

## EDUCATION FOR SUSTAINABLE DEVELOPMENT

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### Summary

Education for sustainable development comprises formal and non-formal teaching and learning that enables humans to live in harmony with other human communities, other species, and the larger environment. Such education is perhaps the most important factor in bringing about the shifts in thought and action essential to achieving sustainability, at individual and community levels and within policies and practices spanning the local to the global. Given current ecological and social contexts—including population growth, depletion of the resource base, contamination, loss of biodiversity, climate change, the speed of globalization, and persistent gender inequalities in education and control over resources—education for sustainable development is more critical than it has ever been.

Education for sustainable development seeks to bring about changes in values, behavior, and lifestyles needed to achieve sustainability; encourage creation or strengthening of sustainable production and consumption patterns and improvements in the management of natural resources; and ensure that people are informed and prepared to support changes in a range of sectors to advance sustainability.

Programs and policies of education for sustainable development take as their model existing life-support systems and seek to redefine, in the context of sustainability, the meaning and implications of terms like growth, development, progress, and consumption. Important underpinnings for education for sustainability are programs of environmental education developed over the last quarter of the twentieth century. Values, including ethics, form the fulcrum of education for sustainable development; the ultimate test of such education is the action it inspires.

## **1. What Is Education for Sustainable Development?**

Education for sustainable development is formal and non-formal instruction and learning that instills in people the desire to live in harmony with other human communities, other species, and the environment within which all species, human and non-human, live. Such education seeks to integrate the concept and consciousness of sustainability into all aspects of life, including production, consumption, reproduction, and the creation and maintenance of livelihoods. Education for sustainable development embraces the concept of lifelong learning, and works to instill knowledge, to create care, and, most critically, to catalyze action. This education, comprising knowledge, skills, wisdom, ethics, responsibilities, creativity, analytic abilities, and critical thinking capacity, is at the heart of human values and goals and the means to pursue them.

Education for sustainable development is perhaps the most critical component for bringing about the shifts in thought and action that are essential for sustainability—at individual, family, and community levels and within the policies and practices of governments, international organizations, and the global private sector. Indeed, there is a growing international consensus on the need for concerted programs of education for sustainability. As the Secretary-General's report prepared by the United Nations Educational, Scientific and Cultural Organization (UNESCO) for the sixth session of the United Nations (U.N.) Commission on Sustainable Development (April 20–May 1, 1998) put it:

[E]ducation is the most effective means that society possesses for confronting the challenges of the future and for shaping the world of tomorrow . . . Education is also the means for disseminating skills, for bringing about desired changes in behaviors, values and lifestyles, and for promoting public support for the continuing and fundamental changes that will be required if humanity is to alter its course, leaving the familiar path that is leading towards growing difficulties and possible catastrophe, and starting the uphill climb towards sustainability. Education, in short, is humanity's best hope and most effective means in the quest to achieve sustainable development.

Sustainable development presents two different sets of challenges, one for those living in industrialized (“developed”) countries and another for those living in developing countries. In the industrialized nations, the challenge of sustainability is to stabilize and ultimately reduce current high consumption, waste, and contamination levels that have adverse and long-term environmental impacts. In developing nations, the challenge is to meet current human needs for food, shelter, health care, education, and employment, as well as achieve a higher quality of life, without depleting resources and ecosystems to such a degree that they no longer function. In all nations, “development”—as change, enhancement, and forward motion—is continual; all are “developing” nations, and the challenge of sustainability is a continuous and increasingly conscious reality. As economist and Nobel laureate Amartya Sen writes in *Development as Freedom: Human Capability and Global Need* (1999):

We live in a world of unprecedented opulence of a kind that would have been hard even to imagine a century or two ago . . . And yet we also live in a world with remarkable deprivation, destitution and oppression. There are many new problems as well as old ones, including persistence of poverty and unfulfilled elementary needs, occurrence of famines and widespread hunger, violation of elementary political freedoms as well as of basic liberties, extensive neglect of the interests and agency of women and worsening threats to our environment and to the sustainability of our economic and social lives. Many of these deprivations can be observed, in one form or another, in rich countries as well as poor ones . . . Overcoming these problems is a central part of the exercise of development. [And] individual agency is, ultimately, central to addressing these deprivations.

### **1.1. Embracing All, Redefining the Terms**

Education for sustainable development requires seeing all individuals as having agency—the ability to act—and therefore, as essential participants in the process of achieving sustainability. It also requires seeing all individuals as having the capacity to learn, to understand, to assess, and to take action in their individual lives and in the broader world. Given the challenges of sustainability, and the speed with which change is both taking place and needed, the definition of the community of educators for sustainable development must be expanded to include “all those, whatever their role in society, who perceive a need or a duty to inform and educate people regarding the requirements of a sustainable future.” Such an inclusive definition expands and firmly democratizes the cadre of educators and represents the best means of enabling all people to have the means and determination to address the earth's current problems.

Education for sustainable development also requires that terms in common use throughout the world at all levels of society, like “progress,” “growth,” “development,” “quality of life,” “value,” and even “knowledge,” be reexamined and redefined within the context of sustainability. Economist Herman Daly has said: “We have to distinguish between growth and development. We have to shift from pursuing growth, which is quantitative, to pursuing development, which is qualitative.”

Within this revisioning of concepts, “a sense of the earth and its meaning is particularly urgent right now,” writes historian and theologian Thomas Berry in *The Dream of the Earth*, “for the different sciences have developed an immense volume of information about the natural world in its physical aspects, and a corresponding power to control it. Yet earth is still seen as so much quantified matter.”

We can turn the most luxuriant forests into throwaway paper products . . . we can pollute the air with acids, the rivers with sewage, the seas with oil . . . we can invent computers capable of processing 10 million calculations per second. And why? To increase the volume and speed with which we move natural resources through the consumer economy to the junk pile or the waste heap.

## **1.2. Expanding Venues for Learning**

The challenge of achieving sustainability means that education for sustainable development cannot be confined to classrooms alone. Instead, learning about sustainability must be integrated into all human activities and structures: *inter alia* families and communities, workplaces, trades unions and associations, nongovernmental organizations (NGOs), health centers, youth groups, community-based organizations, the media, government services, local, regional, and national governing bodies, businesses (both at the retail and producer level), parents’ associations, and in the full gamut of educational institutions, from a primary school class in a small village to the most eminent institutes of higher learning.

Indeed, the community of educators could include teachers, administrators, environmental, health, and planning officers, NGO staff, youth leaders, parents’ association members, parents, grandparents, elected community officials and traditional leaders, the media, international organizations, government departments and institutions, foundations, and private businesses.

Such a community of educators and of education could have a profound effect on the speed and strength of the transition to sustainable communities, economies, lifestyles, livelihoods, and cultures: “This vast community of educators represents an enormously potent, but largely untapped human resource for sustainable development,” states the Secretary-General’s report prepared by UNESCO for the sixth session of the U.N. Commission on Sustainable Development:

It represents . . . a means for bringing the struggle for sustainable development into communities and local institutions around the world, which, in the final analysis, is where the cause of sustainable development will either triumph or fail.

### 1.3. Natural Processes As Model

Nature and life-support systems themselves can serve as a mentor and guide in the process of educating for sustainability. In natural systems the building blocks of sustainability can be seen and their efficiency and elegance learned from and valued accordingly. “Reconnecting with the web of life means building and nurturing sustainable communities in which we can satisfy our needs and aspirations without diminishing the chances of future generations,” writes physicist and educator Fritjof Capra in *The Web of Life: A New Scientific Understanding of Living Systems*: “we can learn valuable lessons from the study of ecosystems, which *are* sustainable communities of plants, animals and microorganisms.”

Still, the ways in which such systems work continue to be insufficiently understood, even as life-support systems and natural cycles are altered and disrupted by human activities and technologies. Further, it has been demonstrated that many such systems have no substitutes at any price. For example, researchers and designers spent US\$200 million to build and equip the fully enclosed Biosphere 2 in the desert of Arizona in the U.S. to mimic the earth’s life-support systems. But they were unable to maintain sufficient levels of oxygen for just the eight people inside. “Biosphere 1, a.k.a. Planet Earth, performs this task daily at no charge for six billion people,” write Paul Hawken and Amory and Hunter Lovins in *Natural Capitalism: Creating the Next Industrial Revolution*.

Also central to the process of education for sustainable development are *human* systems of learning, accepting, caring, and acting: “just as technology cannot replace the planet’s life-support systems, so, too, are machines unable to provide a substitute for human intelligence, knowledge, wisdom, organizational abilities and culture.” It is also only the human mind that can bring an ethical framework to actions. Seeding an ethic of *biocentrism*, which sees humans, other species, and natural resources as parts of a planetary life system, with each life form relying on and worthy of the respect of others, is a central goal of education for sustainable development. “Education is . . . essential in enabling people to use their ethical values to make informed and ethical choices,” states UNESCO’s report for the sixth session of the U.N. Commission on Sustainable Development:

Over time, education also powerfully affects cultures and societies, increasing their concern over unsustainable practices and their capacities to confront and master change. Indeed, the potential of education is enormous. Not only can it inform people, it can change them. It is not only a means for personal enlightenment, but also a means for cultural renewal . . . education increases the capacity of people to transform their visions of society into operational realities. It is for this reason that education is the primary agent of transformation towards sustainable development.

The human mind has brought about miraculous improvements in the human condition—medicines that save the lives of children; vaccines that prevent or eradicate disease; and technologies that replace injured or weakened body parts. Given the abilities of the human mind to learn and to apply knowledge, the shift to sustainability is possible; strategies for reducing the use of toxic materials and fossil fuels and minimizing waste are already a reality. There is growing interest in examination and replication of the

elegant natural biological and chemical systems that produce, for example, spiders' silk as strong as Kevlar and an abalone's inner shell tougher than the best ceramics—non-toxic, naturally occurring compounds made at low temperatures and under low pressures.

The challenges of education for sustainable development are to promote and harness human creativity to recognize the consequences of choices; and to engender the recognition among all people that human beings are not apart from the natural world, but are part of the myriad ecological systems that support life on the planet. As Donella Meadows, Dennis Meadows, and Jorgen Randers write in *Beyond the Limits*:

The sustainability revolution, if it happens, will be organic and evolutionary. It will arise from the visions, insights, experiences, and actions of billions of people. It will require every human quality and skill, from technical ingenuity, economic entrepreneurship, and political leadership to honesty, compassion, and love.

## **2. The Ecological and Social Context**

A brief overview of current ecological and social conditions provides a frame within which education for sustainability is carried out, and where prospects for its future can be discerned. The primary contextualizing factor is that many researchers and thinkers believe that human societies throughout the world are already in “overshoot.” This means they are drawing on the earth's resources faster than these resources can be restored or regenerated, and releasing wastes and pollutants at a rate faster than the earth can absorb them or eliminate their potential harm to humans and other species. Hawken et al. write:

There is no longer any serious scientific dispute that the decline in every living system in the world is reaching such levels that an increasing number of them are starting to lose, often at a pace accelerated by the interactions of their decline, their assured ability to sustain the continuity of the life process. We have reached an extraordinary threshold.

The known facts of the global ecological crisis support the need for far-reaching, broad-based, comprehensive and continuous programs and policies in support of education for sustainable development. Some of the critical factors about which broad public awareness is required—the likely determinants of when and whether the shift to sustainability is achieved—are discussed below.

### **2.1. Population**

In October 1999, world population reached six billion. It is increasing by 80 million people each year. Although birth rates are falling from historic highs, rapid population growth is still a reality, with some of the highest growth rates in the poorest and most ecologically fragile regions of the world. The U.N. Population Division projects that by 2050 human population will grow to between 7.7 billion and 11.1 billion. Rapid population growth challenges a country's ability to ensure sustainable economic growth and employment, to protect the environment, and to provide health, basic education, and

clean water. Even today, 1.2 billion people do not get enough to eat and 1.5 billion do not have access to clean water.

Population is inextricably linked to consumption and production patterns. High consumption in developed countries puts intense strains on the global environment: each child born in developed countries will add between 30 and 50 times as much to consumption and pollution over their lifetime as children born in developing countries. But with the globalization of Western consumer culture under way, the impact of population growth in developing countries is taking on a new magnitude.

## **2.2. Destruction of the Resource Base and Toxic Contamination**

Natural resources continue to be destroyed at a rapid rate: each year, at least 14 million hectares of forests are lost. In addition, natural stocks of minerals, oil, and gas are being depleted, with significant environmental threats posed by their continued extraction (including air and water pollution, habitat loss, and acid rain). In just the twentieth century, the world lost one-quarter of its topsoil and one-third of its forest cover. Acid rain, created primarily by the burning of fossil fuels, can travel for hundreds of miles spreading contamination to often unpolluted forests and farmland; there, chemicals leach into the soil and, over time, deplete stocks of calcium and magnesium—both essential plant nutrients. This nutrient decline can cripple plant growth, threatening food production. Still, the use of fossil fuels continues at rapid rates; petroleum-derived fuels power more than 600 million vehicles worldwide, and it is estimated that between 2000 and 2020 as much oil will be used by human societies as has been used during the whole industrial era.

Toxic chemicals also continue to be widely used in consumer products and production processes. Some of these, like mercury, brominated flame retardants, dioxin, and PCB (polychlorinated biphenyl), are defined as persistent bioaccumulative toxins (PBTs), which do not leave the environment, but rather accumulate in food, water, natural systems, and human and animal tissues; they can also travel long distances. Since 1950, products made with and containing more than 85 000 newly created synthetic chemicals have proliferated across the global economy. In the U.S. alone, more than 200 000 industrial plants making or using these chemicals have come into operation, and more than 7.463 billion kg of such chemicals are flowing into commercial products and waste streams every single day.

Production of synthetic organic chemicals continues to rise. It tripled between 1966 and 1994. Synthetic organic chemicals have made possible a remarkable world of new plastics, adhesives, paints, pharmaceuticals, and consumer products—from nylon stockings and nail polish to home cleaners. However, they have also created profound new risks to the environment and human health. More than 80% of these chemicals have yet to be fully characterized. As carbon-based compounds, they resemble molecules naturally found in all living organisms. But, as synthetic creations, living organisms have not learned to metabolize them. As such, when ingested or inhaled, the chemicals may give signals to cells to divide, die, or mutate, or have other unforeseen impacts.

Since 1950, general concern about potentially negative impacts of synthetic chemicals

has been heightened by many unexpected findings about particular substances. Among them are the long-term toxicity of DDT; the identification of carcinogens, teratogens, and mutagens; and the ozone-depleting properties of chlorofluorocarbons (CFCs), initially thought to be safe, low in toxicity, stable, odorless and, as a result, excellent for use as coolants and propellants.

In addition, a host of new concerns are emerging, focusing on the impact that exposure to toxic chemicals may have on children, whose developing systems are especially vulnerable. These include the very limited understanding of the effects of tens of thousands of chemicals on health and on the environment; the unsettling emergence of data on vast, unexpected, and negative effects of many categories of chemicals, including CFCs, dioxins, and other chlorinated organic chemicals and, most recently, endocrine-disrupting chemicals, the impacts of which may come closest to home, potentially affecting every family's future; and persistent economic and societal demands for the benefits that some highly toxic chemicals have provided to human societies.

### **2.3. Loss of Species and Biodiversity**

Ten thousand more humans arrive on the planet each hour, and as human numbers and activities increase, other life forms are killed, crowded out, and their habitats destroyed. Of the earth's approximately 4000 mammalian species, 1100 are currently threatened with extinction; of the 232 species of primates, nearly half are at risk of disappearing, as are about one-third of all fish species. The overwhelming majority of species lost are forest-dwelling animals and tropical insects whose habitat has been destroyed. In Indonesia alone, defined as a high biodiversity country, two million hectares of forest were lost in 1997 and 1998. In Brazil's Amazon rainforest, the amount of land cleared in 1997 and 1998 exceeded the total area of Taiwan by 1.5 times.

Aquatic habitats are also being lost, specifically coral reefs. As species and habitats are destroyed, the natural functioning of ecosystems is degraded, with potentially negative impacts for the health of humans and other species. Specifically, loss of biodiversity harms the ecosystem services vital to human livelihoods—formation of soils, growth of food, fuels and products, and water and gas cycling and purification. Large numbers of plant species are becoming extinct before their contribution to ecosystem functioning is known, or their potential benefits to human health recognized, for example, in the form of new medicines. Loss of biodiversity is also irreversible—and humans have not yet been able to replicate fully the functioning of natural systems.

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### **Biographical Sketches**

**Joanna D. Underwood** is founder and president of the national environmental research organization INFORM, Inc. Ms. Underwood founded INFORM in 1974 to identify practical solutions to some of the United States' most complex environmental problems. Since its creation, INFORM has become a prime force in educating decision makers from all sectors about the need for an entirely new attack on our environmental problems, one using preventive approaches. In 1987 and 1992, INFORM received awards from the U.S. Environmental Protection Agency (Region II) and from the U.S. EPA Administrator for environmental leadership, particularly in pollution prevention.

Ms. Underwood's environmental initiatives began as co-director of the Council on Economic Priorities from 1970 to 1973, where she co-authored a major study of air and water pollution in the pulp and paper industry, *Paper Profits*. Published by M.I.T. Press, this was the first report to publicly compare efforts by companies to control air and water pollution.

Under her guidance, INFORM's researchers have used a similar approach; they seek to document the impact of business practices on the environment and identify constructive options for change through field examinations of corporations and government entities alike. Landmark INFORM research has highlighted options for renewable energy sources, cleaner transportation fuels, industrial pollution prevention, better management and prevention of U.S. municipal solid wastes, and more sustainable

agricultural. Many environmental groups across the country rely on INFORM's research to focus their campaigns. INFORM's expertise has stimulated initiatives by U.S. industry to reduce toxic and solid wastes, and empowered grassroots groups to evaluate and negotiate more effectively with local waste-generating plants.

A graduate of Bryn Mawr College, she has taught courses at New York and Adelphi Universities, and has lectured widely. Ms. Underwood is listed in *Who's Who in America* and *Who's Who of American Women*.

**Mia MacDonald** is currently a U.S.-based consultant in international development issues, working in the areas of gender and international development policy, women's reproductive health and population, sustainable development, economic, social and political development, and U.S. foreign policy. As a consultant, she has worked with United Nations agencies, foundations, and international non-profit organizations, including UNFPA, UNICEF, UNIFEM, the Ford Foundation, Save the Children, the Sierra Club, and INFORM, Inc. She was previously on the staff of the New York-based International Women's Health Coalition, where she developed and managed a public affairs program, and has worked as a journalist and non-profit manager. She has a Bachelor of Arts degree in English from Columbia University and a Master of Public Policy degree with a concentration in International Development from Harvard University. She lives in New York City.