implicit belief in the human domination of nature. Few, if any, asked how the knowledge that their institutions propagated and dispensed fit with our responsibility for the earth.

What would it mean for colleges and universities to respond with intensity and ingenuity” to the ecological challenges looming ahead? The answer, I believe, has three parts. It means, first, rethinking the foundational principles of higher education. In we must recognize that all education is environmental education, by which I mean that students are taught in various and often unintended ways that they are part of, or apart from, natural systems. Furthermore, we must recognize that the goal of education is not the mastery of knowledge, but the mastery of self through knowledge — a different thing altogether. In the conduct of teaching, we must also acknowledge that the process of learning is often as important as the content, and that institutions teach by what they do as well as by what they say.

Second, an intense and ingenious response to environmental challenges requires rethinking the conventional curriculum. The ecological crisis is, in large part, a crisis of design. We’ve made things—farms, houses, cities, technologies,

and whole economies—that do not fit harmoniously within their ecological context. One of the principal tasks of education in the coming century is to foster ecological design intelligence, which requires a careful meshing of human purposes with the larger patterns of the natural world. It also requires the careful study of those larger patterns to inform human purposes. The ecological design arts are the set of perceptual and analytic abilities, ecological wisdom, and practical wherewithal that will enable the young to make things that fit into a world of microbes, plants, animals, and entropy.

According to David Wann, author of *Biologic*, designing with nature means incorporating intelligence about how nature works

Liberal arts institutions have not been vigorous enough in their response to the rapid decline in the habitability of the Earth.

into the way we build and live. Design applies to the making of nearly everything that directly or indirectly requires energy and materials including farms, houses, communities, neighborhoods, cities, transportation systems, technologies, economies, and energy policies. When human artifacts and systems are well designed, they are

in harmony with the ecological patterns in which they are embedded. When poorly designed, they undermine those larger patterns creating pollution, higher costs, and social stress. Bad design is not simply an engineering problem, although better engineering would often help. Its roots go deeper.

Good design everywhere has certain common characteristics including

- right scale
- simplicity
- efficient use of resources
- a close fit between means and ends
- durability
- redundance
- resilience
- the solving of more than one problem

Moreover, good ecological design promotes human competence instead of consumer dependence. Where good design becomes part of the social fabric at all levels, unanticipated positive side effects (synergies) multiply. Good urban design, for example, minimizes the use of automobiles by putting jobs, recreation,

schools, and shopping in close proximity. Fewer automobiles mean more people walk and bike, leading to a more physically fit population; less urban congestion, hence more civility; cleaner air, hence better health; lower emission of CO₂, hence less risk of climate change; fewer accidents, hence lower insurance costs.

And by using less gasoline we will have fewer oil spills, which helps to preserve biological diversity, balance trade deficits, and improve the economy. When people fail to design with ecological competence, unwanted side effects and disasters multiply.

Ecological design requires the ability to comprehend patterns that connect, which means getting beyond the boxes we call disciplines to see things in their larger context. It requires, in other words, a liberal education. But nearly everywhere the liberal arts have become more specialized. Design competence requires the integration of first-hand experience and practical competence with theoretical knowledge, but the liberal arts have become more abstract, fragmented, and remote from lived reality. Design competence requires us to be students of the natural world, but the study of nature is being displaced by the effort to engineer nature to fit the economy instead of the other way around. Finally, design competence requires the ability to inquire deeply into the purposes and consequences of things, to know what's worth doing and what should not be done at all. But the ethical foundations of education have been diluted by the belief that values are merely personal opinions

All of this is to say that liberal arts institutions have not been vigorous enough in their response to the rapid decline in the habitability of the Earth. A more adequate response would aim to equip students to do the work of rebuilding households, farms, institutions, communities, corporations, and economies that 1) do not emit carbon dioxide or other heat-trapping gasses; 2) operate on renewable energy; 3) do not reduce biological diversity; 3) use materials and water with high efficiency; 4) recycle materials and organic wastes; 5) restore damaged ecosystems, and 6) promote sustainable local and regional economies. These objectives will require significant changes in the skills,

aptitudes, and abilities fostered in the conventional curriculum.

Third, an intense and ingenious response to the ecological challenges ahead means rethinking how institutions operate, buy, invest, and build.

Operations. The same institutions that purport to induct the young into responsible adulthood ought not to undermine the health and sustainability of the world their students will inherit through their daily operations. Colleges and universities take in vast amounts of energy, food, water, and materials, and they dispose of large amounts of waste in a variety of forms. Every institution ought to conduct an audit of these resource flows to determine its total environmental impact.

For example, how much CO₂ is emitted per student per year? How much paper is used? How much water is consumed? An audit will also indicate ways in which environmental impacts as well as costs can be reduced through greater efficiency in the use of resources and operational changes that close waste loops, eliminate hazardous chemicals, and adopt management practices with lower environmental impacts.

Purchasing. According to the 1992 Almanac of Higher Education, in the academic year 1987-88, colleges and universities bought \$11.4 billion worth of goods and services. For the most part these expenditures were made without much thought for their environmental impacts. If environment is to become the "central organizing principle" for higher education, however, buying power should be used to leverage the development of sustainable local and regional economies. Food served on college campuses, for example, seldom comes from land farmed sustainably. Whatever the price paid by the institution, its real cost to society, measured in both ecological and human terms, is much higher. Buying food locally, on the other hand, encourages the development of sustainable agriculture in the surrounding region, improves the quality of food served in campus dining halls, promotes local economic development, and eliminates the economic and ecological costs of transportation, refrigeration, and processing. The same principles apply to many other institutional

purchases whenever it becomes possible to substitute local resources, materials, and products for those imported from distant sources.

Investment. College and university endowment funds in 1993 totaled \$73.9 billion, according to an October 1993 article in *The New York Times*. As with purchases, the vast majority of this money is invested without much regard for environmental impacts. An "intense and ingenious" response to looming ecological problems would require trustees and administrators to screen institutional investments to determine whether they promote the transition to a sustainable economy or not. Aside from the more obvious investment criteria having to do with the environmental practices of particular companies, there are good reasons to use a percentage of investments to leverage sustainable development throughout the region in which the institution is located. Investments in regional energy efficiency, in particular, may offer attractive opportunities for high returns with short payback times.

Campus Architecture. It is widely assumed that learning takes place in buildings but that none occurs as a result of how they are designed or by whom, how they are constructed and from what materials, how they fit their location, and how well they operate. Academic architecture is in fact a kind of crystallized pedagogy; buildings have their own hidden curriculum that teaches as effectively as any course taught in them. Students should be involved in the design, construction, and operation of academic buildings. That effort can be a liberal education in a microcosm that includes virtually every discipline in the catalog. The act of building is an opportunity to stretch the educational experience across disciplinary boundaries and across those dividing the realm of thought from that of application. It is an opportunity to work collectively on projects with practical import and to teach the art of good work. It is also an opportunity to lower life-cycle costs of buildings and to reduce a large amount of unnecessary damage to the natural world caused by careless design.

As we approach the year 2000 the vital signs of the Earth are virtually everywhere in decline. The big numbers are working against us:

population growth, the extinction of species, deforestation, desertification, soil loss, acid rain, toxics, and ahead, the possibility of rapid climate change. But these trends need not prove fatal to the human prospect if we are able to summon the courage and the moral energy necessary to respond with foresight and wisdom. For their part, however, colleges and universities have done little to prepare their graduates to deal with the challenges ahead. The question, still unanswered, is whether they are capable of responding with "intensity and ingenuity" at all.

To some, such a response to the challenges of the 21st century appears to be utterly unimaginable. To others, however, it looks a great deal like what Winston Churchill once called an "insurmountable opportunity." It is an opportunity to revitalize and enliven curriculum and pedagogy. It is an opportunity to create a genuinely interdisciplinary curriculum. It is an opportunity to redesign the campus to reduce costs, lower environmental impacts, and help catalyze sustainable economies.

In fact a revolution in education is gathering momentum. It is apparent in the conferences sponsored by the Student Environmental Action Coalition that have drawn thousands of students from campuses all over the United States. It was evident in the February 1994 conference sponsored by Yale University students who organized the "Campus Earth Summit." It is evident in the rapid growth of environmental studies programs on campuses virtually everywhere. It is evident in growing student enrollments in environmental studies courses and participation in campus environmental projects. Increasingly, students realize that their inheritance is being spent carelessly and sometimes fraudulently. But a sizable number know in their bones the truth of Goethe's words that "whatever you can do or dream you can, begin it, Boldness has genius, power, and magic in it."

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LITTLE GREEN LIES



The Environmental Miseducation of America's Children

Some have called it "Eco-Kid Power," while to others it is the "Newest Parental Nightmare." The latest craze sweeping this nation's youth is environmental consciousness, due in no small part to the spread of ecological issues into the classroom. This movement has reached almost every school district in the nation, as children are increasingly taught the importance of being green.

More Pennsylvania high school students are taking environmental education classes than physics. Even the federal government is actively involved. In 1990 President Bush signed the National Environmental Education Act, appropriating \$65 million over five years to set up in the Environmental Protection Agency (EPA) an Office of Environmental Education that serves as a clearinghouse for green educational materials. Most classroom environmental information, including most that is listed at the EPA clearinghouse, comes from literature and teaching guides drafted and distributed by the major environmental groups.

It is entirely appropriate for children to learn about the environment. Indeed, any comprehensive science program for primary and secondary schools ought to include discussions of the food chain, the life cycles of various species, and the fundamentals of meteorology. Using nature trails and camping in the wilderness can be valuable educational experiences, particularly if children are taught to understand what they are seeing. Unfortunately, much of what is taught to children is simple-minded and inaccurate. Among the growing environmental disinformation spread through the classroom are 10 myths that give children an incomplete understanding of environmental issues.

1: Recycling Is Always Good

The recycling craze has captured America's schools. From coast to coast, children are organizing recycling programs in their schools and neighborhoods, separating their trash, and sending bottles, cans, newspapers, and yard waste to their local recycling centers. Various environmental groups, as well as the EPA through its "Recycle Today!" campaign, actively promote recycling as a means to "help stamp out the Garbage Gremlin." Animated characters such as Henry Cycle and Captain Planet sell the practice to elementary school children.

In one guide for parents and educators — "This Planet Is Mine" — Mary Metzger and Cynthia Whittaker claim that recycling is "by far the most commonsensible and energy-saving waste reduction technique." This sentiment is echoed in the EPA's "Let's Reduce and Recycle: Curriculum for Solid Waste Awareness," where children in grades K-6 are told that recycling reduces pollution and saves natural resources, energy, money, and landfill space.

While recycling is often a sensible means of disposing solid waste, it is not so clear that recycling is always of benefit to the planet. Aluminum cans have been profitably recycled for years — indeed companies actually pay for used cans — because recycling aluminum costs less energy and money than does producing cans from virgin materials. Yet this may be the exception rather than the rule. Although recycled paper can be used for newsprint, ledger paper, and cardboard boxes, it is inappropriate for paper products that require the greater strength of unrecycled paper, as the fibers tend to deteriorate during the recycling process. The

bleaching of recycled paper causes more water pollution than bleaching paper from virgin pulp. Even when materials are collected for recycling, they are often not used for that purpose.

In Islip, New York, there are mountains of tinted glass from bottles collected for recycling, and in the nation's capital newspapers intended for recycling sit rotting in warehouses.

Children were told during a CBS "Schoolbreak Special" that "recycling paper saves trees," and that if all paper were recycled it would save 500,000 trees per week. However, 87 percent of all paper in the United States is produced from trees planted and grown for that purpose by the paper industry. Were there less of a market for unrecycled paper products, the incentive to plant more trees would likely shrink as well. Thus, is recycling really a policy that serves to save trees? Or, may it actually reverse the current trend of growth of America's forests? Roger Sedjo of Resources for the Future, an environmental think tank, points out that there has been a steady increase in U.S. forestland for the past 40 years, and profit-seeking firms are planting, growing, and harvesting forests on an unprecedented scale." The existence of vibrant markets for virgin wood materials has encouraged this growth.

What is more, it is not clear that recycling is always the "environmentally" preferable disposal option for solid waste. Cleaning cloth diapers, for example, may at first glance seem less wasteful than throwing out disposables, but collection and sterilization requires massive amounts of water, energy (for heat and transportation), and detergent, not to mention the additional time spent in cleaning. If recycling requires increased consumption of energy, it may not result in the net saving of resources that environmentalists desire.

2: Plastic Is Bad

Plastic has reached the top of the eco-kid enemies list. Among the "55 fun ways kids can make a difference" listed in Michael O'Brian's "I Helped Save the Earth" are: "Use paper, not plastic," "Don't buy drinks in plastic containers," and "Buy things packaged in cardboard, not plastic." "50 Simple Things Kids Can Do To Save the Earth" calls upon all children to "Stamp out Styrofoam" because "using Styrofoam means

using up precious resources ... and adding more garbage to our world." It further asserts that "plastic foam is often made with chemicals that make the ozone hole bigger!"

One reason plastics are attacked is that they are often difficult to recycle. In addition, plastics are generally not biodegradable, and perhaps most important, other than being "natural," are produced synthetically from man-made chemicals. Thus, the use of plastic is viewed as an inevitable source of pollution and an unnecessary contribution to the solid waste stream.

Because they are rarely recycled, most plastic products eventually find their way into a landfill. The greatest environmental concern raised by the use of landfills is the possibility that toxic wastes will seep into the local groundwater. Yet plastics are typically inert, and therefore they are certain not to decompose. The stable state of plastics — their non-biodegradability — is a protection for human health when they are deposited in landfills.

Of course, many kids are upset by the notion that plastics placed by people in the earth today will remain there for centuries. But while plastic does not degrade in a landfill, rarely does anything else either. As the research of William Rathje at the University of Arizona has shown, in landfills, even newspapers fail to biodegrade for decades. What is held against plastic can be a criticism of paper as well.

Children uncomfortable with using plastic might want to ask why its use is so common in contemporary society. Plastic packaging limits breakage and spoilage, and makes it possible to distribute foods and medicines over greater distances at significantly lower cost. Plastic can create strong but lightweight packaging for everything from candies and soft drinks to vitamins and vegetables that would otherwise require tremendous expenditures of natural resources. Do not these benefits offset, at least in part, the environmental concerns about disposal?

Consider aseptic packaging, the synthetic packaging for the "juice boxes" so many children bring to school with their lunch. One criticism of aseptic packaging is that it is nearly

impossible to recycle, yet on almost every other count, aseptic packaging is environmentally preferable to the packaging alternatives. Not only do aseptic containers not require refrigeration to keep their contents from spoiling, but their manufacture requires less than one-10th the energy of making glass bottles.

What is true for juice boxes is also true for other forms of synthetic packaging. The use of polystyrene, which is commonly (and mistakenly) referred to as "Styrofoam," can reduce food waste dramatically due to its insulating properties. (Thanks to these properties, polystyrene cups are much preferred over paper for that morning cup of coffee.) Polystyrene also requires significantly fewer resources to produce than its paper counterpart. As documented in *Science* magazine, a polystyrene cup can be produced with one-sixth the physical material, one-12th the steam, and one-36th the electricity of its paper counterpart. It is no wonder that polystyrene cups are as much as 60-percent less expensive. It should also be noted that, contrary to popular perceptions, the production of polystyrene has not required the use of chlorofluorocarbons (CFCs) for years, and thus poses no threat to the ozone layer.

The environmental benefits of plastic are demonstrated every day as over a million American students receive their milk from plastic, pillow-shaped pouches that require less material to produce than the conventional mini-milk carton and that create 70 percent less waste by volume. Indeed plastic is typically less bulky than other forms of packaging, and therefore reduces the amount of solid waste disposal.

3: There Is Too Much Garbage

The popular children's book "50 Simple Things Kids Can Do To Save the Earth" declares, "We are making so much garbage that in many places there is not enough room to bury it all." Another EarthWorks publication, "Kid Heroes of the Environment," claims that "America faces a 'garbage crisis'; we're running out of places to dump our trash." Many children's environmental concerns are based upon the underlying assumption that too much waste is being created and that there is no place to put it.

However, there is ample space in which to dispose of America's garbage through landfilling, should such an approach be desired. As the research of A. Clark Wiseman of Resources for the Future has demonstrated, all of the solid waste produced in America in the next 1,000 years could easily fit in a single landfill accounting for less than one-10th of one percent of the United States. This landfill would be approximately 44 miles on each side and only 100 feet deep. If there is more than enough space to dispose of America's garbage, can we really say that there is too much trash? Given that landfilling is significantly less expensive than most other disposal options, advocating that landfilling not be used means that more money will be spent on waste disposal, and less will be available to spend on other things.

While landfilling remains an environmentally and economically viable option, other methods of waste disposal are continually being developed. One increasingly attractive approach is the development of "waste-to-energy" facilities, whereby garbage can be turned into a source of energy. As more communities begin to rely upon this approach to waste disposal, garbage will actually become an important commodity. What is more, should landfill space ever truly become scarce, the resulting increase in the costs of waste disposal would encourage individuals to reduce the amount of waste they produce and develop alternative waste disposal options.

4: Pesticides Are Always Bad

"ABC's for a Better Planet," a children's book featuring the immensely popular Teenage Mutant Ninja Turtles, recommends that children "get folks to buy fruits and vegetables that are grown organically — that is, without chemical pesticides. Organically grown stuff may not look as perfect, but it tastes great — and it's good for you." Linda Lowery's *Earth Day*, a book designed for children in grades K-4, asserts, "People don't need to use chemicals on their crops and lawns. There are safer, more natural ways to protect plants and help them grow."

To emphasize concern over pesticides even further, the National Environmental Education Act

requires that the EPA annually present a Rachel Carson Award in honor of the author who first brought fear of pesticides into the mainstream with her 1962 book "Silent Spring." A biography of Carson is also one of the first in a new series of children's books published by Simon & Schuster's Silver Burdett Press.

While Carson deserves credit for raising awareness of the potentially damaging effects of DDT on eagle and osprey populations, many of the concerns she promoted, such as fear of the risks of pesticide residues on food, are greatly overblown. Metzger and Whittaker's "This Planet Is Mine" tells parents and eco-educators that pesticide use is killing millions of people, and that "children often receive greater pesticide exposure" than adults. However, the path-breaking work of Bruce Ames, a biochemist at the University of California at Berkeley, has demonstrated that pesticide residues on foods, such as fruits and vegetables, pose no significant health risk.

Notes Ames, "99.9 percent of all the pesticides we ingest, by weight, are natural, produced by the fruit and vegetable plants themselves as part of their protective mechanism." This can be seen in many common foods. While "everyone worries about minute amounts of dioxin," Ames has discovered that "there is a lot more of a dioxin-like compound naturally in broccoli than you will ever be exposed to through dioxin contamination in the environment." But, Ames points out, even the higher level of carcinogenic compounds naturally present in foods poses a negligible health risk.

As a result of the scare over Alar — a substance used to strengthen apple stems and prevent apples from falling off the tree prematurely — frightened mothers were calling the EPA to inquire if one could safely pour apple juice down the drain. Yet Alar residues posed no threat to their children. As Rutgers professor Joseph Rosen noted, Alar "has not been identified as the cause of a single childhood cancer." In fact, according to Dr. Sanford Miller, dean of the University of Texas Health Science Center's Graduate School of Biomedical Science, "The risk of pesticide residues to consumers is effectively zero."

While pesticide residues pose no appreciable threat to human health, Ames has noted that the probable impact of efforts to limit pesticide use "will be to raise cancer risks, because it will cut consumption of the very foods most beneficial in preventing cancer." Pesticides, including those compounds used to fight insects, weeds, and fungi, increase agricultural productivity and help to prevent food spoilage. The result is that fruits and vegetables are more readily available to consumers at lower prices. And, pesticide-assisted increases in agricultural efficiency have enabled farmers to produce more food while devoting less land to agriculture. Fewer trees are cut down, and fewer wetlands are filled to meet increases in food demand.

5: Acid Rain Is Destroying Our Forests

The Teenage Mutant Ninja Turtles tell our children that "acid rain" pollutes rivers and kills fish and trees." *50 Simple Things* claims, "Acid rain is extremely harmful to plants, rivers, and lakes In some places it is killing forests. And it pollutes the water that animals and people need to drink." The EPA lists the Acid Rain Foundation as a source of educational materials in its booklet *Environmental Education Materials for Teachers and Young People (Grades K-12)*. Materials provided include acid rain educational activities for grades 4-8 and a curriculum for grades 6-12 that repeat these charges time and time again.

The curricula state correctly that many trees are dying in the eastern United States, that north eastern lakes and streams have fewer trout and other sport fish than they did earlier this century, and that burning fossil fuels can make rain more acidic. But a \$700-million study commissioned by Congress, the National Acid Precipitation Assessment Program (NAPAP), concluded that acid rain is not a major source of problems in eastern forests and fisheries.

On the contrary, the nitrogen contained in acid rain actually helps much of the eastern forest by providing a necessary nutrient. It also turns out that most acid lakes in the Northeast have been acidic for most of their history. Fish could live in them temporarily when the clearing of forests for farming and paper pulp made watersheds more alkaline; but the watersheds returned to their natural acidity when the farms and dairies

became uneconomic and the forests grew back. NAPAP determined that little damage could be attributed to acid rain in the United States, and even then only at very high altitudes in a few small areas.

6: We Use Too Much

Last year the "New York Times" ran a story on the "Newest Parental Nightmare," the "eco-smart" child who constantly pesters his parents to use less and "conserve" energy, for one day we might run out. This pressure results in part from school materials such as the EPA children's activity books on water conservation, which proclaim, "We need to save water! This is also called 'conserving' water — not wasting it so we'll have enough for the future!" The TV special based upon *50 Simple Things* told children, "Turn down the heat and put on a sweater" because that is a more efficient use of resources. Muppets Kermit the Frog and Miss Piggy were enlisted to promote this message, appearing in a public service announcement for the National Wildlife Federation.

Children are taught to monitor the "wasteful" activities of their parents. As Dee Kloss told the *Philadelphia Inquirer* about her eight-year-old eco-conscious daughter, "She's harassing me, that child. If I leave the water on when I'm brushing my teeth, she yells at me. She says, 'Off, off, off. You're wasting that water.'" Ironically, some health groups actually recommend letting tap water run for a full minute before using — due to concern over lead or other potentially toxic sediments.

Unfortunately, this effort to watchdog water use reflects a simplistic view of natural resources. Water in the United States will not "run out," although it may be misallocated. In almost all cases, water shortages have occurred as a result of political intervention; California's problems can be attributed, for example, to artificially low water prices for agricultural use. As for energy, oil and natural gas prices are at their lowest price in decades, a clear sign that fossil fuel supplies are abundant. The price of a resource rises when it becomes more scarce. But the prices for the vast majority of non-renewable resources — from aluminum to zinc — have declined over the past century.

Even if a given resource were to become scarce, this would not be the end of the world. Its price would rise and the economy would promote increased efficiency and the development of alternatives.

In the case of energy, the goal should not be "conservation" in the sense of simply using less but "efficiency" — using less to accomplish more. Otherwise, reducing energy use would require sacrificing personal mobility, autonomy, and living standards. Any serious effort to reduce personal consumption would require giving up various human activities, from transportation of people and resources, to heating, lighting, and cooking. Driving to and from school or the office may burn fuel, but it often saves time that can then be devoted to other important activities. Almost all efforts to enhance energy efficiency involve trading capital expenditures in the present for potential energy savings in the future. These trade-offs are inherent in any serious effort to reduce the use of energy, and must always be considered. Nevertheless, they are rarely discussed in the classroom.

7: There Are Too Many People

As population continues to increase, so will the human impact on the natural environment. More people on the planet means that more people are engaged in activities that shape the world around them. As a result, children are taught, the earth faces dire ecological consequences, from resource depletion to famine and extinction. From the EPA's *Earth Notes* — sent to educators for grades K-6 — the educational materials such as *For Earth's Sake* and *The Population Challenge of Zero Population Growth*, educational materials on population growth are becoming part and parcel of the environmental curriculum.

One educational guide, distributed in conjunction with Turner Broadcasting's "Save the Earth Season," provides a worksheet in which the students' "ultimate goal is protecting the environment through population control." A high-school text published by Addison-Wesley even talks of the "innovative" population measures developed in the People's Republic of China, a country known for coercive abortions and draconian laws limiting family size.

Some educational messages are more explicit in their advocacy of population control. *This Planet Is Mine* instructs educators to tell children that population growth will cause severe environmental problems “unless the use of birth control methods increases.” In suggested activities, educators should “talk about what would happen to the planet if all the people in the world created large families generation after generation.”

If population growth is such a dire threat, why are living standards worldwide increasing concurrently with increases in the world’s population? Even in the Third World, increases in agricultural production typically outpace population growth. If it is true that a continually expanding population will overcome the limits of world food supply, why then is most of the world experiencing increases in agricultural productivity that far outpace the increases in people? There are indeed areas that continue to experience famine, but more often than not these areas are in the throes of civil war and violent unrest that disrupt the distribution of food.

Children are rarely taught that as societies become more prosperous, population growth eventually slows and resources are used more efficiently with less environmental damage.

8: The Air Is Getting Worse

A common refrain on air pollution in school materials is that “the problems are here and they are growing at an alarming rate” (*This Planet Is Mine*). *50 Simple Things* claims, “Today the air is so polluted in some places it’s not always safe to breathe!” whereas “until about 150 years ago, the air was pure and clean.” There is little recognition in school curricula that, by most measurements, air quality is actually improving. According to the EPA’s own data, levels of ground-level ozone, the pollutant known as “smog,” are declining significantly in most urban areas. Even were ozone levels not declining, there is little evidence that the moderate levels found in most cities are responsible for any long-term health effects.

The Virginia Department of Air Pollution Control’s “Airy Canary” has trouble flying because of “Dastardly Dirt” created by increased industrial and commercial activity. Yet after initial

industrialization, economic growth typically results in decreases of airborne particulates, the form of air pollution with the most significant health effects. Particulate concentrations in such cities as Tehran and Calcutta are almost 10 times greater than those found in New York. As Resources for the Future vice president Paul Portney has noted, “It is important to remember that cities in the United States that are relatively polluted by our standards might be considered quite clean in other parts of the world.”

While children are taught to dislike automobiles, they are not told that not all cars pollute equally, or that in most cases the contributions of individual vehicle emissions are negligible. Much air pollution is the result of incomplete fuel combustion. As technology has improved over time, cars have naturally become more efficient and have thus polluted less. While many give full credit to federal laws for these gains, reductions in automobile emissions began well before the first national clean air legislation was enacted.

Another source of air pollution that is often overlooked is the natural environment. While air pollution is almost always blamed upon human activity, in some areas most of the pollution comes from natural sources. Particularly acute in some areas is the emission of methane and other volatile organic compounds — a primary component in the formation of smog — from plants and animals. In addition, the topography of some areas makes them natural air-pollution traps. As a result, cities located in valleys or depressions, such as Los Angeles, often suffer from greater pollution than those areas where there may actually be greater levels of emissions.

9: Global Warming Will Kill Us All

Topping the list of environmental concerns these days is the threat of global warming. Increasing concentrations of carbon dioxide, methane, and other greenhouse gases, it is argued, will cause an irreversible change in the earth’s climate by increasing average world temperatures by several degrees. Thus, it should be no surprise that discussions of global warming have become very prominent in the classroom. *Beat the Heat: The CO₂ Challenge*, distributed to teachers by Scholastic, Inc., charges that

“the world is hotter today than any time in recorded history,” but fails to acknowledge that the “recorded history” of accurate temperatures barely extends back 100 years.

Following the initial broadcast on PBS of “After the Warming,” the show’s producer, Maryland Public Television, drafted a teachers’ manual as if the program — which chronicled the “history” of environmental degradation to the year 2050 — was based upon fact, rather than exaggerated assumptions and unfounded conjecture. The TBS children’s special “One Child — One Voice” claimed that the greenhouse effect could increase temperatures by as much as 5 or 6 degrees. The American Museum of Natural History, in conjunction with the National Science Foundation and the Environmental Defense Fund, is promoting a series of educational activities and programs based upon its exhibit “Global Warming: Understanding the Forecast.” Educational books like “50 Simple Things” tell children that with the greenhouse effect “places that are warm would become too hot to live in, and ... the places that grow most of our food could get too hot to grow crops anymore.” Simply put, global warming is portrayed in the classroom as a threat to all human civilization.

While these arguments are put forward as scientific fact in the classroom, various polls of climate scientists indicate little consensus on how the climate will change over the next century or the relationship between human activity and these changes. On the need for urgent action by the United States, there is even less agreement. In fact, one poll of climate scientists conducted by Greenpeace found that fewer scientists (45 percent) believed action was necessary to avert a “runaway greenhouse effect” than those who felt otherwise (47 percent).

Even if the world does warm up, the higher temperatures could well be beneficial. There is much research to show that plants would thrive in a carbon-dioxide enriched atmosphere, and that a slightly warmer climate would create a healthier planet. Agricultural experts point out that because carbon dioxide acts as a fertilizer for most plants, increasing concentrations of carbon dioxide will increase agricultural productivity. Also, most of the recorded temperature increases in recent years have

occurred at night, meaning smaller swings between night and day temperatures, and thus, fewer killing frosts.

Any serious effort to reduce the claimed threat of warming through a massive reduction of greenhouse gas emissions would have drastic economic consequences. One recent study by the Department of Energy projects that reducing carbon dioxide emissions to only 20 percent below 1990 levels would cost as much as \$95 billion each year — and for many environmental advocates, such reductions are only the first step. When massive expenditures are forcibly directed toward averting global warming, fewer resources are available for use in other sectors of the economy, from nutrition and education to health care and housing.

10: The Ozone Layer Is Going, and So Are We

The other global environmental threat that keeps children awake at night is the fear that human activity is destroying the ozone layer, exposing humans — and for that matter all types of flora and fauna — to hazardous levels of solar radiation. The Teenage Mutant Ninja Turtles tell children, “The ozone layer protects us from the sun’s deadly radiation ... but the ozone layer is getting thinner each year.” According to *This Planet Is Mine*, ozone depletion will cause “DNA damage and resultant genetic defect.” Moreover, “Ultraviolet rays also contribute to the dramatic increase we have seen in skin cancers, eye cataracts...and impair the human immune system, reducing our ability to fight disease.” In a recent debate on the Senate floor, Senator Albert Gore intoned, “We have to tell our children that they must redefine their relationship to the sky, and they must begin to think of the sky as a threatening part of their environment.”

Children are rarely told that the ozone layer naturally thins and accretes every year in a seasonal cycle that is controlled by the sun. Manmade chlorofluorocarbons (CFCs) are blamed for ozone depletion, while natural sources of ozone-depleting substances (for example, the oceans and volcanoes) are typically overlooked. Although chlorine molecules can contribute to ozone depletion, Linwood Callis of the National Aeronautics and Space Administration’s Atmospheric Sciences

Division charges that “73 percent of the global (ozone) declines between 1979 and 1985 are due to natural effects related to solar variability.” While such claims are not universally accepted in the scientific community, it is clear that children are only getting a small part of a very complex story.

Contrary to what is being taught, the marginal ozone depletion that may be caused by CFCs would only result in marginal increases in UV-B radiation. For example, if 10 percent (a common estimate of the maximum potential ozone decline) of the ozone layer above Washington, D.C., disappeared tomorrow, radiation levels would only increase to approximately those typically found in Richmond, Virginia, almost 100 miles south. In fact, natural levels of UV-B rise rapidly as one approaches the equator or moves higher above sea level.

The school materials also typically fail to explain the important human benefits that have resulted from the use of CFCs. For example, these chemicals have helped save millions of lives through making available to the peoples of the world inexpensive refrigeration for food and medicine.

Toward a Better Shade of Green

While environmentalism is likely to be a mainstay of education in the years to come, this does not mean that America’s children are to be condemned to curricula of half-truths and political advocacy. Instead, children can, and should, be taught facts, not conjecture, and they should learn the whole story, including how an environmental concern fits into the greater ecological and economic context. Rather than impressing upon children the need for political advocacy, children should be encouraged to think of their own solutions after all the facts have been presented. If water use is an issue, a child should learn about the hydrological cycle;

if the concern is solid waste, a child should learn where paper comes from and where it may eventually go. At that point it might be profitable for a schoolchild to hypothesize about how public or private action might address the concerns raised about a given issue.

Children need to understand that modern activities do not cause only “negatives” and that all efforts to alleviate environmental impact are purely “positive.” Children need to be taught that there are trade-offs implicit in every environmental issue. Recycling paper may reduce the logging of trees (although they are indeed a renewable resource), but it may increase the use of energy and water. Banning CFCs may theoretically affect the levels of stratospheric ozone, but it would restrict the availability of refrigeration needed to preserve food and medicine in the Third World.

Children also need to learn environmental issues in a balanced manner. If there is scientific uncertainty on the likelihood and probable impact of global climate change it is wholly inappropriate to scare children by telling them their parents are destroying the earth. Environmental regulations can often have significant impacts upon regional and national economies, yet wealthier societies are not only healthier, but also more likely to be concerned about the environment. Environmental education can be a valuable addition to school curricula, but only if it is conducted in a careful, thoughtful, and non-ideological manner. After all, schools are for education, not political indoctrination.

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INFORMATION

BY THE PRESIDENT'S COUNCIL ON SUSTAINABLE DEVELOPMENT

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.

Young people make up 20 percent of the population, but 100 percent of the future.

Richard W. Riley,
Secretary U.S.
Department of
Education

Reprinted from Sustainable America, by the President's Council on Sustainable Development.

A FACT SHEET

EPA'S ENVIRONMENTAL EDUCATION DIVISION



LEGISLATION

The National Environmental Education Act of 1990 calls on EPA to provide national leadership to increase environmental literacy. The Act also encourages partnerships and builds upon long-standing efforts conducted by federal and state agencies, institutions, non-profit organizations, and the private sector. To implement the Act, EPA's Environmental Education Division in Washington, D.C., has developed the following mission, goals, and programs with support from EPA's ten regional offices.

Mission

To advance and support national education efforts to develop an environmentally conscious and responsible public, and to inspire a sense of personal responsibility for the care of the environment.

Goals

- o Expand communication and partnerships;
- o Educate youth to protect the environment;
- o Promote the pursuit of environmental careers;
- o Educate the adult public to increase environmental literacy; and
- o Bridge international boundaries.

THE ACT

PRIMARY PROGRAMS AND PARTNERSHIPS

Grants

Each year EPA awards nearly 250 grants worth approximately \$3 million to support quality environmental education projects across the country. Since 1992, EPA has awarded nearly 1,000 grants worth approximately \$11 million to education

institutions such as schools and universities; state, local, and tribal government agencies; and non-profit organizations in all 50 states, the District of Columbia, and various other U.S territories. The vast majority of projects are awarded by EPA's ten regional offices for grants of up to \$25,000, especially for grant of \$5,000 or less. EPA's current priorities for funding include projects which improve teaching skills, educate the public about human health problems from environmental pollution; enhance state, local, and tribal capacity to develop and deliver programs; promote environmental careers; and provide education for communities and the general public.

Teacher Training

EPA awards a cooperative agreement every three years to support the development of a nation-wide environmental education and training program. The purpose of this program is to train education professionals to develop and deliver quality environmental education programs. This training program was initiated in 1992 with a three-year cooperative agreement to a consortium of universities and organizations headed by the University of Michigan. Under this program, the consortium supported K-12 in-service teacher training by developing resource materials, establishing an electronic data base of information and education materials, and conducting teacher training workshops. In September 1995, EPA awarded this cooperative agreement to a consortium headed by the North American Association for Environmental Education (NAAEE) to operate the first year of the second three-year phase of this program. This phase includes and builds upon the work initiated by the University of Michigan and focuses on expanding existing quality training efforts; evaluating and

disseminating information on “model” education materials and programs, and strengthening partnerships and networks of environmental education professionals.

Fellowships

The National Network for Environmental Management Studies (NNEMS) is a fellowship program that encourages college students to pursue professional environmental careers. The program provides students from more than 210 participating universities with the opportunity to gain a valuable educational experience while conducting an actual environmental project. Each year, EPA program managers and scientists design new projects based on agency priorities. Out of a field of more than 1,000 organizations, NNEMS was named “One of America’s Top 100 Internships” in the Princeton Review.

Tribal Scholarships

The Tribal Lands Environmental Science Scholarship Program provides Native American college students with funding to pursue undergraduate and graduate degrees in the environmental sciences. EPA created this program to increase the number of Native Americans working at EPA and on reservations to improve the environmental protection of Indian lands. More than 60 students now receive scholarships.

Youth Awards and Programs

The President’s Environmental Youth Awards (PEYA) Program recognizes youth across America for creating projects that demonstrate their outstanding commitment to the environment. All PEYA nominees receive certificates from EPA’s 10 regional offices; one from each region becomes a national winner. The national winners are brought to Washington, D.C., for an annual awards ceremony. In addition, various youth programs and conferences have been developed through partnerships between EPA and other organizations. Examples of such projects include the development of an educational computer game, titled “Operation Watershed,” in partnership with

the National 4-H Council, and development and implementation of the Teaching Resources and Individual Leadership (T.R.A.I.L. Boss) Manual with the national Boy Scouts of America.

Leadership Recognition Awards

EPA periodically recognizes outstanding career contributions to environmental education under the National Environmental Education Awards Program. Four award categories honor excellence in teaching, literature, natural resource management and film/broadcast media.

Foundation

The National Environmental Education and Training Foundation (NEETF) was created by Congress under the Act to encourage public-private partnerships in support of environmental education, and to complement EPA’s environmental education efforts.

EPA Advisory Board

The EPA Environmental Education Advisory Board advises the Administrator of EPA regarding implementation of the Act. The Advisory Board also facilitates communication and coordination of environmental education activities across EPA.

Federal Task Force

The Federal Task Force on Environmental Education advises the Administrator of EPA regarding implementation of the Act. The Task Force also facilitates communication and coordination of environmental education activities across the federal government where such activities are related to the programs administered under the Act.

National Advisory Council

The National Environmental Education Advisory Council advises the Administrator of EPA regarding implementation of the act. This eleven-member Council represents schools, universities, states, non-profit organizations, senior Americans, and the private sector.

DEPARTMENTS

BY JOAN TAYLOR AND MONICA MIEROSZEWSKA

BIBLIOGRAPHY / BOOKS AND DOCUMENTS



Bibliography on Environmental Education

Dashefsky, H. Steven.

Environmental Science: High-School Science Fair Experiments.

TAB Books, 1994, 177 p., cloth, ISBN 0-8306-4587-X, paper, ISBN 0-8306-4586-1

Approximately two dozen experiments on applied ecology, soil ecosystems, energy, aquatic ecosystems, and potential solutions to environmental problems are described. Each includes background information, project overview, materials list, step-by-step procedures, how to analyze data, suggestions for altering the experiment by changing variables, and bibliographic references. Some of the experiments are suitable for students in grades 7-9.

Gardner, Robert.

Celebrating Earth Day: a Sourcebook of Activities and Experiments.

Millbrook Press, 1992, 96 p., paper, ISBN 1-56294-070-8

Highlighting the global problems of waste disposal, water conservation and air pollution, this book offers plans of action and scientific experiments to relate these problems to readers' homes, schools, and neighborhoods and to suggest ways to help restore environmental health. Suggested for grades 5-9.

Hale, Monica, editor.

Ecology in Education.

Cambridge University Press, 1995, 208 p., cloth, ISBN 0-521-43346-0, paper, ISBN 0-521-55669-4

Papers from a 1990 international symposium on "the general understanding and role of ecology in education" discuss recent advances and approaches used in various countries for different educational settings, systems, and audiences. Fourteen programs from African, Asian, European, and American countries are used to illustrate the "think globally, act locally" concept.

Ham, Sam H.

Environmental Interpretation: a Practical Guide for People With Big Ideas and Small Budgets.

Fulcrum Publishing, 1992, 482 p., paper, ISBN 1-55591-902-2

Specific, practical information for leaders conducting education activities related to the environment. How to prepare and present talks, walks, inexpensive exhibits, self-guided tours, slide/tape programs, and low cost visual aids. Includes numerous case examples and illustrations. (adapted from *SciTech Book News*, May 1993)

Miller, G. Tyler, Jr.

Living in the Environment: an Introduction to Environmental Science.

Wadsworth Publishing, 7th edition, 1992, 705 p., cloth, ISBN 0-534-16560-5

One of the most widely used textbooks in introductory environmental science courses. Humans and nature, the human population, global problems, resources and resource management, and environment and society are some of the topics discussed. The text is supplemented with colored illustrations, photographs, a glossary and references. (adapted from *Biosis*, May 1993)

Orr, David W.

Ecological Literacy: Education and the Transition to a Postmodern World.

State University of New York Press, 1992, 210 p., cloth, ISBN 0-7914-0873-6, paper, ISBN 0-7914-0874-4

Orr, a professor of environmental studies, has written 15 essays about sustainability, education, and the uses and purposes of knowledge. He writes that sustainability can be achieved only by participatory democracy and an informed citizenry. He recommends wide-ranging changes in post-secondary curricula to achieve greater focus on environmental issues, increase citizen activism and promote sustainable living. (adapted from *BioScience*, October 1992)

Sheehan, Kathryn, and Mary Waidner.

Earth Child: Games, Stories, Experiments and Ideas About Living Lightly on Planet Earth.

Council Oak Books, 2nd revised edition, 1994, paper, ISBN 0-933031-93-9

A compendium of activities, information, and stories to encourage parents and teachers to integrate study of the environment into all aspects of the home or school experience. The text is supplemented with pen-and-ink illustrations, quotations, and books reviews. Addresses of sources of supplies and information lead to additional resources. (adapted from *Wilson Library Bulletin*, February 1993)

Smith, Gregory A.

Education and the Environment: Learning to Live With Limits.

State University of New York Press, 1992, 185 p., cloth, ISBN 0-7914-1137-0, paper, ISBN 0-7914-1138-9

Smith, a professor of education, describes this book as "an effort to interject environmental considerations into the current discourse about U.S. education." He sees schools as a primary place for students to learn the skills necessary to take collective action at local and international levels to deal with environmental problems now and in the future. (adapted from *Education Digest*, February 1993)

Weinstein, Miriam.

Making a Difference College Guide, 1994: Education for a Better World.

Sage Press, 1993, 221 p., paper, ISBN 0-9634618-1-8

Profiles of 70 colleges and other post-secondary institutions with programs "committed to public service, social change and environmental stewardship." A concise essay describes the school or program and its mission, lists selected majors and courses, and describes the school atmosphere and strengths. Factual data on costs, student and faculty composition by gender and race, and application process follow.

Wizansky, Richard, and Joan Moody.

Earth Work: Resource Guide to Nationwide Green Jobs.

HarperCollins West, 1994, 160 p., cloth, ISBN 0-06-258543-6, paper, ISBN 0-06-258531-2

This guide provides information about the diversity of environmental careers in many sectors, including academic, government, private, and non-profit. Includes a directory of organizations offering green jobs and schools offering environmental degrees. Profiles earth workers, describing their backgrounds and choices to follow green careers. A bibliography of other books about green careers is included.

Joan Taylor and Monica Mierozewska
are reference specialists on global issues for the
U.S. Information Agency.

A longer bibliography on other environmental topics can be found on the USIS Earth Day Page on the Internet.

ARTICLE ALERT



Lambert, Thomas, "Endangered Species Act: Facing Stiff Opposition (USA Today, vol. 124, no. 2610, March 1996, pp. 32-35)

In slightly more than two decades, the Endangered Species Act (ESA), which provides for the protection of endangered species and subspecies as well as their habitats, has gone from being one of the least controversial laws enacted by the U.S. Congress to one of the most contentious. Noting that the ESA is notorious for provoking land-use conflicts between regulators and property owners, Lambert, of the Center for the Study of American Business, argues that it should be scaled down.

Harris, David, "The Last Stand," Rolling Stonno. 727, February 8, 1996, pp. 38-43.

This article is adapted by the author from his newly published book of the same title. He describes an environmental struggle to save the primeval rain forest that once covered the mountainous Pacific coast of the U.S. Northwest. This rain forest, the largest privately held old-growth redwood forest on earth, has been nearly decimated by a century of clear cutting. Harris considers this struggle as a challenge to President Clinton to reaffirm his environmental protectionist stance within the context of a more pro-business Congress and a more conservative Supreme Court.

Nash, Jennifer; Ehrenfeld, John, "Code Green: Business Adopts Voluntary Environmental Standards, Environment, vol. 38, no. 1, January/February 1996, pp. 16-20, 36-45.

During the past decade, private codes of environmental management practice have begun to emerge as a major force in corporate environmental programs. Examples of these

codes include the Chemical Manufacturers Association's Responsible Care program and the International Chamber of Commerce's Business Charter for Sustainable Development. Massachusetts Institute of Technology's (MIT) Nash and Ehrenfeld explore how these private codes created by business are beginning to have a major impact on corporate environmental practices, with benefits that go well beyond those achieved by regulation.

Flavin, Christopher, "Power Shock: The Next Energy Revolution." World Watch, vol. 9, no. 1, January/February 1996, pp. 10-21.

Despite almost unimaginable progress in computer-based technologies, the world's energy dependency on oil, natural gas and coal seems immutable. Not so, writes energy expert Flavin: we are on the verge of a monumental transition to renewable and decentralized energy systems that will begin to displace fossil fuels within decades. Flavin cites three factors driving this change: new technologies, industrial restructuring and environmental pressures. Some of these energy sources are now in operation — solar power, advanced windmills and fuel cells.. But the great leap forward will occur with the move to hydro-based energy sources.

Dutton, Gail, "Green Partnerships," Management Review, vol. 85, no. 1, January, 1996, p. 24.

Business and environmental advocates are increasingly cooperating with government decisionmakers to achieve more flexible — but not less strict — environmental standards. Dutton looks at how one corporation is fostering mutually acceptable regulatory procedures and goals and reducing confrontations. She suggests steps corporations can take to make their decisions with environmental groups effective and mutually beneficial.

Adler, Tins, "Black-Eyed Peas Go To Mars?" *Science News*, vol. 148, no. 23, December 2, 1995, pp. 376-377.

In an article subtitled "Tales of New Destinies for Plants," the author discusses how scientists are working to find ways for people to make wider use of less well-known species of plants and fruits. She writes that many nutritious fruits and vegetables, as well as grasses that control soil erosion, fast-growing trees, and plants that do well on dry soil, remain underutilized and could also present an "environmentally friendly" alternative to some current fuel and construction materials.

Wheeler, David L., "The Search for More-Productive Rice," *The Chronicle of Higher Education*, vol. 42, no. 14, December 1, 1995, pp. A12, A25.

A scientist at Cornell University in Ithaca, New York, is putting a new twist on traditional plant breeding techniques. Instead of trying to breed a perfect plant and exporting it to the world, Susan R. McCouch starts with local varieties of rice and tries to improve on them, using the latest tools of molecular biology. "Her research is still in its early stages, but she hopes that eventually she and her collaborators can duplicate the results of the 'Green Revolution,' which began in the late 1960s," the author says.

Farquar, Doug, "Bordering on Disaster," *State Legislators*, vol. 21, no. 10, December 1995, pp. 30-33.

The 2,000 mile border that separates the United States and Mexico divides vastly divergent cultures and political entities. However, environmentally and economically, the region is borderless. Farquar discusses the impact of the North American Free Trade Agreement (NAFTA), the lack of federal resources and the rapid growth in population and pollution in making the border the most environmentally degraded region in the United States. And he looks at how America's Southwestern states are addressing the border region's environmental and health problems.

Frosch, Robert A., "Industrial Ecology: Adapting Technology for a Sustainable World," *Environment*, vol. 37, no. 10, December 1995, pp. 16-24, 34-37.

"It is simply no longer possible to avoid the wastes that we create, and disposing of them is becoming more and more of a burden," says Harvard University's Robert Frosch. Industrial societies have attempted to deal with pollution and waste largely through regulation, but Frosch argues that we have reached the point where the only effective approach is one that incorporates an "industrial ecology" that operates much like a natural ecosystem, where material and energy circulate continuously in a complex web of interactions. He explores how this approach could greatly reduce the toll manufacturing processes take on the environment.

Krumenaker, Larry, "Rhythm Section," *The Sciences*, vol. 35, no. 6, November/December 1995, pp. 14-17.

Questions about the causes and effects of world climate change are becoming more urgent as scientists study global warming. However, to understand the importance of current climate change, we must study it in the context of historical patterns. This well-written article describes the development of Earth's weather cycles as they relate to planetary influences, geology and evolution.

Gelbspan, Ross, "The Heat is On," *Harper's Magazine*, vol. 291, no. 1747, December 1995, pp. 31-37.

A Pulitzer-Prize winning reporter asks "how long we can go on pretending that nothing is amiss with the world's weather." He asserts that due to "extravagant burning of oil and coal" global warming is resulting in "new record-setting weather extremes." Gelbspan cites evidence to support his thesis, and disagrees with those who deny that global warming is a serious problem, accusing them of spreading "disinformation."

The annotations above are part of a more comprehensive Article Alert offered on the home page of the U.S. Information Service.

SPEAKERS AND SPECIALISTS



Environmental education has repeatedly been shown to be a vital and integral component of sustainable development. The scope of environmental education is as long and as wide as the issues affecting the environment, while the range of programs that can be effectively employed to address those issues is as equally long and wide.

The U.S. Information Agency/Service (USIA/USIS) has supported many international programs on environmental education and the environment. Just a few of the recent recent programs illustrate what environmental education can accomplish.

In Mexico, Ricardo Martinez of the California Integrated Waste Management Board delivered lectures and seminars on solid waste management to academics, environmentalists and officials in several Mexican cities. He focused his remarks on recycling, including the management of landfills, and the importance of public education.

Paquita Bath, Educational Director of the Nature Conservancy, conducted a lengthy international telephone conference on conservation, energy-saving technologies and sustainable development with senior environmentalists and academics in Sierra Leone.

Richard Borden of the College of the Atlantic conducted a two-week program on human ecology and sustainable development studies, with an emphasis on curriculum development, with the Human Ecology Department at the Free University of Brussels.

In Thailand, Tom Kelly, Director of the Secretariat of University Presidents for a Sustainable Future, addressed ecosystems education, particularly the training of a wide variety of specialists and the necessity of conducting environmental impact studies, with academics at Chiang Mai University; with Thai and regional delegations at the Thai-hosted Conference on Upland Tropical Ecosystems; and with NGO representatives.

During a two week workshop in Bahrain, Hashem Akbari of the Lawrence Berkeley National Laboratory examined energy efficiency and conservation, specifically concerning residential and public building codes, with the Environmental Protection Committee of Bahrain and the Center For Energy Studies at the University of Bahrain.

By their success these programs, and countless more involving committed environmentalists in America and around the world, demonstrate that more widespread environmental education can benefit both the environment and economies around the world.



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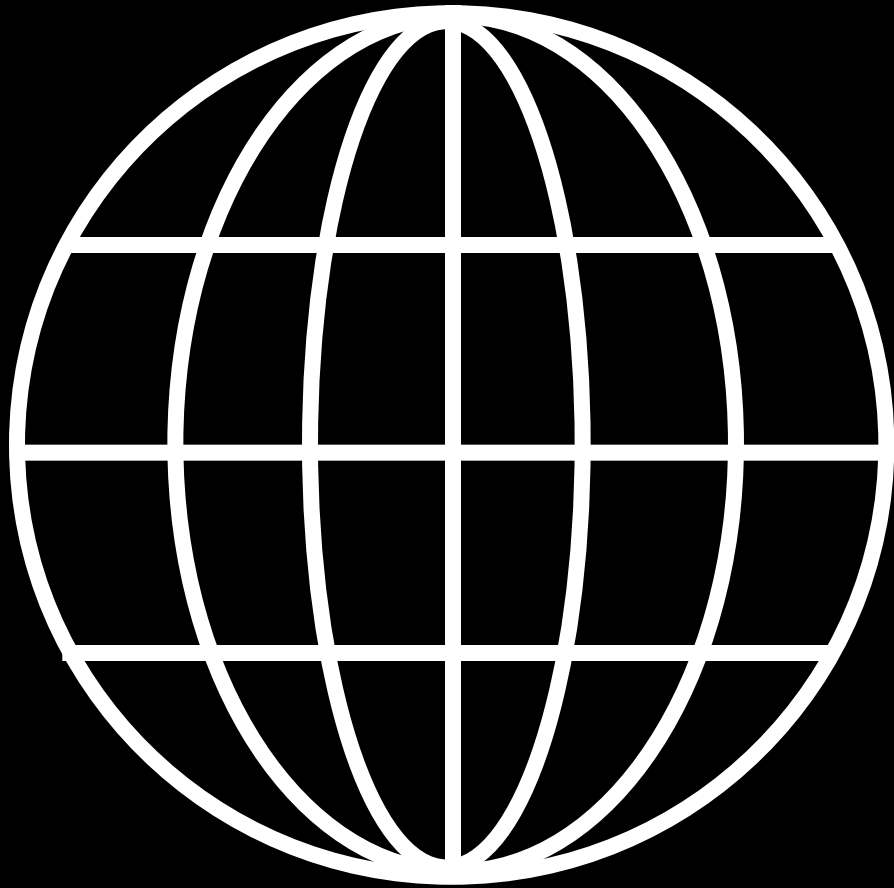
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