

TOWARD A PEDAGOGY OF ECOLOGICAL RESPONSIBILITY:
LEARNING TO BE CONSCIOUS MEMBERS OF THE EARTH COMMUNITY

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Presentation at the
21st Congress of the Pan-Pacific Association of Private Education (PAPE)
held at the Manila Hotel, Manila, the Philippines
November 26-29, 1999

Human beings have evolved through continuous learning and adaptation. And new human learning is constantly necessary because of continuous changes and adaptations in the larger community of life of which we are part and on which our own lives and the lives of future generations utterly depend.

This has always been true. But today it is not only human evolution that requires new human learning rooted in a new consciousness. The fate of the planet also requires new commitments and breakthroughs in human learning. We must learn to re-inhabit the Earth in new, more responsible ways as contributing members of the community of life.

Fifteen billion years ago, with a great flash of creativity, a fireball foamed into existence that gave birth to the galaxies and the entire universe. Five billion years ago, a hundred million miles from the sun, the biophysical planet Earth emerged out of stuff of the fireball, fashioning itself into oceans, continents, and eventually living beings. Within this evolutionary process human beings emerged only a few million years ago. They slipped quietly into the life community of the time, these early human beings, but no one could know the future course of Earthly affairs once their intelligence, emotion, and imagination awakened and began to make their awesome powers present upon the planet. Thomas Berry observed:

"By inventing their own ways of interacting with soil and seed, by developing in knowledge and the reach of knowledge, humans expanded to an astounding new presence, first within the life world and then within the planet as a whole, even its most elemental cycles of being." (in "Cosmic Creativity and Human Culture," Breakthrough, Winter/Summer, 1990)

The nature of the human being required the development of a second level of being—the realm of culture. If humans were to survive and find a proper niche, they had to learn "how to enter Earth's restless yet ordered activity in a sustainable and mutually beneficial manner." And they had to find ways to pass this knowledge on to new generations. This was then, as it is now, the primary learning challenge.

Some of humanity's greatest inventions were developed by the earliest humans in Paleolithic hunting and gathering societies, including speech, ritual, kinship, social bondedness, and symbolic expression. These cultural inventions made it possible to learn, remember, and pass on knowledge from generation to generation. Once humans had invented these ways to develop and pass on learning, human groups began to explode in all directions around the Earth.

Starting 50,000 years ago, homo sapiens permeated Europe and Asia; they found their way to Australia by 40,000 years ago and America by 30,000 years ago. Soon the human penchant for learning enabled them to effectively infiltrate every biome of Earth and with this there began a new macrophrase dimension in Earth's evolution.(Berry, op. cit.)

As Teilhard de Chardin would later observe, with the introduction of human culture and consciousness into planetary evolution, a certain threshold had been crossed Humans were from the Earth and of the Earth, but they were the Earth in a new phase of its evolution. A new sphere (Teilhard called it noosphere) of mind and consciousness had entered the evolutionary process and would henceforth have increasing effect on the further stages of planetary evolution.

Words and symbols, powerful expressions of consciousness. As Thomas Berry has observed:

"Primal peoples spoke of the spirit power released by sacred chants They considered words to have the power to change both the structure and functioning of the universe. From a modern perspective too, we can say simply that with the invention of human language [and with human capacity to learn and teach], the Earth unleashed the most formidable powers experienced in over four billion years." (Berry, op. cit., p.6)

"Today, 50,000 years later, where have these powers brought us?" Where have they brought the Earth?

If we look around at the state of the world we can see that today, "certain human practices are causing the degradation of the entire human and non-human Earth community." (Berry, op. cit.)

The learning-teaching programs and ideals of the modern period, and modern notions that humans are separate from and over the Earth, have resulted in a state of planetary crisis that threatens the stability of future generations and represents a major evolutionary crisis and a challenge for human learning now and in the future.

The greatest hurdle in meeting this challenge is how to awaken the human community, and especially educators and policy makers to the fact that we face a major challenge to human learning that goes beyond anything we have seriously considered to date. We must awaken and revivify humanity. We must lead new generations to a deeper awareness, wisdom and knowledge of our fundamental and inextricable relationship with the Earth community and generate the creativity needed for renewing the total Earth community—human and non-human. We must develop a new mind, a new humanity in vital relationship to the Earth.

As Kenneth Boulding asserted, if humanity is to survive, it will have to change more in the next 25 years than in the last 25,000. We are not talking about the physical development of a new brain, but about a new mind, a new way of seeing and being, of learning to be in the world as responsible, creative members of the community of life, with co-responsibility for the next stages of planetary evolution.

This is no small challenge for educators and educational policy. But we haven't even begun to grasp the gravity and scope and depth of the challenge before us.

In *Our Common Future* (1987), the World Commission on Environment and Development called on governments and people to take responsibility for the environment. But the Commission gave only brief mention to one of the essential prerequisites to make this possible—education. The few pages on education focused primarily on the need to increase school enrolments and basic literacy. Schooling and literacy are, of course, helpful. But it is not the unschooled and illiterate who are perpetrating the gravest environmental harm, but rather those who have been schooled and conditioned in patterns of unquestioning consumption, waste and ignorance of their integral relationship and dependency on the Earth and each other. Given that few schools or adult education programs have even begun to undertake the kind of social and environmental learning required to effectively redress environmental threats, schooling in itself is no guarantee of ecological responsibility.

A central challenge before us then, is to develop a pedagogy of ecological responsibility. This applies to all levels and types of learning, whether formal, nonformal, or informal; whether at early-childhood, elementary, secondary, or adult-education levels; whether in family, school, community, or other settings.

The task is immense. We must do no less than learn to re-inhabit the Earth (Berry, 1985). This means learning to live as conscious, participating members of the larger Earth community. The Earth is like a single cell in the universe and we are not over the cell, but part of her life. We will live or die as this single cell lives or dies.

This prescription may seem obvious and simple. But we should not be deceived. It challenges the very foundations of modern civilization, including its models of economic development, education, and its underlying thought structures. It turns upside down the prevailing philosophies, ideologies, and scientific and religious-belief systems rooted in paradigms of human dominance over the Earth, and asserts instead that humans and human communities are subsystems of a larger life system. Western models of civilization, development, and education have spread worldwide and permeated almost every region of the world. It is no trivial matter to change the underlying structures of thought in which we have been schooled, and which at deep and often unconscious levels affect our fundamental patterns of seeing and being on the planet.

The needed learning must go much deeper than simply superimposing facts about the environment on top of existing paradigms and world views. If we are to find long-lasting solutions to environmental crises we need to get at the unconscious thought structures, ideologies, and world views which guide our harmful choices and behavior and learn to re-inhabit the Earth in deepened consciousness and attunement to the life of the Earth and our common dependency on, and shared responsibility for, her functional integrity.

Nor is it enough to look back to a bygone age for solutions; we are in a radically new situation. Although humans have always been able to affect the environments of which they were a part—whether in positive, benign, or destructive ways—human destruction of the environment today is on a scale and complexity unprecedented in history. A pedagogy of ecological responsibility must be commensurate to the needs of our times. There is little margin for error.

Environmental damage by early human groups

There are lessons to be learned from early human communities. But there is a tendency today to idealize or romanticize the ecological lifestyles of early human communities, looking only at the evidence of

positive behavior and ignoring the negative. There are positive lessons from past societies who learned to live in harmony with the laws of nature. But geographical and archeological evidence also abounds about the environmental damage caused by the economic activities of early human groups (Goudie, 1989). Evidence of damage from early human activities has been found in virtually every world region and for every type of economic system, ranging from hunting-gathering societies in Africa, Asia, Europe, the British Isles, South America, the Pacific Islands, and Australia, to later cattle-keeping and agricultural societies in Upper Egypt, Nubia, Mesopotamia, Europe, China, and India, to metal workers in the Bronze and Iron Ages in northwest Iran, northern China, Britain and many parts of Africa. The environmental damage resulting from these early economies included: 1) deforestation (usually involving the burning of woods and forests for the improvement of hunting, cattle-grazing, and agriculture); 2) the eradication of some plant and animal species (through overhunting, overgrazing of animal herds, deforestation, or the introduction of new agricultural technologies and practices such as ploughing and irrigation); and 3) soil damage such as erosion, salinization, acidification, and desertification (caused by deforestation and poor agricultural practices). Mineral exploitation also caused environmental damage. Metal working required enormous amounts of wood and charcoal and led to wholesale clearing of trees and great erosional scars in some world regions (Goudie, 1989).

Some groups did not survive the desertification, flooding, starvation, or other effects of the environmental damage they caused. Others survived by migrating to new territories. Human history is full of stories and mass migrations—environmental refugees fleeing changing environmental conditions that were the consequence of either their own and /or nature's activities. Today there are more than ten million environmental refugees. In the days when human populations were small and groups widely dispersed, migration may have been a viable solution. But as human populations grew, so did competition for environmentally favorable territories and this solution became less viable. Some scholars now believe that organized warfare—which is not innate, but appeared only about ten thousand years ago—first arose as a product of environmental degradation and the resulting competition between groups for new territories capable of sustaining them and their economies. In the 21st century, with increasing populations competing for diminishing resources, we can expect an increase in environmentally induced conflict and warfare.

Whatever the extent of damage to the Earth by early human groups, it pales in comparison with the destruction waged by human groups today. The damage we are doing today often exceeds the Earth's regenerative capacities, is global in scale and complexity, and is changing the face of the Earth in ways that will have profound effects on future generations.

In the 20th century especially, humans inflicted more damage on the environment than in all previous history. It was a century of exponential growth. Human populations multiplied almost four times, from 1.6 billion in 1900 to 6 billion in 1999. In the millions of years of human existence that preceded the year 1850, the total human population at any one time had never exceeded one billion. By 1930 it had doubled to 2 billion. By 1960, a third billion was added, and a fourth by 1977. Only twelve years later, in 1989, there were five billion, and in 9 more years—this year—we reached 6 billion. Despite some success in slowing world population growth, human populations are expected to double again to 10 billion by the middle of the 21st century. Ninety percent of the 10 billion will be in African, Asian, and Latin American countries, doubling current populations in these regions.

In the same century the global economy multiplied 17 times, from an annual output of \$2.3 trillion in 1900 to \$39 trillion in 1998. The growth in economic output in just three years—from 1995-1998—exceeded that during the 10,000 years from the beginning of agriculture until 1900. Per capita income multiplied four times, from \$1,500 to \$6,600, with most of this increase coming in the second half of the century. Life expectancy increased from 35 years in 1900 to 66 years in 1999. More food was produced in the 20th century than ever before. And human products poured into an increasingly global marketplace at record rate.

In one sense these figures represent tremendous human success. Advancements in science, medicine, industry, and technology made it possible for more people to live longer, healthier, and more productive lives. But these figures also portend serious problems to come. The benefits of this growth were not evenly distributed. Most of the benefits are going to one fifth of the world population who live better lives than ever before, while another one fifth at the bottom struggle to survive with no or little access to safe water, or adequate nutrition, shelter, education, or employment.

Moreover, the costs of human growth to the larger Earth community have not yet been calculated. In the 20th century the world lost close to fifty percent of its original forest area. This in turn caused increased flooding, soil erosion, and the depletion of aquifers and a diminished capacity to absorb carbon emissions that cause global warming. A five-fold increase in fossil fuel use since the 1980s has contributed to atmospheric concentrations of CO₂ that are at the highest level in 150,000 years and are beyond the capacity of nature to absorb. As a consequence world temperatures are rising. The 13 warmest years since records began to be kept in 1866 have all occurred in the 1990s. Severe heat threatens food productivity and human life.

Whereas soil formation exceeded soil erosion throughout most of the Earth's history, in this century a combination of overplowing, overgrazing, and deforestation reversed the relationship. We have crossed a threshold of unsustainability. Each year the Earth community loses millions of tons of top soil, depleting the Earth's fertility and undermining its food-producing capacities. In Africa erosion caused the loss of 8.2 million tons of gain—an 8 percent drop-in the 1989 harvest, a loss that is expected to mount to 16.5 tons by 2020 if erosion is not abated.

The 20th century also saw more pollutants and toxic chemicals dumped into air, soil and water than in all previous centuries. Radioactive emissions from nuclear weapons production, testing, and stockpiling entered the air, soil, water, and ultimately the DNA and human gene pool, affecting the viability of future generations. This presents a tremendous moral challenge for today's generation.

We are stealing from our children and grandchildren. Moreover, we are undermining their very capacity to be born, and live in health. Children are more vulnerable than adults to pollutants; and unborn children are the most vulnerable of all, especially in the embryonic stage when organs begin to form. The right to a healthy environment may be the ultimate right-to-life issue. Birth defects, learning disabilities, cancers, and chronic illnesses appear to be rising among children. In the latter half of the 20th century more and more chemicals were added to the environment which could cause birth defects and damage the reproductive organs of men and women.

Future generations are also threatened by the emissions of CFCs and other ozone-depleting gases that are producing a hole in the Earth's ozone layer, exposing people and the Earth community to higher amounts

of the sun's ultraviolet rays. Those yet to come will pay the greatest price in the form of increased cancers, diminished food supplies and other ill effects.

The 20th century also saw the greatest human-caused wave of mass species extinction's in all history. While it is natural to lose some species in the course of evolution, scientists estimate the normal background rate is about 1-10 extinctions per year, which are made up for by the emergence of new species.

But we are now losing between 1,000 and 27,000 species a year, most of it by human causes. This is unprecedented. It has been calculated that in the three centuries between 1600 and 1900 humans accounted for the loss of one species every four years. After 1900 the rate began increasing to one per year and, by 1979 to one a day. Now it may be one an hour.

This magnitude of loss has only occurred five times before in 1.5 billion years of life on Earth. The greatest mass extinction from natural causes was the Permian extinction 245 million years ago, when 95% of all known animal species were lost. The most recent was the Cretaceous extinction 65 million years ago when 76% of all species were lost, including the dinosaurs. It took millions of years following each of these extinctions for the Earth to recover its previous level of biodiversity.

The mass extinction now underway is caused by humans and could be avoided through a change in consciousness and human choices of behavior. If we fail to learn lessons and make necessary changes in our behavior, we may be on our way to causing the loss of 2/3 of all living species. The species themselves will be gone forever. Not even the Creator can bring them back because the conditions in which they were first created will have changed. Moreover, it will take the Earth millions of years to recover the level of bio-diversity it had in 1900. Future generations of human will live on a planet of weeds. For only weedy like creatures are likely to survive today's mass extinction. "Weedy" here means creatures that reproduce quickly, spread rapidly, and survive almost anywhere—like rats, cockroaches, pigeons, feral dogs, sparrows and crows. These will inherit the Earth.

In the next 50 years we may lose 50% of the world's forest bird species, and 1/3 to 2/3 of all species will be lost.

Forests—especially tropical forests—are critically linked to Earth's biodiversity. According to FAO, the rate of deforestation in tropical countries has increased since the 1970s (when Myers made his estimates) to a loss of 15.4 million hectares (38.5 million acres) per year, with South America losing 6.2 million hectares per year, Southeast Asia 1.6% of its forests. The Philippines, once nearly covered with forests, has lost 92%

By the middle of the next century tropical rainforests will exist virtually nowhere outside protected areas. These protected areas, which now encompass 6.3% of the planet's land area, do not retain their full biological diversity.

Globalization and interdependence

Increasing globalization makes these threats even more complex. We are in a new historical situation in which human decisions and activities in one region dramatically affect the ecological and economic well-

being of the entire Earth community. National and local communities have increasingly been penetrated by global forces beyond their control. Foreign direct investments have more than tripled from the mid-1980s to the mid-1990s. And the power and wealth of some transnational corporations now exceed those of many nation-states. Fifty-one of the world's hundred largest economies are now economies internal to corporations. About 29 percent of economic activity worldwide is generated by only 200 corporations which are linked by strategic alliances and interlocking boards.

Rich and poor countries alike are confronted by the need to survive growing global competition for favorable balances of trade and payments, and for access to scarce resources, markets, and new technologies. The drive for economic security and a competitive edge in the world market has led many countries to subordinate long-term ecological concerns to short-term economic goals.

All countries face this dilemma. But the poorest countries, especially those that have borrowed heavily from international banks and agencies to finance economic development programs are especially pressured. Faced by debilitating foreign debts, rising interest rates, adverse terms of trade, interrupted financial flows, and conditionalities imposed by lending agencies, many have resorted to overusing their resource base, exporting precious natural resources (their ecological capital), and ignoring environmental degradation. Worse, many poor countries have become the dumping ground for toxic waste from the richer countries. With tougher environmental protection laws at home, many industries in the rich countries now do the most polluting aspects of their production in poor countries where standards are weak or not enforced, or illegally dump toxic waste in poor countries.

Today the people of all countries are inextricably bound together in one interdependent Earth community. The bottom line for economic security is ecological sustainability. At the same time, the path to ecological integrity is linked to resolving global economic problems, especially gross inequities. Such prospects require a major transformation in the way we think about our relationship to the Earth and one another.

What kind of Earth, what kind of humanity, what kind of human spirit are we bequeathing to future generations? In the past, when groups exceeded the limits of environmental sustainability they moved on to new territorial frontiers. But there are few, if any, new territorial frontiers, and many countries are loathe to absorb more refugees among already strained populations. But the habit of looking to a new frontier to resolve economic and environmental limits is deeply imbedded. In the absence of new territorial frontiers, some look for new technological frontiers to fix the problem. But while appropriate technology may help resolve some, it cannot resolve all our environmental problems. A danger is that people addicted to over-consumption and environmentally destructive habits, and those that aspire to such consumption, will blindly place their trust in a technological fix in order to avoid making fundamental changes in their patterns of behavior and relationship within the Earth community. The most important new frontier for redressing environmental crises and healing the Earth community now is the frontier of the mind and spirit, the realm where ethics are shaped and responsibility taken for the state of our world.

The learning challenges before us were partially foreseen by Teilhard de Chardin and by the Russian academician, Vladimir Vernadsky (see Moissejev, 1987). Although neither foresaw the extent of the environmental crisis we face today, both postulated the existence of a new sphere of mind and consciousness which had emerged through the human as a continuation of the Earth's evolutionary dynamics and creative processes and which, in turn, would have increasing effects on the biosphere.

In their view this new sphere was not only a new space enveloping the biosphere, it was also a new epoch—a change of incredible magnitude—that would increasingly affect the further evolution of the Earth. As Vernadsky and Teilhard saw it, humans and human consciousness were not the culmination of evolution; the Earth would continue in its development, but increasingly this development would take place on the other side of the new threshold—for example, in the realm of mind and spirit and the way it in turn affected planetary dynamics. In this view, the Earth and its human creatures have entered a period of co-evolutionary dynamics in which human consciousness and the activities that flow from it will increasingly affect the next stages of planetary evolution. In other words, the fate of the Earth is increasingly a matter of human choice.

The implications for social and ethical learning are profound. We have new powers over life and death never dreamed of by our ancestors. We can help the Earth to flourish or we can render it uninhabitable for future human generations. But there has been a tragic lag in our development. We have not yet developed the spiritual vision, moral maturity, or ethical systems to use our new powers in ways that will enhance rather than diminish the prospects of life for our children and grandchildren. We have not yet developed a global culture of ecological responsibility—or its extensions in global public policy and law—that will help the Earth maintain its functioning integrity. A failure to try to develop an adequate environmental understanding and ethics now would be a failure of the greatest magnitude.

Equilibrium in the development of a co-evolutionary ethics

Although we are in a radically new situation, there are some lessons to be learned from past societies and the types of ethical and learning systems they developed to govern their relationships with nature and each other.

As early human groups became conscious of the powerful role of nature in their own physical and economic survival, they recognized the need to learn—and to teach upcoming generations and other members of their societies—to regulate their activities vis-à-vis the more powerful Earth forces. Initially, these ethical systems were based primarily on a sense of what nature could do to humans, not what humans could do to nature. There was a sense of utter dependency on the Earth and of vulnerability in the face of the powerful and uncertain forces of nature. The gods first emerged in human consciousness as symbols of these powerful life-giving and life-taking forces, and rituals and codes of behavior were developed to appease or ward off the destructive forces, and to please and encourage the life-giving forces. Over time, human societies also became aware of the effects their activities had on nature systems and the need to regulate their behavior in ways that would preserve the integrity of the life systems of which they were a part. Some groups personified the Earth as a Great Mother. To harm the Earth was to harm one's Mother. The human children of the Earth were not separate from but rather part of her life. They would live or die as their Great Mother lived or died.

These ethical systems varied among different societies in different geographic regions, time periods, and socio-economic systems. But despite widespread variations, the ethical systems of successful societies (i.e. groups that succeeded in surviving physically, economically, socially, and psycho-spiritually for a significant period of time) had at least two characteristics in common:

1. They balanced the individual good with the common good. Too much repression of individual needs and expression endangered a group's chances for survival and long-term success by stifling the creativity,

initiative, and adaptability required for changing circumstances. But the lack of an ethic of responsibility for the good of the whole community on the part of too many of its individual members could undermine the very foundations of a society's existence, and hence also the security and survival of its individual members.

Similarly today, an environmental ethic adequate for our new situation must be based on a profound sense of the common good as well as individual good. In the West, with its heavy emphasis on individual rights, we need to recover a sense of community and the art and ethics of being good neighbors. We can start with our local communities. We need to learn to serve and care for the Earth and its people where we are planted. We can begin by learning about and appreciating the special geological, biological, and human cultural evolution and qualities of our bio-region, and by working with our neighbors to assure its present and future sustainability. At the same time we live in an interdependent world and all our local communities and bio-regions are interconnected in the larger web of planetary life. No local community or bio-region is completely self-sustaining. All drink from one water system and breathe from one air system. Our economies are interlocked. We have emerged from separate past histories, but we now share a common future. We will learn to live together as good neighbors or we will die together. Today an ethic of the common good needs to extend to all humanity—not only those living in the present, but those yet to come in the future whose well-being is dependent on our choices today. Moreover, it must extend beyond the common human good to the good of the total community of beings who dwell in and comprise Earth's life—the millions of other species who with us comprise the web of life and whose fate is increasingly a matter of human choice. The golden rule, "Do unto others as you would have them do unto you," requires that we respect and care for the air, water, soil and natural resources we share in common. Indeed, harming the Earth, on which the lives and health of all the community depends, may be another form of stealing from, or even killing, our neighbors. It is also the ultimate form of sacrilege—for to destroy the integrity of creation is to defy the Creator.

2. They balanced their relationships and activities in four spheres. A second characteristic or dynamic in the ethical systems of successful past societies was the relative equilibrium they sought between four spheres affected by human choices and activities:

the biosphere—the sphere of life or Earth's nature system;

the technosphere—the structures made by humans and set in the space of the biosphere, such as human settlements or cities, communication systems, farmlands, irrigation systems, aqueducts, sewage systems,

roads, vehicles, industries, etc., that are partially controlled by, but also have unintended consequence on, the biosphere;

the sociosphere—the political, economic, and cultural institutions or systems humans develop to manage their relations with each other and with the other two spheres; and

the sphere of mind and spirit

Societies that lost this ethical equilibrium for any length of time (e.g. by failing to develop an environmental ethic strong enough to offset the strains on the nature system from the introduction of new technologies or economic activities) risked either the erosion and degradation of their environment (and with it their physical and economic means of survival which are ultimately rooted in the nature system), or their social-spiritual disintegration (also affected deeply by relationships with the nature system), or both.

Each new technological revolution brought new economic benefits for human groups, but also disequilibrium and strain on ecological, socio-economic and psycho-spiritual systems. For example, the invention of improved hunting weapons increased success in felling larger animals, but it also resulted in the extinction of some species which could not reproduce themselves as fast as they were being killed. The plough and irrigation systems revolutionized agriculture, but also led to soil depletion and erosion. Bronze and iron technologies resulted in improved tools and living conditions, but also led to deforestation. More recently, the industrial and scientific revolutions contributed to a higher standard of living and longer lives for more people than ever before in history, but also produced more environmental damage in the span of a century than in all of previous history.

There is a vulnerable period in any technological revolution that is marked by a lag between its first heady advances and the time when its impact on economic, environmental, and spiritual systems can be assessed and new ethical, educational and political systems developed to restrain its destructive aspects. A civilization must not destroy itself once it has developed the technological means to do so. Ethical systems are a means societies have developed to prevent this.

In previous transformations (e.g., from hunting and gathering to pastoral and agricultural economies) the changes took place more slowly and societies had hundreds, even thousands of years to undertake the necessary learning and teaching, make successful adaptation, and establish ethical equilibrium. Today's crises have also been compounded by the fact that the modern industrial and technological revolution was accompanied by a secular revolution or divorce between science and religion. In the past, science and religion were one and science proceeded with moral questions and internal correctives to guide its uses and applications. But as traditional religions seemed irrelevant or even an obstacle to many people in the light of the new opportunities and challenges that were emerging from the industrial and scientific fields, some made of science and technology a religion unto its own, believing it would deliver a new earthly paradise.

Then too, the consequences of industrial growth on the environment were not immediately apparent or, when apparent, not the primary concern of moral critics. Ethical questions focused more on the tremendous economic displacement and social conditions that followed in the wake of the industrial revolution. In Europe (and later in many other world regions) millions of peasants were driven off their lands. (In England and Scotland the land was given over to raising sheep for wool to feed the burgeoning textile mills.) The peasants migrated en masse to urban centers, seeking work in factories where they and their children worked 12 or more hours a day for starvation wages. Thus, although the factories were spewing out pollutants that destroyed the health, and sometimes took the lives of workers and people in the surrounding communities, the ethical debate centered more on questions of distributive or economic justice and ownership of private property and the means of production than on seemingly less critical ecological effects.

These questions of economic justice created a great ideological or ethical divide between the defenders of laissez faire capitalism at one end of the spectrum and the proponents of a communist revolution and dictatorship of the proletariat on the other. In between were various economic reform movements. In the West, Christian social ethics was heavily preoccupied by this debate for more than a century. In their social teachings many of the Christian churches tried to find some equilibrium between the rights of the individual and the common good, for example, between the excesses of laissez faire capitalism and individualism on the one hand and collectivist tyranny on the other. In the Catholic social teachings, for example, this took the form of arguing for both the right to private property and the dignity and rights of workers. But "ethics and the environment," or environmental rights and responsibilities were not addressed. When social teachings mentioned the Earth at all, it was usually in the context of private ownership and the just distribution of the products of the Earth, such as, the Earth as a producer of commodities, and not to establish standards for right human relations with the Earth itself.

Fortunately, this is now beginning to change, and many of the world religions are now beginning to address not only the need for environmental ethics, but also a spirituality of care for the Earth.

Freedom, authority and ethical learning

At the center of the debate between communism and capitalism was the question of freedom. Freedom is also at the center of the debate between environmental interests and economic interests. Environmental groups want more restraints on destructive economic activities and greater emphasis on the freedom and right to a healthful environment. Those concerned about distributive justice argue for freedom from too many environmental restraints in order to realize freedom from poverty and the right to a decent standard of living. And big corporate interests wanting to maximize profits for stockholders want freedom and governance ceded to the global market place. Thus freedom and its meaning is a core question for sustainable development.

Freedom is also a central question for ethics and other aspects of human learning. In the case of ethics, it is the existence of human freedom or free will that makes adults responsible for the effects of their choices. Ethics do not exist without human freedom. Paradoxically, ethics (and freedom itself) also implies the acceptance of restraints on freedom. These restraints are accepted—even self-imposed for the sake of a greater good for our ourselves, others, or the Earth. Ethics restrain, but also free us. There is freedom in limits. One of the most important lessons I learned as a parent and, for a time a teacher of young children, was that some rules or limits that help children feel safe also set them free to explore,

learn and create. Ethics can also free us by offering a guide through the chaos of choices that beset us, especially in the consumer and information age with its confusing array of messages that could seduce us into becoming slaves to impulses that in the long run can imprison or destroy us and cripple our capacity for growth and effective action.

In the West freedom has come to be seen too narrowly as the freedom to choose from an endless array of consumer products. Such constructs of freedom are inimical to an ecologically sustainable future. We need to learn to think about human freedom in far deeper ways, because of the far-reaching effects choices and actions for the life of the Earth.

What does human freedom mean in this new context? The question is related to the problem of sovereignty or authority. When, under what circumstances, with what authority, and with what criteria should human freedoms and sovereignties be limited or curbed with respect to activities that damage or threaten environmental and human health? Are questions of freedom and ethics to be approached primarily through the private sector as matters for individual ethics (i.e., self-governance through deeper awareness, and self-made pledges to do better), or more through the public sector or processes of collective governance? Or some combination? If a combination, then what balance between the private and public sectors? What balance between the sovereignty of the individual person, the sovereignty of the local community, the sovereignty of nations, and the sovereignty of the collective of peoples and nations? How should human freedoms and sovereignties be tempered by and harmonized with the freedom and sovereignty of the Earth?

Ecological systems as learning models

What values, world views and philosophic models should shape a new, global ecological ethic or ethos at the global level? What economic and political systems? What kind of educational systems and models of learning? What kind of local, national, and global politics or legal and judicial systems should be developed, and what kind of civic learning will be required to reinforce this ethos and governance?

When we try to answer these questions, we find existing philosophies and models of socio-economic and political systems (and also of educational systems) are inadequate. Marx's dialectical model has proved to be too limited and simplistic. It was based on the oppositional dynamics in Hegel's formula of thesis-antithesis-synthesis, which seeks a resolution of the contradictions between two polar opposites. But this mechanistic model does not allow for the incredible complexity of living systems, including human social systems as well as nature systems, and the multifaceted dynamics involved in their functioning, or the many possible outcomes that may need to be considered in shaping a viable future (K. Boulding, 1981)

Social Darwinism as expressed in laissez faire capitalism has proven equally unsatisfactory. It stresses the competitive aspects of natural selection to justify unbridled competition. But in applying Darwin's concept of "survival of the fittest" to socio-economic relationship, social Darwinists made some major mistakes. The phrase "survival of the fittest" did not even originate with Darwin, but was borrowed by him from Herbert Spencer, an early evolutionist and proponent of social and economic laissez faire. In fact, Darwin had examined the role of cooperative as well as competitive patterns of behavior in survival. The major error of the Social Darwinists, says Kenneth Boulding (1981), was to "underestimate the enormous complexity of ecological interaction involved in the selection process" and to stress the competitive at the expense of the more co-operative patterns of behavior. Darwin's actual findings would

suggest that the more appropriate phrase is "survival of the fitting:" those species survive who learn to fit into one of the many and varied niches in the ecosystem. In biological systems co-operative and adaptive behavior has generally paid off very well, whereas fighting and conflict (not so prevalent except when related to sexual selection) has often led to species extinction. Boulding also faults Social Darwinists for underestimating and undermining the role of government and political structures in the social evolutionary process.

The more appropriate model in Boulding's view is one based on an understanding of evolution and eco-systems. Unlike the Marxian and Social Darwinian models, the evolutionary model takes into account the tremendous complexity of living systems, including human social systems. Eco-systems are open to many possible solutions and directions. Applying this lesson to socio-economic systems "opens up the possibility for very large improvements in public policy" made possible through evolutionary learning processes (K. Boulding, 1981).

A key to unleashing new potential in both biological and social evolution is information or knowledge. In biological systems the information or knowledge is genetic and largely unconscious; thus change occurs through genetic mutations. But in human social systems much of the knowledge or information is learned and more conscious; thus change occurs through mutations in learning of "know-how." New learning helps us to reduce errors in our images of the world and to find creative solutions to some of our problems. It provides a basis for more realistic appraisals of alternatives and courses of action. This includes finding solutions to such grave environmental threats as depletion of the ozone layer or global warming, developing energy alternatives, and finding ways to deal with resource scarcity and maldistribution. While these are serious problems they are not insoluble. But they do require new learning, new world views, new ethical systems, and human creativity and inventiveness.

It is now of great importance that our new learning include a deepened understanding of the Earth's living processes as a foundation for a new ethical constructs. Among other things, we need to learn more about the upper and lower limits for ecological health and for protecting our ecological life-line. This could help shape relevant principles for both ethics and public policy. In both ethics and public policy the challenge before us is to harmonize our choices and activities with the upper and lower limits of the integral functioning of the earth. Most of all, we must learn to live on the Earth with consciousness and intentionality and not just surrender to custom. We need to will our way of life and take responsibility for creating a future in which life can continue in its incredible variety and beauty.

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