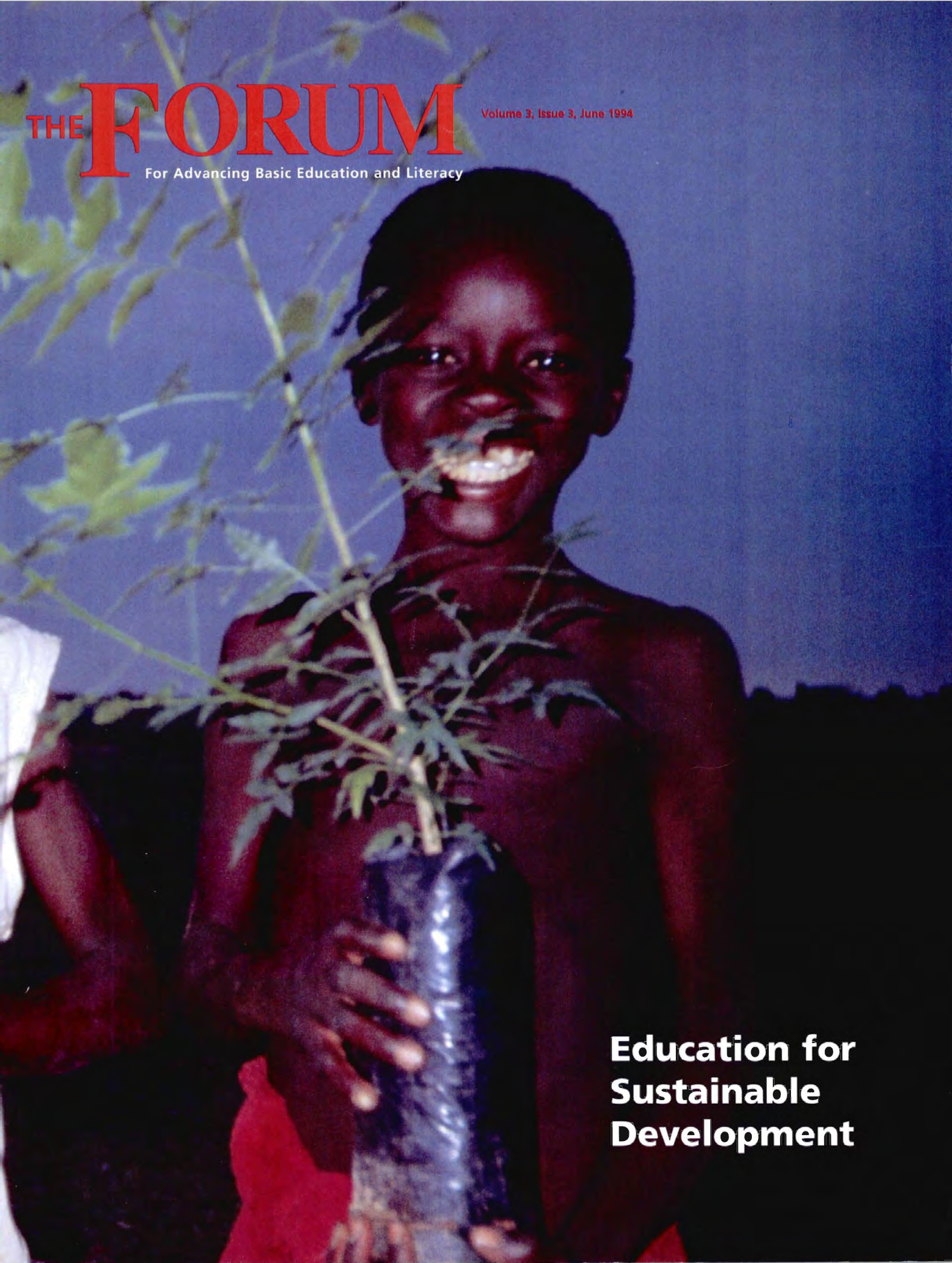
THE FORUM

Volume 3, Issue 3, June 1994

For Advancing Basic Education and Literacy



Education for Sustainable Development

To Our Readers

Neither our economic nor our education systems have adequately adjusted to the fact that human beings and their economic activities depend on the earth and its natural processes. To some extent this is understandable. Both modern economics and mass formal education were born in an era when human activity seemed to have less impact on the earth and when natural resources seemed less finite. Yet as the human economy has approached some of the earth's natural limits, we have come to appreciate that natural resources are finite and that the effects of human activity on the ecosystem are important, poorly understood and possibly irreversible. In many ways we have nearly filled the earth. Yet we are leaving little for our grandchildren. And many people in the South as well as the peripheral North lack basic necessities of life.

We have not incorporated these understandings into our economic and education systems. National income accounts, for example, still do not reflect the loss of natural resources as a cost against income. National development plans rarely consider the environmental sustainability of current economic policies or their effects on future generations.

Similarly, the implications of these ideas for education have been poorly articulated. When education is brought into discussions of ecology and the environment, it tends to come in at the end of the thinking, when the problems and solutions are identified and all that needs to happen is for people to be "educated" to act properly. Too often, environmental education is aimed at individuals when the problems are much larger, or targeted toward people with the fewest options and least able to bring about change. A deeper understanding of the connections between education and environment is needed.

This issue of The FORUM has two aims: 1) to provide a spectrum of theoretical perspectives on the connections among education, economics and ecology; and 2) to describe in more concrete terms some ways educators have worked to promote sustainable development.

Photo: Meg Garlinghouse

It is clear that responsible education and economics cannot continue to ignore ecological issues, but there is little consensus on what sustainable development is, how it best can be achieved and what, therefore, is the proper role of education. In many ways, the question revolves around growth. Is growth the solution or the problem? Does sustainable development involve a refinement of existing economic arrangements, for example, charging those who benefit from use of natural resources the full costs of replacement, as Theodore Panayotou suggests? Or does sustainability require a completely new way of thinking, in which development is distinguished from growth, as Herman Daly and David Orr believe?

Christina Rawley, former editor of The FORUM, relates the discussion to education by asking whether an industrial model of education is appropriate for a world which is mostly pre or post-industrial. She parallels the ultimate inefficiencies of monocultures in schooling and in agriculture and seeks metaphors for ways of living that are both ecological and economical. David Orr echoes similar themes in his exploration of environmental literacy.

A series of excerpts from leading thinkers frame a kind of debate about whether population growth is an environmental problem.

Paula Palmer discusses diversity — in cultures, knowledge systems and tropical forest ecosystems. She describes the linkages among research methodology, the strengthening or undermining of indigenous cultures and environmental sustainability.

Anil Chitraker describes a program in Nepal in which children are educated as agents of environmental preservation, in which the goal is to teach an "environmental ethic" by teaching those who will teach others. Graham Vulliamy notes some of the contradictions and implementation problems that must be addressed for environmental education initiatives to be effective.

The causes and cures of many environmental problems cross national boundaries. Neil Taylor outlines a multinational environmental education effort being launched in the South Pacific and designed to deal with common environmental problems in a context of few resources and widely scattered populations.

The article that follows describes a children's environmental magazine developed in Mali to supplement scarce instructional materials and involve children in the ecological problems of their country.

Defining education in the broadest terms, Jacoline Vinke provides an overview of the various educators and learners of environmental education in the larger society. Finally, in the last article Fred Niedermeyer outlines a primary level environmental education program developed in the US. The issue closes with additional environmental education resources and a few final thoughts.

Again, we hope you will share this issue with your colleagues. If you need more copies of this or past issues, or if you have ideas, suggestions or comments, please write us.

— James H. Williams, Editor

The Forum
for Advancing Basic Education and Literacy
Harvard Institute for International Development
One Eliot Street
Cambridge, MA 02138, USA
Tel: 617-495-9478
Fax: 617-495-0527
Telex: 275276
Cable Address: HIID
TWX No: 7103200315

James H. Williams, Editor
Sami Farhad, Assistant Editor
Manish Jain, Assistant Editor
Gregory Goering, Editorial Assistant
Eliott Jones, Graphic Designer

Editorial Board of Advisors

Manzoor Ahmed
UNICEF
New York, USA
Arfah Aziz
Ministry of Education
Kuala Lumpur, Malaysia
Victor Billeh
National Research and Development Institute
Amman, Jordan
Francoise Caillods
International Institute for Educational Planning
Paris, France
Cheng Kai Ming
University of Hong Kong
Hong Kong
Fay Chung
UNICEF
New York, USA
Kathleen Cloud
Director, WID, University of Illinois
Champaign, Illinois, USA
Frank Dall
UNICEF
Amman, Jordan
Cecilia de Cano
Minister of Education
El Salvador
Elizabeth King
The World Bank
Washington, DC, USA
Noel McGinn
Harvard University
Cambridge, Massachusetts, USA
Kurt Moses
Academy for Educational Development
Washington, DC, USA
Irene Moutlana
University of Port Elizabeth
Port Elizabeth, South Africa
Katherine Namuddu
Rockefeller Foundation
Nairobi, Kenya
Ernesto Schiefelbein
Minister of Education
Santiago, Chile

CONTENTS

2 **Economics for Sustainability** — by Herman Daly and Donella Meadows
Remedies to promote the "greening" of economics

3 **Sustainable Development and Economic Growth** — by Theodore Panayotou
Sustainable development cannot take place without economic growth

4 **Ecology as the Basis for Environmental Education and Sustainable Development** — by Christina Rawley
Modern education has not prepared people to understand their fundamental connections with the environment

6 **On Ecological Literacy** — by David Orr
Ecological literacy is the ability to ask "What then?"

7 **Perspectives on Population and Environment** — selected excerpts
Is population growth the problem, the solution or the wrong question?

8 **Empowering Indigenous Peoples to Preserve Their Forests and Cultures** — by Paula R. Palmer
Participatory action research as a framework for achieving environmental and social goals

10 **Children as Agents of Environmental Change** — by Anil Chitraker
Helping children develop an environmental ethic for natural resource use

11 **Constraints to Environmental Education Reform** — by Graham Vulliamy
Issues in the implementation of environmental education programs

12 **A Regional Approach to Environmental Education in the South Pacific** — by Neil Taylor
A low-cost model of formal and informal education being implemented in the Pacific

13 **Children's Magazines for Environmental Education** — based on World Conservation Union materials
Producing magazines as supplementary teaching-learning materials in Mali

14 **Actors and Approaches in Environmental Education** — by Jacoline Vinke
A great diversity of environmental educators and learners

16 **Think Earth** — by Fred Niedermeyer
An environmental education curriculum for primary schools

17 **Additional Resources and Closing Thoughts**

ABEL
Advancing Basic Education & Literacy

The Forum is published by the **Harvard Institute for International Development** for the Advancing Basic Education and Literacy Project (ABEL) in collaboration with the **Academy for Educational Development**, **Creative Associates International**, and **Research Triangle Institute**. The Forum informs educators worldwide of the latest innovations in basic education. The Forum publication is supported by U.S.A.I.D. Contract No. DPE 5832-Z-00-9032-00 (Project No. 936-5832). Research findings, views, and opinions expressed herein are solely those of the authors and no endorsement by U.S.A.I.D. should be construed. All individuals and organizations are encouraged to copy and distribute articles contained herein. Please acknowledge the source as *The Forum for Advancing Basic Education and Literacy*. Copyright © 1994 by the President and Fellows of Harvard College.

Economics for Sustainability

by Herman Daly and Donella Meadows

On this occasion* I would like to suggest a few remedies for the middle-aged infirmities of the field of Economics to encourage further "greening" of economic thinking:

Remedy One: Stop counting the consumption of natural capital as income. When the Philippines permits its forests to be carried off as logs to Japan, its balance of payments looks good, for a few years. When Indonesia sells off its oil, when the United States fishes its great cod populations down to remnants, the economy booms, until the resource is gone. That kind of behavior breaks the most time honored economic law, which is to take this year only what will leave intact the capacity to produce the same amount next year.

Don't spend down your capital. Every economist knows that. The problem is that economists have never counted soils, forests, clean water, clean air, mines, oil wells or other species as capital. These resources are income-producing. Indeed, without them there would be no income. But we have no accounting systems to keep track of natural capital.

The World Bank is seeking ways to "green the GNP," by adding natural resources to national accounting systems. The Bank should also count the loss of natural capital when calculating whether to fund a dam or a road. Not to do so means biasing projects toward unsustainable development.

Balance-of-payments accounts should also be corrected when natural capital such as timber or petroleum is exported. Those exports are now counted as foreign exchange income when they should be counted as capital transfers. If they were, international lending and national development policy would change enormously.

Remedy Two: Tax labor and income less; tax throughput more. Throughput means flows of energy and materials from the Earth, through the economy, and back in the form of waste to the Earth. It makes no sense to tax what you want more of (income, capital gains, employment) instead of what you want less of (depletion, pollution). Energy, material extraction and pollution emission should be taxed, not income.

The North should take this step first. Indeed, sustainable development must be achieved in the North first. The major weakness of the World Bank's ability to foster sustainable development is that it only has leverage on the South. Some way must be found to push the North.

Economists have never counted soils, forests, clean water, clean air, mines, oil wells or other species as capital.

Remedy Three: Maximize the productivity of natural capital and invest in increasing it. Economists don't have to be told that the smartest way to invest is to find the most limiting factor in an economy or economic process — the factor that is most strained, the one that is holding back production — and find a way to use that factor more efficiently or to get more of it.

What many economists do have to be told is that in many places the limiting factor is no longer labor or man-made capital. It is natural capital. The fish catch is limited not by the number of fishing boats, but by the remaining fish in the sea. Cut timber is not limited by the number of sawmills, but by the number of standing forests. This realization is slow to come partly because of inadequate accounting and partly because so many economists were trained in a half-empty world where nature was abundant. They haven't yet adjusted to a world where nature is suddenly very limiting (as well as limited).

Remedy Four: Move away from the ideology of free trade and free capital mobility and toward national production for internal markets. At present, global interdependence is celebrated as a self-evident good. The royal road to development is thought to be the unrelenting conquest of each nation's market by all other nations. It is necessary to remind ourselves that the World Bank exists to serve the interests of its members, which are nation states. It has no charter to serve the cosmopolitan vision of converting many relatively independent national economies into one tightly integrated world economic network, upon which the weakened nations depend for even basic survival.

Globalizing the economy means erasing much of the power of national governments to carry out policies for the common good, Any protection of local businesses, of workers, of communities or of the environment can be struck down as a restraint of trade — as if trade were the highest value, to which all other values must be sacrificed. Take it as a prediction. Ten years from now the buzz words will be 'renationalization of capital' and 'community rooting of capital.'

Will these remedies be taken seriously? Maybe it's wishful thinking, but I believe that the first two will, with time, become conventional wisdom. The future of the third is more debatable, but I'm confident of it in the long run. It's going to be a real battle for the fourth. ❖

** This material is based on a speech given by Herman Daly on his retirement from the World Bank in March 1994 and on a write up of that speech prepared by Donella Meadows for the Valley News newspaper. Mr. Daly now teaches at the School of Public Affairs, University of Maryland at College Park, College Park, MD, 20742, USA. TEL (USA) 301/405-6330 / FAX 301/403-4675. Donella Meadows is an adjunct professor of environmental studies at Dartmouth College, Hanover, New Hampshire, USA.*

Sustainable Development and Economic Growth

by Theodore Panayotou

As developing countries struggle to escape poverty and meet the aspirations of their people, many see sustainability as an extra burden to an already Herculean task. Sustainability that means the current generation of poor must endure Spartan conditions so that the next generation will have a better standard of living lacks intergenerational justice. Sustainability that assigns future generations the standard of living of the current generation means the maintainance of poverty. True sustainability requires poverty alleviation, fertility decline, substitution of human capital for natural resources, effective demand for environmental quality, and a responsive supply. These changes cannot take place without economic growth.

The alarmist prediction that continued economic growth will lead to ecological disaster and utopian prescriptions to ban growth and change people's values derive from a fixation on the symptoms of environmental degradation: hectares of forest lost, tons of soil eroded, species endangered, tons of pollution generated.

The root causes of environmental degradation lie in the dissociation between scarcity and price, benefits and costs, rights and responsibilities, actions and consequences. Too many resources are unowned and unpriced. Others are priced too low, or their depletion is subsidized. Preventing prices from rising with growing scarcities and rising social costs distorts the signals that in a well-functioning market would bring about increased efficiency, substitution, conservation and innovation. The ultimate source of environmental degradation and unsustainability is not growth but policy and market failures.

Simply put, you get what you pay for; what you don't pay for, you lose. If a government subsidizes waste, inefficiency, resource depletion and environmental degradation, that is what it will get. If people have free and open access to a scarce resource, it will not be a resource for long.

Economic growth generates many benefits — higher standards of living, better education and health, greater longevity, better working conditions, and reduced hours of work. Economic growth also has costs — resource depletion, environmental degradation, ecological disturbance and widening inequalities, especially during the takeoff stage. For the market to work for sustainability, the costs of growth must be borne by those who generate them, not by general taxpayers, foreign lenders or future generations. This principle is not only fair but efficient and sustainable as well.

How can polluters and resource users be made to pay the social and developmental costs of their growing wealth? 1) Governments must eliminate all direct and indirect subsidies, giveaways and public projects that promote environmental degradation or resource depletion. 2) Governments should establish the institutions necessary for the emergence and efficient functioning of environmental and resource markets—institutions such as secure, enforceable, and transferable property rights and enforcement of contracts. 3) Governments must internalize externalities and mitigate any other market failures through a consistent structure of market-based economic incentives and disincentives rather than a patchwork of unenforceable bureaucratic command-and-control regulations. 4) Governments must subject all public projects to rigorous scrutiny, assessment and valuation of environmental effects.

Skeptics ask whether growth is possible if the full environmental costs of growth are paid for. Growth derived from appropriating other people's resources or shifting one' own costs onto others will not continue. However, growth from increased efficiency and productivity will continue. Empirical studies show that the most important sources of growth are increased efficiency and innovation resulting from accumulated knowledge and expanding human capital.

There is considerable scope for decoupling economic growth from expanding energy and resource use and advancing environmental degradation. The classic example is Japan, which in 1991 produced twice the output of 1973 with the same amount of energy and greatly reduced emissions. Industrial growth can be decoupled from toxic waste, urban development from congestion and pollution, agricultural growth from deforestation and soil erosion, and resource extraction from ecological destruction and social dislocation.

Sustainable development requires an undistorted, competitive and all-encompassing market that gets the incentives right. Currently existing markets are neither undistorted nor all-encompassing, particularly in the case of natural resources and the environment. It is tempting to declare the free market unworkable when it comes to ecology and the environment and to seek to replace it by government fiat. However, the regrettable experience of the centrally-planned economies of Eastern Europe, the threats to state-owned forests throughout the tropical world, and the impotence of command-and-control regulations to contain worldwide environmental degradation dictate otherwise. Natural resources treated as free goods or state property are rapidly being depleted. The environment as a public good or "everybody's property" is "nobody's property." The poor have been the ultimate victims.

The state plays a critical role in the struggle for sustainable development, but not one of direct management or control. Rather, the state's role is to establish new rules of the game and promote an environment of competition, efficiency and conservation. Only the state can secure effective property rights, legal enforcement of contracts, pollution charges and permits, environmental performance bonds, and other institutions and mechanisms essential for the emergence and efficient functioning of green markets, on which sustainable development ultimately depends.

Theodore Panayotou is Lecturer, Department of Economics, Harvard University, Fellow at the Harvard Institute for International Development and Director of the Institute's International Environment Program (1 Eliot St., Cambridge, MA 02138, USA). *This material is adapted from Chapter 6 of Green Markets: The Economics of Sustainable Developmental (ICS Press, San Francisco, California, 1993).*

Ecology as the Basis for Environmental Education and Sustainable Development

by Christina Rawley

Education is essential to environmental protection and restoration. To the extent that education is used to maintain the integrity of place, it can be the primary contributor toward environmental sustainability. However, as a primary vehicle for modernization through industrialization, education has unwittingly contributed to the disruption of the ecosystem and environmental degradation.

Modern education has been based on an historical model of development which has viewed progress as a sequence from an undeveloped small-scale agrarian economy to a developed large-scale industrial economy. During the process of industrial development, education systems prepare children for occupations that ignore the ecological processes within which natural systems exist. In the words of former Tanzanian president Julius Nyerere, "We have to admit that after all the years and millions of dollars spent, we still continue to educate as if there were office jobs in the city for everyone." To the extent that education has promoted modernization, it has failed to educate people to understand the natural world. Fundamental changes are needed to transform our approach to development to achieve environmental sustainability in the post-industrial world.

As outlined in the table below, an ecologically sound future may require innovations that include characteristics of pre-industrial stages to recoup the knowledge inherent in indigenous systems that worked over millennia. For example, environmental degradation in California's Central Valley—an area of relatively low population where the most highly developed industrial farming techniques are practiced—is proceeding at an astonishing rate in comparison with that in the intensive rice cultures of much of Asia, which have maintained high levels of productivity even with large populations. Agrarian cultures have known how to use natural resources with minimal impact on the ecosystem. Education systems of the future will benefit from understanding ecologically sound systems that have existed for millennia. Such systems are sensitive to the combined action of technological advance, population increase and human relationships to the environment.

Ecological Paradigm for Education and Development

The word ecology is derived from the Greek *oikos*, meaning "house" or "place to live." Literally ecology is the study of organisms "at home." Usually ecology is defined as the study of the relation of organisms or groups of organisms to their environment, or the science of the interrelations between living organisms and their environment. Although the terms ecology and environment are often used synonymously, they should be distinguished. The environment surrounds us, but the individual or community can be autonomous or disassociated from it. The environment is not necessarily related to us. Environmentalism has often reflected an atomistic, mechanistic world view which separates elements of whole systems. It is part of the science which built the industrial age. It is precisely this separation of self from environment that ecology attempts to overcome.

The Pond as Ecological Metaphor

A mother watched as her four-year-old child worked busily stirring the water in a puddle by the roadside of a city street. "My child, what are you doing?" she asked, to which the child replied: "I'm growing fish!"

Ecology provides examples of highly productive systems which are both economical and environmentally sound. A pond is one of the simplest ecosystems to envision because it has easily identifiable boundaries. There are a myriad of relationships within the pond, in the food chain and with essential gases which are controlled by organisms. As sunlight hits the pond, algae give off energy essential for animals to survive. In return, bacteria and animals produce carbon dioxide, which the algae and other plants need to live. The fish within the pond have their own life cycles integrated with other members of the community. Fish populations stay in check, partly by producing fewer offspring when population density reaches maximum levels for ecological sustainability.

This intensive method of polyculture is practiced today in many areas of the non-industrialized world. It is an example of efficient use of space where several species with different feeding habits can take advantage of different environmental conditions within the pond. The first known treatise on this polyculture pond farming method, written in the fifth century by Fan Li, detailed the economics of the practice. He observed that the polyculture technique was more productive than monocropping techniques used at that time because it was able to provide larger numbers of fish in greater varieties through the changing seasons. Monoculture techniques that optimize conditions for a particular fish often create an environment within which it is difficult for other fish to coexist.

Ecological Precepts

An ecosystems approach to development provides several analogies useful in reconceptualizing social and education systems. An ecological worldview acknowledges that systems are 1) in a constant state of change and transformation based on 2) differentiation of species, experiences, and ways of being which are 3) intricately interconnected and interrelated.

1. First, everything is in a continual state of movement, change or transformation that is non-linear and cyclical. Any model of development is likely to become inappropriate, if not obsolete, if it does not accommodate the continuous dynamism of life processes.

In the fish pond nothing is still. Every element is in motion, even when the surface appears to be perfectly quiet. The pond evolves in cycles that change with the seasons, air temperatures and levels of sunlight. It creates its own microclimate, cooling the air around it in daytime,

releasing warmth from the water at night and giving off oxygen and carbon dioxide necessary for surrounding plant and animal life. When the balance is altered, the smell and color of water changes, as does fish behavior.

Human populations are also in a constant state of change and are affected by the environment as we also affect it. An ecologically literate society requires a flexible learning environment, curriculum and teaching practices that focus on change as an essential precept of all life. This means that schooling will need to change from rigid authoritarian to flexible structures that allow for greater exchange or "flow" within the curriculum and teacher-student relationships.

2. As in nature, human experience is based on differentiation and diversity. The wholeness of the fish pond ecosystem depends on diversity rather than homogeneity. This is contrary to modern concepts of monoculture prevalent during industrialization, examples of which abound in the monocrops of corn and wheat that extend for acres throughout the world. Disregard for the primary tenet of diversity in this case has led to rampant use of chemical pesticides and fertilizers which has left the soil without natural organic life forms to form a fertile base for future crops. It has also eliminated beneficial insects that help maintain natural balances. When such monocropping practices were applied to delta rice farming, pesticides and fertilizers poisoned the fish, snails and other aquatic life used in the balanced diet of the population. Though rice production increased in the short term, the overall supply of protein decreased.

Education systems have also been organized as monocropping systems. Schooling has often focused not on what people must deal with in daily life, but on developing the human capital necessary to increase industrial outputs. This "monocropping of the mind" has not valued the diversity that exists among men and women of different cultures, spiritual orientations and socio-economic groups inherent to biodiverse regions of the world. An ecologically literate society would honor diversity in schools and learning environments, in the curriculum, languages of instruction, and in the diversity of different ways of learning, knowing and experiencing the social and natural environment in different regions of the world.

Education and Environment in Three Technological Stages

Category	Pre-Industrial (Agrarian)	Industrial (Mechanical)	Post-Industrial (Ecological)
Production Environment			
Economic Base	Agriculture	Industry	Information
Orientation	Community/city	National	Regional/global
Economic Emphasis	Household; small-scale business; informal	Industrial; large-scale enterprise; formal universalistic;	Small & medium businesses; household; entrepreneurial
Validity	Highly contextualized in local community	Little concern for context	Contextual, individual and regional
Ecology	Essential & unarticulated	Not considered	Articulated and emphasized
Education			
Planning	Dispersed (non-formal)	Centralized (formal)	Decentralized
Financial Support	Village or local	Reliance on national support	Local, regional; decreased national support
View of Self Within Environment	Individual & family within tribal or village based on strong belief systems related to natural elements	Individual in competition with nature to use resources as economic capital for exploitation	Individual in environmentally interdependent communities; natural limits recognized; strong, clear relationships with natural world
Cultural Awareness of Nature	Diverse cultures in the natural world	Monocultural nature in separate parts	Diverse cultures interconnected; nature linked with social systems
Language of Instruction	Indigenous	State determined unified language	Bilingual (indigenous & national)

3. All parts of life are interconnected, interrelated and interdependent with a high degree of reciprocity. Food for fish is distributed throughout the pond, the so-called wastes of one becoming food for another in a reciprocal give and take process.

Social systems also require an understanding of reciprocity. In many agrarian societies, acts of giving and receiving were equivalent -- facets of a single process of generalized exchange which assured the circulation of wealth throughout society. This understanding of reciprocity implies that everything has a use, and nothing is waste. For environmental sustainability, whatever is produced must be reincorporated in a way that enhances life, for the planet is an interconnected system.

These precepts imply that for education to promote environmental sustainability, ecology must be both a subject to be taught and a pedagogical process. The challenge for planners is to design education programs that integrate biological and electronic technologies with housing, learning environments, food production and waste utilization within an ecological and cultural context. The survival of life rests in large part on the ability of policymakers to stimulate creative planning and fresh approaches to education and development for environmental sustainability. ❖

Christina Rawley, the founding editor of The FORUM, can be contacted at Ecologic, 1737 34th St NW, Washington DC 20007, USA. TEL (USA) 202/965-1886.

On Ecological Literacy

by David Orr

Literacy is the ability to read. Numeracy is the ability to count. Ecological literacy, according to environmentalist Garrett Hardin, is the ability to ask "What then?" Considerable attention is properly being given to our shortcomings in teaching the young to read, count and compute, but not nearly enough to ecological literacy. "What then?" questions have not been easy for us despite all of our formidable advances in other areas. "What then?" is an appropriate question to ask before the last rain forests disappear, before the growth economy consumes itself into oblivion, and before we have warmed the planet intolerably. Ecological literacy implies a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably.

There are several reasons ecological literacy has been so difficult for Western culture. First, ecological literacy implies the ability to think broadly, to know something of what is linked to what. This ability is lost in an age of specialization. Ecological literacy is difficult, second, because we have come to believe that education is solely an indoor activity. A good part of it of necessity must be, but there is a price. Ecology has become increasingly specialized and remote from its subject matter. Ecology is an applied subject. Its goal is not just comprehension of how the world works but a life lived according to that knowledge.

The decline in capacity for aesthetic appreciation is a third factor working against ecological literacy. Disordered landscapes are not just an aesthetic problem but signify a more fundamental disharmony between people and the land. Ugliness is a sure sign of what is called "unsustainability." Finally, ecological literacy is becoming more difficult, not because there are fewer books about nature, but because there is less opportunity for the direct experience of it. Where the artificially-created environment crowds out the natural, people can lose their sense of belonging to a natural world. A sense of place requires direct contact with its natural aspects, with its soils, landscape and wildlife.

It all comes down to whether the public understands the relation between its wellbeing and the health of natural systems. For this to occur, we must rethink both the substance and the process of education at all levels. What does it mean to educate people to live sustainably, going, in Aldo Leopold's words, from "conquerer of the land community to plain member and citizen of it?" The answer rests on six principles.

The first is recognition that all education is environmental education.

By what is included or excluded, emphasized or ignored, students learn that they are a part of or apart from the natural world.

By what is included or excluded, emphasized or ignored, students learn that they are a part or apart from the natural world. Conventional education, by and large, has been a celebration of all that is human to the exclusion of our dependence on nature.

Second, environmental issues are complex and cannot be understood through a single discipline. Despite discussion and experimentation, interdisciplinary education remains an unfulfilled promise. A promising approach might be to reshape institutions to function as transdisciplinary laboratories including components such as agriculture, solar technologies, forestry, land management, wildlife, waste recycling, architectural design and economics.

Third, education occurs in part as a dialogue with place, and has the characteristics of good conversation. Formal education happens mostly as a monologue of human interest, desires and accomplishments that drowns out all other sounds. It is the logical outcome of the belief that we are alone in a dead world of inanimate matter, energy flows and biogeochemical cycles. But true conversation can occur only if the existence and interests of the others are acknowledged.

Fourth, the way education occurs is as important as its content. Environmental education ought to change the way people live, not just how they talk. Learning best occurs in response to real needs and the life situation of the learner, not those of the teacher. The radical distinctions typically drawn between areas of knowledge and between teacher and student, school and community should be dissolved. Real learning is participatory and experiential, not just didactic.

Fifth, natural world experience is both an essential part of understanding the environment and conducive to good thinking. Direct experience is an antidote to indoor, abstract learning. Nature's diversity may be the source of much human creativity and intelligence. If so, the homogenization of ecosystems may result in a lowering of human intelligence.

Finally, education relevant to the challenge of building a sustainable society will enhance the learner's competence with the natural world. Practical competence is an indispensable source of good thinking. Good thinking proceeds from the friction of reflective thought and real problems. Aside from its effects on thinking, practical competence will be essential if sustainability requires people to take an active part in (re)building their homes, businesses, neighborhoods, communities and towns.

Ecological literacy implies radical changes in institutions and patterns now considered normal. It begins with ecology as the basis for redesigning technology, cities, farms, and educational institutions, and with a change in metaphors from mechanical to organic, industrial to biological. ❖

David Orr is professor at Oberlin College, Oberlin, OH, USA TEL USA 216/775-8312 / FAX 774-2490. *This material is excerpted from Ecological Literacy: Education and Transition to a Postmodern World by David Orr (Albany, New York: State University of New York Press, 1992).*

Perspectives on Population and Environment

There is little neutral ground when discussing issues of population. By way of introducing the diversity of perspectives on this important subject, we present three points of view:

Point of View No. 1. Population Growth Is the Problem

Population, when unchecked, increases in a geometrical ratio... Subsistence increases only in an arithmetic ratio...This implies a strong and constantly operating check on population from the difficulty of subsistence. This difficulty must necessarily be severely felt by a large portion of mankind... the period when the number of men surpass their means of subsistence has long since arrived...

Thomas Robert Malthus
(*An Essay on the Principle of Population*, edited by Philip Appleman, New York, W.W. Norton, 1976, 59-60).

You can always blame any particular difficulty on something that is not overpopulation. Nobody ever dies of overpopulation. They die of famine, pestilence, and war. There's always some proximate cause.

Dennis Meadows
(*Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*. Chelsea-Green, 1993)

The nature of exponential growth is such that limits can be approached with surprising suddenness. The likelihood of overshooting such a limit, with catastrophic results, is made even greater by (a) the momentum of human population growth, (b) by the delays between cause and effect in many environmental systems, and (c) by the fact that some kinds of damage are irreversible by the time they are visible...As zoologists are well aware, animal populations often overshoot the carrying capacity of their environment—a phenomenon invariably followed by population crash.

Paul R. Ehrlich, Anne H. Ehrlich, and John P. Holdre
(*Human Ecology*, San Francisco, W.H. Freeman, 1973. 10, 11-2)

Point of View No. 2. Population Growth Is Not the Problem

And why is our standard of living so much higher now than it was 200 years ago? The all-important difference is that there is a much greater stock of technological know-how available, and people are educated to learn and use that knowledge...

Because improvements—their invention and their adoption—come from people, it seems reasonable to assume that the amount of improvement depends in large measure on the number of people...

Julian Simon
("The Case for More People," *American Demographics* 1:10, 1979, 26, 28).

So the major constraint upon the human capacity to enjoy unlimited minerals, energy, and other raw materials at acceptable prices is knowledge. And the source of knowledge is the human mind. Ultimately, then, the key constraint is human imagination acting together with educated skills. This is why an increase of human beings, along with causing an additional consumption of resources, constitutes a crucial addition to the stock of natural resources.

Julian Simon
(*The Ultimate Resource*. Princeton, NJ: Princeton University Press, 1981, 221-2)

By way of example, consider two nations. One is about the size of [the state of] Maryland and has a population of 7.2 million; the other is as big is as [the state of] Montana but has a population of 123.5 million. The first has a population density of 703 people per square mile, a lot by most standards; the second has a density of 860 per square mile, among the highest on the planet. Country No. 1 has tracks of untouched forest and reserves of gold, tin, tungsten, and natural gas. Country No. 2 has few natural resources and little arable land...Is it, therefore, overpopulated?

Most economists would say no [even though] population has long since overtaken agricultural capacity...Country No. 2 is Japan...Country No. 1 is Rwanda, the place with the highest fertility rate in the world. There, too, the production of food lags behind the production of people. ... Some economists might therefore attach to this crowded land the label "overpopulated." Others though, might say that Rwanda has not yet reached the kind of critical mass necessary to develop its rich natural endowment.

Charles C. Mann
("How Many Is Too Many?" *Atlantic Monthly* 271:2, February 1993, 52)

Point of View No. 3. Population Growth is the Wrong Question

Population control without fundamental social reform does nothing in itself to tackle the underlying causes of poverty. Its result can therefore only be an intensification of the vicious cycle of economic poverty and social backwardness.

Denis Goulet and Michael Hudson
(*The Myth of Aid*, New York, IDOC North America, 1971, 129)

We reject the prevalent notion that 'over population' has a causal connection with environmental degradation. The North, with 20% of the world's people, consumes 80% of the total resources.

Editorial (People's Perspectives on "Population," *People's Perspectives* Nos. 4-5, November-December 1993, 33)

Given the high rates of infant mortality and death rates of young children, parents in developing countries must have large families to assure that children will survive to be able to help support the family and the parents in illness or old age...With higher food production and lower infant mortality rates, parents see that more of their children will survive, so "insurance births" taper off and the birth rate drops substantially...In ending hunger and malnutrition, we prevent births as well as deaths...While family planning information and techniques are an important part of overall health care,the real answer to overpopulation is not population control, but rather creating self-sufficiency for impoverished parents.

Roy L. Prosterman
("More Food, Fewer Children,") *A Shift in the Wind*, no. 3, November 1978, 10)

That population growth arises from the same causes that lead to poverty on the one hand, and environmental degradation and resource alienation on the other should be apparent from the India data which shows that population control programmes have systematically failed because people in destitution make a rational choice to have more children. The focus on population as the cause of environmental destruction is erroneous at two levels. Firstly, it blames the victims. Secondly, by failing to address the economic insecurity and denial of rights to survival that underlie population growth, policy prescriptions avoid the real problem...Giving people rights and access to resources is the only solution to arrest environmental destruction and the simultaneous process of population growth.

Vandana Shiva
(*People's Perspectives* No. 1, August 1993)

The FORUM acknowledges the Hunger Project and its book Ending Hunger (New York: Praeger, 1985) for inspiring the format used here and for several of the quotations.

Empowering Indigenous Peoples to Preserve Their Forests and Cultures

by Paula R. Palmer

Two-thirds of Central America's forests have been cut down in the last 50 years. Most of the remaining forests are inhabited by indigenous peoples who depend on the forest for their livelihoods and cultural identity (Chapin, 1992). Their traditional land use practices, which have preserved biodiversity over centuries, reflect their spiritual understanding of relations between God, nature and human society. To them, the felling of forests means cultural extinction.

Environmentalists often overlook the contribution indigenous peoples can make to forest conservation. Although they both seek to preserve the forests, environmentalists and indigenous peoples are not easy allies, approaching each other with quite different cultural conceptualizations of nature and a 500-year history of domination-subordination and distrust.

Drawing: Juanita Sánchez

Environmentalists worry: Do Indians consciously manage natural resources? Or has their land use been sustainable because of their small populations? Isn't their spiritual rationale for conservation a shaky foundation for resource management? Indigenous people wonder: Can these white people, who look the same as those who build the dams and bulldoze forests, be trusted to let nature be? Will they seek to dominate us as in the past, now through conservation agreements? Will they respect our autonomy and way of life? By collaborating with them, will our culture and authority be strengthened or eroded?

Historically, contact between groups with different knowledge systems and unequal power has resulted in isolation or subordination of less powerful groups. The knowledge system of the dominant group discredits and eventually replaces that of the less powerful. This process typically erodes the self-esteem of the dominated group and leads to irreversible loss of generations of indigenous knowledge (Howes and Chambers, 1980). Yet it is precisely this knowledge which has enabled indigenous peoples to use forest resources sustainably. Leff (1985) concludes that maintaining tribal traditions "is the most efficient political action towards the preservation of [their] natural resources." Many Western scientists now recognize the importance of indigenous knowledge. Half the medicines in the world's drugstores are extracted from plants used first by rainforest peoples (Clay, 1987). But indigenous peoples have been neither enriched nor empowered by discovery of their knowledge. Just as their natural resources have been extracted by outsiders, their knowledge is "mined," processed and packaged elsewhere, for someone else's benefit (Chambers, 1979).

How can environmentalists work with indigenous peoples to achieve environmental goals without threatening the indigenous social structure and belief system? Experience with the Bribri Indians of Costa Rica's KéköLdi reserve illustrates the effectiveness of participatory action research in meeting this challenge.

Background

Except in government-protected zones, environmental destruction proceeds at an alarming pace throughout Costa Rica. To protect some of the country's few remaining lowland moist tropical forests, estuaries and coral reefs, an NGO named ANAI persuaded the Costa Rican government to establish a 9,449-hectare terrestrial and marine wildlife refuge on the Caribbean coast. Though established in 1986, the wildlife refuge was far from secure. The coastal black population, for whom land tenure had long been precarious, saw the refuge as a government move to displace them and restrict their livelihoods. Latino agricultural workers, displaced by growth of the cattle industry in the Pacific area, poured into the Caribbean lowlands looking for land to plant beans and corn. These land-hungry "refugees" saw restrictions on agricultural expansion into "useless" forests as a threat to the only livelihood they knew and an affront to their calling, as Christians and patriotic Costa Ricans, to civilize and cultivate the hinterlands. Faced with strong opposition, ANAI's environmentalists wondered if the Bribri Indians might become allies. Could the KéköLdi Reserve, which partly borders the wildlife refuge, become an unofficial extension of the refuge under Indian management?

To explore this possibility, ANAI obtained funding from Cultural Survival Inc. and hired me to approach the KéköLdi people with a proposal to conduct research about their attitudes toward natural resources, their resource management policies, practices

Drawing: Juanita Sánchez

and problems. I had lived in the region since1974 and published oral histories of the black population. I had also directed a regional oral history project based at the local high school.

At a meeting of the KéköLdi junta (tribal council) in December 1986, I explained ANAI's concerns and asked if the KéköLdi people were concerned about natural resource conservation in the reserve. The question elicited a flood of complaints about non-Indians illegally entering the reserve to hunt, about squatters moving onto Indian lands and clearing forest, and about the negligence of authorities in enforcing reserve boundaries and Indian land rights. Community elders recalled the many animals and birds that had disappeared since their youth. The people were worried about losing the forest and with it their way of life. No one outside the reserve seemed to understand or care about this crisis.

In its next meeting the junta decided that ANAI's proposed study might be useful in getting the attention of authorities to better enforce the borders and laws governing Indian reserves. Four junta members were named to guide, translate, advise and assist me in conducting the research. We would write a report as a basis for further discussion and collaboration with ANAI. The methodology might be called participatory ethnography.

PAR in the KéköLdi Reserve

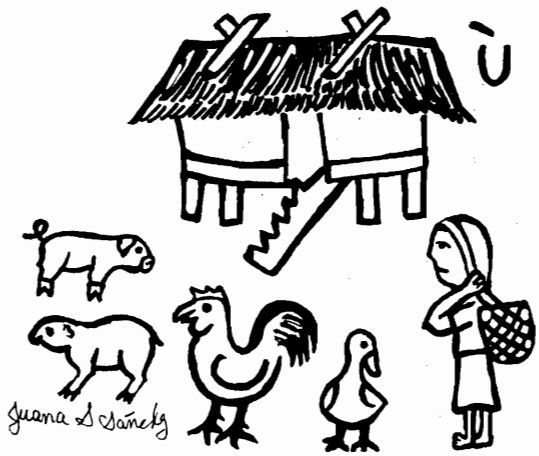
At the first research team meeting in January 1987, I laid out the questions I expected us to investigate. However, my four assistants had other ideas. They wanted me to visit community elders, to learn how the world was created and how Sibö (God) expected people to live in relation to creation. As we listened to and tape-recorded accounts of Bribri cosmology, my "assistants" became my teachers. I began to see nature and the current environmental crisis from their perspective. My role became one of helping them gather the information they needed to protect their natural resources and way of life. Their beliefs and needs drove the process, which had evolved into participatory action research.

Borrowing from a number of writers (Hall, 1993), I define participatory action research (PAR) as a process of research, education and action conducted by a community of relatively powerless people in collaboration with specialized researchers. Its goal is to generate new understandings that guide the community in its struggle for survival, opportunity and empowerment. PAR can take many forms but is distinguished from conventional social science research in four ways:

1) Knowledge is pursued as a means of social change; 2) Community members as well as those with specialized training are researchers. Together, they define, plan and conduct the research, analyze and evaluate data and decide what action is to follow. 3) "Knowledge" can be obtained through both empirical and indigenous ways of knowing. 4) Research process and products are "owned" by the community, not outside researchers.

The KéköLdi people decided that they needed information for three purposes: to educate and persuade the general public to stop environmental destruction; to win allies (including ANAI) in defense of their land, rights and way of life; and to teach their children and future generations pride in the history, knowledge and values of their people. We resolved to publish a book and produce a slide show.

We tape-recorded interviews about a number of subjects: the KéköLdi people's spiritual view of themselves and nature and the status of biodiversity and land use in the reserve (these were distinct categories for me, one and the same for them); the people's knowledge of and dependence on forest plants for medicine, construction, food, crafts, etc; biographies of community elders; history of the reserve and laws governing it; violations of the reserve's laws and borders; threats to the survival of Bribri culture; contemporary political organization within the reserve and the junta's programs and policies for natural resource protection.



Drawing: Juanita Sánchez

Results

Our book, *Cuidando los Regalos de Dios: Testimonios de la Reserva Indígena de KéköLdi*, was published by the University of Costa Rica. Since the book's first publication, there have been several positive outcomes:

The first slide show for the KéköLdi people, ANAI staff and representatives of the wildlife department led to a series of speaking invitations. Significantly, we were invited to speak at a national conference on research in the Atlantic region, as researchers rather than objects of study.

The wildlife department trained five KéköLdi residents as wildlife inspectors. Their official ID cards increased their status among local authorities, whose cooperation in controlling poachers and squatters increased dramatically.

ANAI helped set up a green iguana nursery to repopulate the reserve with this endangered species. The unique nursery has captured the attention of area residents, students and tourists.

***Palmer** continued on page 15*

Children as Agents of Environmental Change

by Anil Chitrakar

If you plan for one year, plant rice
If you plan for ten years, plant trees
If you plan for a hundred years,
educate your children.

A child who writes, "I will plant one tree every day," ten times without any grammatical mistakes is awarded full credit by the education system, but may never plant a single tree. Girls in rural Nepal gather resources such as firewood for their households. As the resources become rarer, the girls spend more time collecting them and have less time for school. This is a major reason that few girls attend school and that most who do attend, drop out after a few years. These are but two examples illustrating the need to link environmental conservation and education.

Creating a Community-Based Environmental Ethic in Nepal

That children are the most vulnerable members of society, the most frequent victims of environmental degradation, and the fact that 80% are enrolled in schools gave rise to Nepal's Environmental Camps for Conservation Awareness (ECCA). ECCA was established in 1987 and currently organizes over 60 camps, hundreds of nature hikes, and numerous meetings, workshops and campaigns to lobby for change in environmental policies and priorities. ECCA's organizing principle is – Why not make children agents for change? Its primary goals are to:

- Foster in children personal responsibility for the condition of their local environment
- Monitor the condition of local natural resources
- Disseminate skills, information and technology relating to the environment
- Take action to improve the state of the environment

Nepal's schools have few facilities to provide hands on education, yet are surrounded by rich natural areas. To foster a sense of responsibility for the environment, ECCA gets children actively involved in nature. ECCA's educational approach encourages learning through discovery and experimentation rather than lectures and texts. The program holds sessions on issues such as pollution and hands on activities such as building toilets, ovens or water filters. Extensive use of demonstrations, environmental games, experiments and audiovisual aids helps to make environmental principles and practices concrete. Through nature hikes and socioeconomic surveys of villages, children's new knowledge is firmly linked to their own localities. These activities help children develop an environmental ethic, which is as important as laws in regulating natural resource use.

Photo: Anil Chitrak

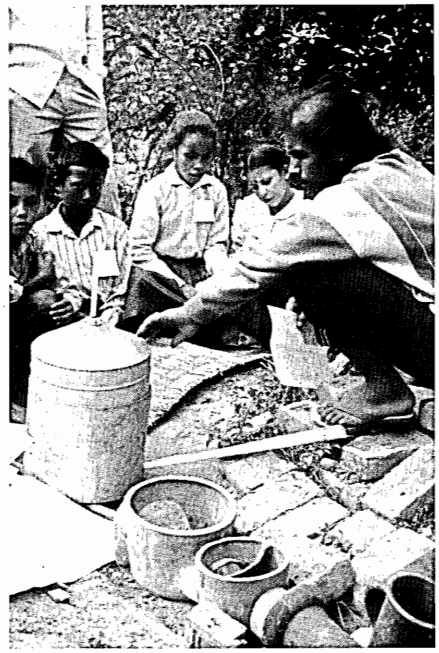


Photo: Anil Chitraker

The ECCA Model

ECCA has three major phases. First is a 3-day counsellor training camp where 20 volunteer university students are trained as camp counsellors for a particular region. During this camp, ECCA experts lead classes on environmental issues and teaching methods.

Phase 2 is a 5-day camp, run by the counsellors, which enrolls 20 children, aged 11-14, from local schools. ECCA has a strict policy that there must be 10 girls and 10 boys and that they must represent the various ethnic groups in their communities. Teachers are also encouraged to attend. Several days prior to beginning a camp in a new village, counsellors visit the village to tailor the program to local environmental needs. Each activity is designed to contribute to ECCA's mission. For example, to encourage children to build fuel efficient "smokeless" stoves, the nature hikes show how limited fuel resources are, and the socioeconomic surveys show how many hours are spent collecting wood and how much the family spends on commercial fuels such as kerosene. Various stove designs are then discussed and one suitable to the locality is selected.

The children then actually build the stove.

In Phase 3 children share what they have learned with the community. This is critical for sustainability because children make linkages between what they have learned and their families, communities and local environments. On the final day of the camps, the entire village is invited for a "parents' day." Children explain what they have learned and built during the camp. Other activities and programs follow, such cleanups of public areas, debates, essay and art competitions on environmental themes, lobbying of local politicians and letter-writing on local environmental concerns to government officials. These ongoing activities are closely monitored by the ECCA secretariat. The 20 graduates are encouraged to continue meeting and to organize their own activities.

ECCA has received grants from agencies including The World Conservation Union (IUCN), the WorldWide Fund for Nature (WWF) and the United Nations Development Program. WWF, which supported ECCA's introduction in Bhutan, provides long term funding. IUCN has provided office facilities. ECCA has also raised funds from sale of T-shirts, coffee mugs and environmental games.

ECCA has been very successful and has now trained over 600 counsellors. Evaluation teams from UNDP and IUCN have recommended expansion to other areas and groups. It is clear that the natural environment is the best classroom for environmental education. Besides providing an excellent hands on opportunity for allowing children to touch, see, and hear what they are learning, outdoor programs are much less expensive to operate in the long run. However, there is an initial investment to train volunteer youths to conduct these programs. It is also clear that young people can be empowered as agents of environmental change. ❖

Anil Chitraker is the founder and coordinator of Environmental Camps for Conservation Awareness. For additional information contact him at ECCA/IUCN, P.O. Box 3923, Kathmandu, Nepal. TEL (NEPAL) 527781 / FAX 521506.

Constraints to Environmental Education Reform

by Graham Vulliamy

Attempts to introduce environmental education in schools are likely to be unsuccessful unless a series of implementation issues are addressed.

Motivation. In most former European colonies, the education system was divided into a European-style academic education for expatriates and a small local elite and a more basic vocational and agricultural education for the rest of the people. High social status came to be identified with a style of academic education, based on syllabi from the colonial capital, that was often irrelevant to the local country context. Later efforts to make schooling relevant to local concerns were seen as attempts to keep the colonized in an inferior position. This has resulted in deep-seated attitudes concerning the role of schooling. Schools tend to be valued extrinsically for their ability to promote mobility out of the subsistence sectors to formal sector jobs, rather than intrinsically for the learning they impart. Any attempt at curriculum reform must recognize that parents and students are likely to reject innovations that do not match their aspirations for social and economic mobility.

Examinations. National examinations are often a more important determinant of the content and processes of teaching than official syllabi. The vast majority of questions asked on examinations test factual recall, rather than comprehension or application skills. This encourages rote teaching of factual information and places a low premium on relevance. Inclusion of new school subjects or practices is unlikely to have much impact if such subjects are not tested on examinations.

Lack of Resources. Many schools lack physical resources, are short of teachers and have organizational problems. In such circumstances, suggestions that teachers should adopt more "progressive" teaching styles are both unrealistic and inappropriate. Unless the incentive structure is altered to reward innovative teaching and learning processes, and unless teachers are provided with adequate facilities to support such activities, promotion of new teaching methods is unlikely to have much impact.

School-Village Transfer. Where school knowledge is explicitly related to students' everyday lives, it may conflict with local or indigenous knowledge and attitudes. Thus, attempts to teach new agricultural techniques, by advising against slash-and-burn techniques of shifting cultivation, for example, are unlikely to succeed unless grounded in a thorough understanding, both technical and cultural, of why local villagers farm the way they do.

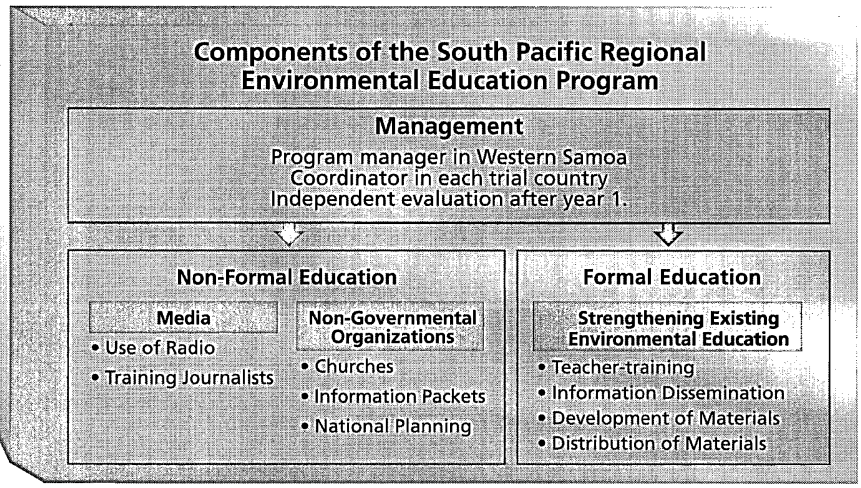
If environmental issues are to be taught, they must be given high status in the eyes of students and teachers. Examinations and teacher training must be changed to support any curricular changes. One approach is to embed environmental concerns into higher status subjects—math, science, language—rather than to create a new subject. An understanding of these constraints should help guard against the simplistic assumption that distribution of instructional materials is sufficient to promote environmental education. A more realistic appraisal of the implementation task is necessary. Once constraints are recognized they are more likely to be overcome.❖

Graham Vulliamy is a professor in the Department of Educational Studies of the University of York, Heslington, York, Y01 5DD, United Kingdom. TEL (UK) 904 433 460 / FAX 904 433 459. *This article is adapted from his article: "Teaching for the Environment in Third World Schools: Some Implementation Constraints," in A.V. Baez, G.W. Knamiller and J.C. Smyth, eds, The Environment and Science and Technology Education. (Oxford, Pergamon, 1987).*

A Regional Approach to Environmental Education in the South Pacific

by Neil Taylor

The South Pacific contains 22 island nations in an area of 29 million square km, though less than 2% is land. Thousands of islands and surrounding coral reefs support a great diversity of life. These unique and fragile ecosystems have come under increasing pressure due to changing consumption patterns, growth of industry and rapid population growth. Serious environmental problems include deforestation and erosion due to logging and slash-and-burn agriculture, overuse of marine resources, land and water pollution, plant and animal extinction, waste disposal and improper pesticide use.



As these nations face similar problems, there is a clear need for regional coordination. The South Pacific Regional Environmental Program (SREP) has recently begun implementation of the first regional environmental education program. The program aims to increase environmental awareness through both formal and non-formal education (see table).

Media Component. Because nearly all South Pacific families own radios, the media component focuses on radio rather than television or print which reach fewer people. Local journalists will be trained to produce radio information spots and full-length features on environmental concerns. Broadcast staff will learn about environmental issues through field trips and lectures and about resources such as the World Radio Environment Network.

NGO Component. NGOs, particularly religious groups, are quite large and influential. Churches offer great potential for environmental education. National meetings of church leaders will plan training workshops for clergy. Information packets will explain the roles local clergy can play in environmental protection. If successful, this approach will be used with women's and youth groups and trade unions.

Strengthening Environmental Education in Schools. All South Pacific nations include environmental education in their official curricula, but implementation is often hampered by lack of teacher training and inadequate resources. To address these problems, teachers will be provided with in-service training and current information on local, regional and global environmental issues. Packages of existing environmental materials will be prepared and distributed to primary and secondary schools. In cases where a specific need exists, new materials may be created.

Teacher training will be provided in three one-week workshops held in the trial countries. Secondary school department heads in relevant subjects and primary school head teachers will study ways to develop positive attitudes toward the environment. Teachers need to encourage students' active participation in learning, for otherwise, children are unlikely to develop a lasting sensitivity for the environment. This is particularly vital in the Pacific, where teaching is didactic and examinations have a strong influence. Workshops in which teachers experience environmental activities first-hand may stimulate curiosity and confidence in teaching by methods other than rote.

Management. The program will be coordinated by a program manager in Western Samoa and a coordinator in each of the three trial countries—Western Samoa, Solomon Islands and Kiribati. SREP's coordination should be facilitated by its links with governments and NGOs. Implementation will take place over two years. After an independent evaluation after Year 1, the program will be expanded to other countries in Year 2. The Australian International Development Assistance Bureau has provided funding of AU$350,000. Further funds may become available after the evaluation.

To increase sustainability after withdrawal of external aid, the program was designed not to be highly technical. Instead, it aims to inform and generate popular enthusiasm for protection of local environments. By working at the grass-roots level and using a variety of delivery channels, the program hopes to change individual behavior which is harmful to the environment. Since beginning in mid-1993, the program has made most progress in Western Samoa. The national church meeting has been held, and arrangements are underway for the media and teachers' workshops. Other countries have chosen country coordinators.

If successful in the South Pacific, this low-cost model of environmental education may be transferrable to other regions with similar problems of scattered communities, communication difficulties and limited funds. ❖

Neil Taylor is a fellow in Science Education, Institute of Education, University of the South Pacific (PO Box 1168, Suva, Fiji). FAX (679) 302 409 / e-mail taylor_n@usp.ac.fj

Children's Magazines for Environmental Education

based on World Conservation Union Materials

In 1985 the government of Mali adopted a national environmental plan which focused on combatting desertification. A key component of this plan has been educating youth in environmental issues. As part of this objective, an environmental education magazine named *Walia* was founded, representing Mali's first environmental awareness program.

Environmental Education Magazines

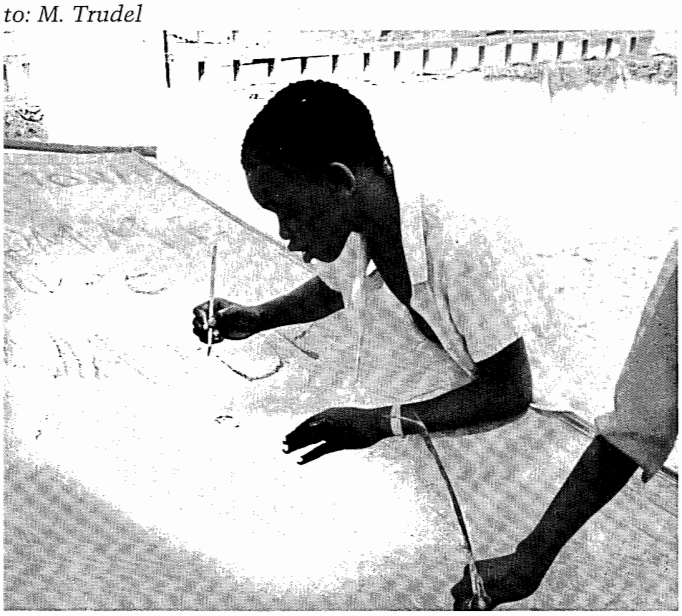
Country	Magazine Name	NGO Sponsor
Indonesia	Asyik	Care
Kenya	Pied Crow	Care
Thailand	Witty Uncle Owl	Care
Burkina Faso	Zooni	IUCN
Senegal	Ekobol	IUCN
Botswana/Zimbabwe	Action	Rockefeller Foundation ODA, SIDA
Bolivia	The Ant	WWF
Jamaica	W.E.C.A.N	WWF
Mali	Walia	IUCN

Walia is the name of a stork which heralds the coming of spring. Targeted at 13-18 year old students, the magazine aims not to replace existing textbooks but to provide teachers with supplementary materials to teach environmental issues. Malian school children frequently have no books, and *Walia* is the only document they can read, re-read and keep. To ensure that children understand the contents and to allow them to share this information with their family and friends, a glossary is provided with names of plants, animals and diseases in the vernacular.

Each issue of *Walia* is devoted to a major topic such as erosion. Articles are short and clear. Use of the familiar French of address, "tu," creates a sense of intimacy while the questions throughout the text keep the students involved. The vocabulary is specific and everyday words rather than technical terms are used whenever possible.

Sources of information include research results of World Conservation Union (IUCN) projects, the national technical services, and the students and teachers who receive the magazine. Students send many drawings and stories to the editorial team. The editorial team visits each school twice a year, allowing those working in fields such as forestry and health to go into more depth on the topics and to answer student questions.

to: M. Trudel



There are three issues of *Walia* per year, one per school term. Five thousand copies are printed and distributed to students and teachers in 25 schools. *Walia* is printed on A4 paper which is then folded to resemble a school exercise book. Color is used only on the outside cover to lower costs. *Walia* is distributed free to schools with one copy per 2 students and one per teacher, a strategy which lowers costs and promotes discussion.

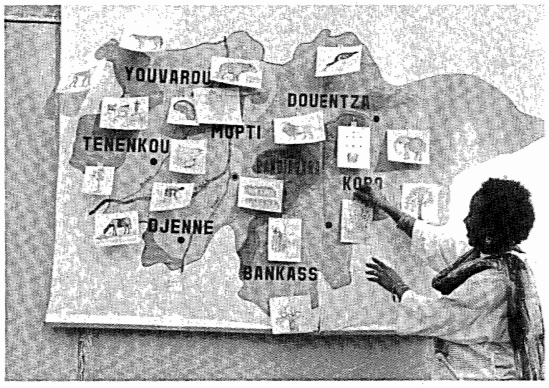


Photo: M. Trudel

Public libraries also receive the magazine.

Since the introduction of *Walia*, students have become much more involved in community environmental activities. One example is a village where students have, with the approval and help of village chiefs and teachers, organized an information campaign on guinea worm. Teams of five pupils explain ways to avoid getting guinea worm by filtering water. Students in other schools have helped combat locusts by teaching villagers how to destroy locust eggs and when to call the plant protection service. *Walia* is used not only in schools, but also in training sessions for forestry officials. Due to the positive impact of environmental education magazines, IUCN and other NGOs have established environmental education magazines in other countries [see box]. Though *Walia* is not financially self-sufficient at this time, a subscription drive has been launched to raise funds. Embassies, private schools and technical services subscribe. ❖

This article is based on "Environmental Education and Communication: A Sahelian Approach," by Monique Trudel, in OECD, Environmental Education: An Approach to Sustainable Development (Paris: 1992) and Walia: The Approach, Practical Guidelines, produced by IUCN's Sahel program. Monique Trudel is Regional Advisor for Education and Communication of IUCN West Africa, BP 3215, Dakar, Senegal. TEL (SENEGAL--221) 32 85 21 / FAX 32 92 46

Actors and Approaches in Environmental Education

by Jacoline Vinke

The process of environmental education involves a number of different actors and audiences. Actors include teachers, government officials, non-governmental organizations (NGOs) and journalists. Audiences include students, farmers and the public. Most groups serve as both audience and actor.

Government agencies and officials. Government bodies and civil servants serve both as actors and as audiences in environmental education. As actors, ministries of education oversee development of national school curricula. Government authorities have the resources to organize environmental campaigns and annual events such as Earth Day. Policymakers and government bodies serve as audiences to journalists, who raise awareness about environmental problems.

Photo: Suzana Padua

Formal Education System. The school system is an important avenue for teaching children about the environment. Because primary school is the highest level of attainment for the majority of children in many developing countries, environmental issues should be introduced early. Environmental education can be infused into existing subjects or taught as a separate discipline. In principle, teaching environmental subjects separately should allow for in-depth teaching. In practice, however, existing curricula leave little room for new subjects, and teachers are given insufficient training. Environmental topics can also be taught with publications such as magazines and through outdoor activities.

Proper preparation of teachers is a prerequisite for successful school-based environmental education. In many countries, pre-service teacher training is rather rigid and limited to the conventional subject areas. Changes in teacher training usually lag behind changes in curricula. In-service teacher training can be as important as pre-service training when teachers have little training in environmental issues. Another barrier to successful implementation is poor teacher motivation due to lack of familiarity with the subject matter, shortage of suitable teaching materials and lack of preparation time.

NGOs. Recent years have seen a significant increase in environmental education activities by developing country NGOs, including ecological associations, religious groups, women's organizations and youth clubs. NGOs vary widely in size, scope, focus and resources. Some focus their activities on a particular target group, while others try to reach wider audiences. Many play an advocacy role. An Ecuadorian NGO, Fundacion Natura, for example, prepared an environmental profile of the country and launched a project aimed at educating the country's decisionmakers. Prominent journalists prepared an audio-visual show on environmental issues, which was used to influence policy.

NGOs' educational activities sometimes lack structure and coherence, due to lack of financial and organizational resources. Sustainability is often a problem. Another issue is lack of coordination. Many NGOs are unaware of the existence of others and operate in isolation. This leads to inefficiencies and overlapping. In some countries umbrella organizations have formed to enhance networking, cooperation and exchange of information. Umbrella organizations can coordinate NGO activities and provide information, training, technical and material assistance. In Indonesia, for example, the Environmental Forum is a coordinating body for more than 300 environmental NGOs.

Journalists. Journalists have enormous potential to disseminate environmental information and influence public opinion. The quality of environmental reporting varies. In many cases environmental reporting is limited to disasters such as oil spills. Less dramatic processes of environmental degradation such as erosion receive less attention. Government control of the media may contribute to a lack of environmental reporting. The media have a unique capacity to provide a continuous flow of information to many different audiences and thus to sustain a growing awareness of the environment. Radio is a powerful tool and does not require literacy to involve, motivate and teach people about the environment. Newspapers and magazines can provide in-depth coverage of issues to specific (and often better-educated) audiences.

Communities and professionals. A variety of other groups affect the environment through their daily activities —decisionmakers in business and industry, city planners, landowners, farmers, fisherman and rural and urban communities in general.

Some NGOs have sought to influence business—informing business leaders of environmental legislation and of the economic benefits of such activities as energy efficient

Continued on next page

Continued from previous page

production and cost-effective recycling programs. Professional training workshops can teach specific environmental management practices and are effective at influencing precisely-defined audiences who serve as "multipliers" or policymakers.

One relatively overlooked group is the urban poor, whose numbers are growing rapidly. Urban areas face major urban environmental problems including sanitation, air pollution and water contamination. While the underlying economic causes of these problems cannot be resolved through environmental education, environmental and health education can improve urban living conditions.

Cooperation among actors. The extent of cooperation among actors often determines the impact of environmental education initiatives. Potential for cooperation is often poorly realized. Different groups can exchange ideas and experiences and share resources, one group complementing the work of another by covering different issues or using different approaches. NGOs, for example, can work with the formal education system to incorporate environmental education into school curricula, teacher training and materials. NGOs can provide complementary inputs such as mobile education units and field trips. NGOs can work with journalists by bringing issues to their attention and providing information and training. Journalists can publicize issues raised by NGOs among decisionmakers and the public. India's Center for Environment Education, for example, regularly supplies environmental information to 1000 newspapers and periodicals. Academic institutions also offer rich potential for cooperation with the media. Universities have a wealth of information on the environment, but usually do little to reach non-academic audiences. Universities could provide journalists access to their resources for transmission to the public. ❖

Jacoline Vinke is an administrator in the Energy and Environment Division, International Energy Agency, OECD. She can be reached at IEA, 2 rue Andre-Pascal, 75775 Paris Cedex 16, France. TEL (FRANCE) 14 524 1861 / FAX 14 524 9004

***Palmer** continued from page 8*

The KéköLdi people use it to educate people about their environmental concerns. ANAI and the Center for Research and Education for Tropical Agriculture (CATIE) initiated a project in the KéköLdi Reserve to cultivate rare plants that are traditionally used in construction and crafts and have market potential. A KéköLdi shaman showed botanists that most medicinal plants grow only in the forest canopy, thus strengthening arguments for conservation.

An NGO specializing in environmental law helped the KéköLdi people conduct a land use and land tenure survey, a necessary step in consolidating the reserve. ANAI and the KéköLdi Junta are collaborating in purchasing land for a biological corridor to include the wildlife refuge and parts of the KéköLdi reserve.

The research team started a cultural school to teach indigenous knowledge to KéköLdi children. Children are learning to write and illustrate their own books in Bribri and Spanish. The research team wrote several successful grant proposals and used the funds to support their environmental and cultural work. The book has been published in English (*Taking Care of Sibo's Gifts*) and Dutch as well as an expanded Spanish edition (*Vias de Extinción-Vias de Supervivencia*). Income from book sales finances reforestation projects and the cultural school.

Conclusions

In 1994 not all is well in the KéköLdi Reserve. External forces (the expanding banana industry, political corruption, rapid tourism development, etc) and internal conflicts constrain the success of programs emerging from the participatory action research of 1987. Yet the approach was successful in building an alliance between environmental organizations and a tribal community, while strengthening indigenous cultural identity and autonomy. Environmentalists and indigenous people benefitted from the research, which used, expanded and legitimated both scientific and indigenous knowledge.

The challenge of preserving critical natural resources is bringing environmentalists and indigenous peoples face to face in many parts of the world. Whether these encounters produce cooperation or conflict, cultural enrichment or ethnocide, depends on the ways in which the encounters are structured. This experience suggests that participatory action research provides a framework for achieving both environmental and social goals. For environmentalists and indigenous peoples to become effective allies, three conditions must be met:
1) Indigenous knowledge must be valued equally with western scientific knowledge to ensure its survival.
2) Indigenous cultural identity must be strengthened rather than eroded.
3) Collaboration must empower rather than exploit indigenous peoples. Environmental goals can only be achieved when there is political and social justice for indigenous people. ❖

English and Spanish editions of the KéköLdi people's book can be ordered from Paula Palmer at 2335 Forest Ave., Boulder, CO 80304, USA. TEL (USA) 303/444-0504 at $12/copy, shipping included. Income from book sales supports KéköLdi environmental and cultural education projects.

References

Chambers, Robert, 1979. "Editorial." IDS Bulletin 10(2).

Chapin, Mac, 1992. "Assault on the Caribbean Coast," Action for Cultural Survival.

Clay, Jason, 1987. Indigenous Peoples and Tropical Forests: Models of Land Use and Management from Latin America. Cambridge, MA: Cultural Survival, Inc.

Hall, Budd, 1993. "Introduction," in P. Park, M. Brydon-Miller, B. Hall and T. Jackson, eds., Voices of Change: Participatory Research in the United States and Canada. Westport, CT: Bergin & Garvey.

Howes, Michael and Robert Chambers, 1980. "Indigenous Technical Knowledge: Analysis, Implications and Issues," in D.W. Brokensha, D.M. Warren, O. Werner, eds., Indigenous Knowledge Systems and Development. Lanham, MD: University Press of America.

Leff, Enrique, 1985, "Ethnobotanics and Anthropology as Tools for a Cultural Conservation Strategy," in J. McNeely and D. Pitt, eds., Culture and Conservation: The Human Dimension in Environmental Planning. London: Croom Helm.

Think Earth

by Fred Niedermeyer

In most schools environmental education is not part of the regular curriculum of core subjects such as math, reading or science. Few teachers teach about the environment thoroughly and regularly. Yet, if a new generation is to protect and sustain the environment, students need to be provided with relevant, implementable, on-going and sustainable programs of environmental instruction.

Think Earth, was developed in California, USA by a consortium of educational agencies, environmental organizations, educators and curriculum development specialists. The curriculum of *Think Earth* emphasizes environmental concepts, skills and behaviors as students learn about conservation of natural resources, waste reduction and pollution control. The program consists of a sequence of 7 instructional units for kindergarten through 6th grade. Each unit requires 1-2 weeks of instructional time, but can be extended through optional follow-up enrichment activities. The units are supported by materials which include a teacher's guide, posters, an animated video, practice exercises, tests and home activity sheets.

Think Earth is designed to promote an environmental ethic in which students learn to balance human and environmental needs. This involves more than teaching students about the environment. Students must change their behavior toward the environment. While children need to know about global warming and endangered speces, they also need to learn how to alleviate these problems by not littering, planting trees and developing other environmental appropriate behaviors. ❖

Fred Niedermeyer is founder and president of Educational Development Specialists (EDS), which develops instructional programs on topics as nutrition, energy, water conservation, solid waste and the environment. Further information can be obtained from EDS at 5505 East Carson Street, Suite 250, Lakewood, CA 90713, USA. TEL (USA) 310/420-6814 / FAX 310/420-1485

A Framework for Designing Environmental Education Programs

Unit Focus	Skills	Concepts	Behaviors
Kindergarten (Conservation)	• Identify products made from trees. • Identify paper saving and litter avoiding behaviors.	• Natural environment includes sun, air, land, water, plants, animals. • Trees provide many uses and benefits, including paper products. • Littering harms the environment. • Use only the paper products really needed.	• Make sure that all trash ends up in trash containers. • Use only as much water as needed.
Second Grade (Waste Reduction)	• Identify recyclable products. • Identify waste reduction behaviors.	• Natural resources are used to make many products. • When trash is buried in landfills, the natural resources are lost and cannot be used again. • Recycling bottles, cans, newspapers and plastic conserves natural resources, saves energy and land, and reduces pollution.	• Save glass, cans, newspapers and plastic bottles for recycling. • Keep reusable things or give them away rather than put them in the trash. • Try not to use disposable products, when possible.
Fourth Grade (Waste reduction)	• Identify methods and problems associated with waste disposal. • Identify hazardous products. • Identify waste reduction behaviors. • Distinguish easily recyclable products.	• Producing and using products creates solid, liquid and airborne wastes. • Wastes are increasing because of increasing population and per capita use. • Making so much wastewater and trash and improper disposal causes pollution and other environmental problems. • Waste needs to be reduced, materials need to be recycled and reused not thrown away.	• Reduce, reuse, and recycle. • Buy products minimally packaged and made from recycled or recyclable materials. • Avoid hazardous products when possible; dispose of hazardous waste carefully. • Keep the environment clean and litter free.
Sixth Grade (Conservation)	• Identify benefits of natural, undeveloped environment. • Identify causes for the overuse of natural resources. • Identify problems of overusing natural resources. • Identify ways to conserve natural resources. • Complete cost-benefit analyses of conservation practices.	• The natural environment provides many benefits, eg, habitat, water storage, fresh air, climate control. • Humans develop the natural environment to meet many needs. • Using natural resources unwisely can result in problems - loss of habitat and biodiversity, food and water shortages. • Natural resources should be conserved, used sustainably.	• Conserve natural gas, gasoline, water, plastic, paper, electricity and other resources. • Buy and use products that conserve natural resources. • Participate in projects and groups that help the environment. • Help preserve and protect wildlife and the natural environment.

ADDITIONAL RESOURCES

In addition to the sources listed at the end of each article, readers may be interested in the following:

IUCN , The World Conservation Union

Rue Mauverney 28
1196 Gland, Switzerland
TEL (Switzerland) 41-22-9990001
FAX 41-22-9990002

Union of sovereign states, government agencies and non-governmental organizations concerned with initating and promoting scientifically-based action to establish links between development and the environment.

UNESCO-UNEP International Environmental Education Program (IIEP)

Bureau for the Coordination of Environmental Programmes
UNESCO

7, place de Fontenoy
74700 Paris FRANCE
TEL (FRANCE) 1/45 68 1000
FAX 1/45 66 9096
or
United Nations Environment Programme
P.O. Box 30552
Nairobi, KENYA

Publishes "Environment and Development Briefs;" provides information on environmental education, modules and curricular prototypes for primary and secondary school environmental education.

The EnviroLink Network

4551 Forbes Ave 3F
Pittsburgh, PA 15213, USA
TEL (USA) 412/681-8300
FAX (USA) 412/681-6707
e-mail admin@envirolink.org

Free online environmental information service reaching 450,000 people in 95 countries. Services include environmental archives, mail, Usenet, bulletin board messaging, real-time chat conferences, IRC, FTP, Gopher, WATS.

Forestry Association of Botswana (FAB)

Lekgota La Temo Ditlhare
P.O. Box 2088
Gaborone, Botswana
TEL (BOTSWANA) 31 314259
FAX 31 374557

Visits community schools, establishes school tree nurseries; manages information center and newsletter; list of publications, reports and papers are available.

Photo: Kurt Moses

Training and Information Programme on the Environment

Institut du Sahel
BP 1530 Bamako
MALI

Resources for continuing teacher training; methodological and practical guide for Sahelian environmental education teacher training; directory of training aids; large selection of field-tested pedagogical tools for environmental education.

Who's Who in Environmental Education: A Directory of Organizations and Agencies

The Pembina Institute
P.O. Box 7558
Drayton Valley, Alberta
CANADA TOE OMO
TEL (CANADA) (403) 542-6272
FAX 542-6464

Directory of organizations involved in environmental education in Canada and abroad.

WorldWIDE Network

1331 H St NW
Washington DC 20005 USA
TEL (202) 347-1514
FAX (202) 347-1524

Network of women interested in environment and education issues; produces newsletter.

CLOSING THOUGHTS

Knowledge is humanity's one infinitely expandable resource.

— *Alternative Treaty-Making: A Process of Support of Sustainable Societies and Global Responsibility*

Carrying capacity is always put into relation with the number of people, and never with the number of cars. And who should be thrown out when the lifeboat is full? People or cars?

— Helen Zweifel
People's Perspectives 1 (1993)

In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught.

— Baba Dioum
Senegalese conservationist
quoted in *Environmental Science & Technology 26:6*

Man is the only animal that blushes. Or needs to.

— Mark Twain

It took Great Britain half the resources of the planet to achieve this prosperity; how many planets will a country like India require?

— Mahatma Gandhi

Only Environmental Education messages which are compatible with the economic conditions under which their audience lives can be expected to be effective.

— Hartmut Schneider
Environmental Education: An Approach to Sustainable Development (OECD)

Human history becomes more and more a race between education and catastrophe.

— H.G. Wells
The Outline of History

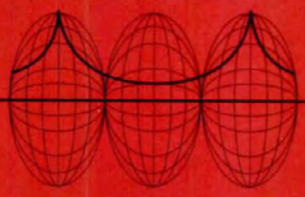
We must look at the world as a total system of interacting parts. There is no such thing as 'an environment' if we mean by this a surrounding system that is independent of what goes on inside it.

— Kenneth Boulding

Please send manuscripts, artwork and calendar submissions to:

The Forum
HIID, One Eliot Street
Cambridge, MA 02138 USA
Tel: 617-495-9478
Fax: 617-495-0527

The Forum is printed on recycled paper.



THE FORUM
For Advancing Basic Education and Literacy

The Harvard Institute for International Development
One Eliot Street
Cambridge, MA 02138 USA

Tel: 617-495-9478
Fax: 617-495-0527
Telex: 275276
Cable Address: HIID
TWX No: 7103200315

The Forum is published as part of the Advancing Basic Education and Literacy Project under contract to:

Academy for Educational Development
1875 Connecticut Ave., N.W.
Washington, D.C. 20009 U.S.A.