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HOPE IS AN IMPERATIVE

To Aaron - just to see you again!  
Thanks for your friendship and leadership!  
Warm Regards,  
David W. Orr  
4/7/11

*Hope Is an Imperative: The Essential David Orr*

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To David Ehrenfeld

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## Foreword

AS THE TWENTY-FIRST CENTURY unfolds, it is becoming increasingly evident that the state of our natural environment is no longer one of many "single issues." It is the context of everything else—of our lives, our work, our politics.

The great challenge of our time is to build and nurture communities that are ecologically sustainable. As David Orr explains in this fine collection of essays, a sustainable community is designed in such a manner that its ways of life, businesses, economy, physical structures, and technologies respect, honor, and cooperate with nature's inherent ability to sustain life.

The first step in this endeavor must be to understand the basic principles of organization that the Earth's ecosystems have evolved over billions of years to sustain the web of life. We need to understand the language of nature, as it were—its flows and cycles, its networks and feedback loops, and its fluctuating patterns of growth and development. Almost 20 years ago, David Orr coined the term *ecological literacy* for this basic ecological knowledge and chose it as the title of his first book. Since then, ecological literacy, or *ecoliteracy*, has become a widely used concept within the environmental movement. Being ecologically literate means understanding the basic principles of ecology and living accordingly.

Ecoliteracy is the first step on the road to sustainability; the second step is ecodesign. We must apply our ecological knowledge to the fundamental redesign of our technologies, physical structures, and social institutions so as to bridge the current gap between human design and the ecologically sustainable systems of nature.

Design, in David Orr's memorable phrase, consists in "shaping flows of energy and materials for human purposes." Ecodesign, he writes, is "the careful meshing of human purposes with the larger patterns and flows of the natural world." Thus, ecodesign principles reflect the principles of organization that nature has evolved to sustain the web of life.

Once we become ecologically literate, once we understand the processes and patterns of relationships that enable ecosystems to sustain life, we will also understand the many ways in which our human civilization, especially since the Industrial Revolution, has ignored or interfered with these ecological patterns and processes. And we will realize that these interferences are the fundamental causes of many of our current world problems.

Because of the fundamental interconnectedness of the entire biosphere, the problems caused by our harmful interferences are also fundamentally interconnected. None of the major problems of our time can be understood in isolation. They are systemic problems—all interdependent and mutually reinforcing—and they require corresponding systemic solutions. Thinking systemically means thinking in terms of relationships, patterns, and context. To use a popular phrase, it means being able to "connect the dots."

The interconnectedness of world problems, the need to become ecologically literate, and the principles of ecodesign are three major strands that weave through the essays in this book. David Orr is a systemic thinker par excellence and a longtime friend and colleague whose thoughts and writings have influenced and inspired my own work for many years. With impeccable clarity, he demonstrates again and again that the current obsession of economists and politicians with unending growth is a fatal illusion; that our persistent failure to formulate sound energy policies has resulted in terrorism, oil wars, economic vulnerability, and climate change; that climate change is a challenge not only to consumerism and the growth economy but also to our political institutions, worldviews, and philosophies.

While all these systemic links are lucidly analyzed, David's writing is also deeply moving, thoughtful, and poetic. His intention is always to foster and expand our awareness of "the connections that bind us to each other, to all life, and to all life to come." I am really glad that Island Press is now publishing David's essential writings in one volume. They include many of his classic essays, which I have savored again and again over the years—for example, *Place and Pedagogy*, *What Is Education*

*For?, Loving Children: A Design Problem*, and my personal favorite, *Slow Knowledge*.

This book is both wake-up call and inspiration. Its trenchant analysis of the dire state of our world, combined with its passionate call to action, remind me of the famous maxim by the Italian political theorist Antonio Gramsci that we need both the pessimism of the intellect and the optimism of the will. Or, as David himself puts it in his introduction, "*Hope is a verb with its sleeves rolled up.*"

These essays are eloquent and full of great wisdom. But what shines through them most of all is their author's deep passion for humanity and for the living Earth.

Fritjof Capra, founding director  
Center for Ecoliteracy  
Berkeley, California

## ~ Introduction ~

FOR BAD ELECTRICAL WIRING, the sensible response is to call an electrician sooner than later. When sparks fly, the sensible thing to do is pull the breaker and reach for the fire extinguisher. When the house is on fire, the sensible thing to do is to call the fire department. But it would not be sensible to call the fire department when the problem is bad wiring or to call an electrician when the house is on fire. The word *sensible*, in other words, is relative to the gravity of the situation.

In the past quarter century, something analogous has happened to us as a nation and to the entire planet. Faced with the overwhelming evidence of environmental stresses, it would have been sensible decades ago to assemble the expertise necessary to redesign energy, food, materials, and manufacturing systems in order to eliminate waste and to coincide with laws of physics and ecology. As things worsened, it would have been sensible to develop global responses by aggressively implementing Agenda 21, the Rio Accords, the Kyoto Protocol, and more. Now, in the second decade of the twenty-first century, it would be sensible to recognize that we have squandered any margin of safety we once had and are in a planetary emergency and need to act accordingly. But there is no global equivalent of a 911 call and no intergalactic emergency squad to come to our rescue. It's up to us.

Meanwhile, as the years tick by, we are nearing (some say we have passed) irreversible and irrevocable changes in the oceans, atmosphere, soils, forests, and entire ecosystems. Now the sensible things we must do everywhere are merely extraordinary, unprecedented, and heroic at a scale sufficient to avert global catastrophe.

We are in the process of evicting ourselves from the only paradise humankind has ever known—what geologists call the Holocene. This 12,000-year age has been abnormally benign with a relatively stable and warm climate, more or less perfect for the emergence of *Homo sapiens*. But CO<sub>2</sub> levels are now higher than they've been in hundreds of thousands of years and rising still higher each year. We are creating a different and more capricious and hostile planet than the one we've known for thousands of years—what writer and activist Bill McKibben denotes as “Eaarth” (McKibben 2010). The challenge of living on this emerging planet is the challenge of our time, exempting no one, no organization, no nation, and no generation from here on as far as one can imagine.

The essays that follow, now the chapters of this book, were written between 1985 and 2010 as human civilization entered the historical equivalent of rapids on a white-water river. No one knows whether the frail craft of civilization will capsize because of climate destabilization, terrorism, economic collapse, technology run amuck, governmental ineptitude, or any number of other threats or whether it will somehow survive, chastened and hopefully improved. It is clear, however, that our previous unwillingness to do what was sensible, obvious, and necessary has now rendered our situation far more difficult and dangerous than it otherwise might have been.

Every writer works with the refracted influences of other people, places, and experiences. My interest in things environmental was enhanced by the great landscape architect Ian McHarg in the early 1970s when I was a doctoral student at the University of Pennsylvania. I was inspired to read everything I could find on the subject and discovered that the study of the “environment” came with an imperative to roam intellectually in order to connect things otherwise isolated by department, discipline, and narrow perspectives. But despite the great range and diversity of disciplines and perspectives necessary to an informed ecological worldview, the subject comes down to the one big question of how we fairly, durably, and quickly remake the human presence on Earth to fit the limits of the biosphere while preserving hard-won gains in the arts, sciences, law, the open society, and governance, which is to say civilization.

The urgency and excitement of that time was palpable. Some of the best thinking and writing ever about the human place in nature occurred in that decade. New nongovernmental organizations formed to defend particular places, ecologies, and the larger environment. The U.S. political system responded by creating the Environmental Protection Agency

and the Council on Environmental Quality. Republicans and Democrats worked together to establish a National Environmental Policy and pass legislation to protect air, water, rivers, wilderness, open space, and endangered species. There were surely differences between Democrats and Republicans, but not paralysis, because there were still enough people in government with a sufficient regard for the issues that bind us together, to the web of life, and to all life to come to justify rethinking crusty old ideas and crossing party lines from time to time in order to protect the common good.

No road map existed then to define the path ahead, but by the late 1970s a global conversation about the sustainability of humankind was gathering steam. Many of us were optimistic that with enough science, better technology, and rational policy reforms, monumental problems could be solved. In hindsight it is obvious that things were not so simple, and neither are they today. Many factors come between what we should do and what we actually do, beginning with the daunting complexity of the problems and potential responses, whether market based or led by government or by cultural change, or all of the above. As well, we have to contend with competing political and economic interests that have become rigid ideologies rooted in tattered beliefs that humans can do as they please with nature without consequences. The stranglehold of bad ideas is deeply rooted often in the inability or unwillingness to see what's right before our eyes. And always the gap between what we should do and what we actually do is widened by ignorance, garden-variety stupidity, and the tendency to put off to tomorrow what should have been done yesterday. And lurking in the shadows there is the darker side of human nature that can't be wished away. But the fact remains that we know enough to act much better than we do. More science and better technology won't be nearly enough without a larger and more rational rationality. And even that won't suffice without summoning help from what Abraham Lincoln once called “the better angels of our nature.”

The perplexities of human nature aside, we navigate between two rapidly flowing currents. Nothing in nature is static, but we have accelerated the pace of ecological change to a rate that rivals or exceeds that of the great extinction events of the distant past. The other current is the quickening pace of technological, demographic, social, and economic changes. In such unpredictable circumstances, no one can say for sure what it means for humankind to come to terms with nature, but we know that the road ahead will not be easy or smooth. Along the way, we will be tempted to do

things that in less vexing times we would recognize as foolish or risky. We will be urged to deploy magic bullet technologies with vast implications without dealing with underlying problems or larger systemic issues. As long as civilization lasts, however, we will have to monitor and manage our demands and impacts on the planet and find widely acceptable and effective ways to limit what we do, whether by law, regulation, cultural norms, or religion or by some other means. We will also have to muster the wisdom to confront old and contentious issues having to do with the fair distribution of wealth and the balance of rights between generations and between humans and other life-forms. That in turn will require robust and competent governments and an ecologically literate and competent citizenry. However such things play out, we've long since passed the time when we could change atmospheric chemistry or the acidity of oceans, or unravel ecologies, or even procreate with little thought for the morrow or the health of the larger whole.

I have organized this collection of essays in five parts that reflect issues and subjects that caught my attention over the past 25 years. Most all of the essays were initially written as aids in solving one practical problem or another. Running through the entire book is the question of how humankind can fit harmoniously in the ecosphere—which invites controversy, multiple opinions, and lots of conjecture. I have only lightly edited the chapters to take out redundancies and update where necessary, so they are mostly as initially published but with fewer references and without footnotes.

The first part deals with fundamental principles. I'll let those essays speak for themselves without further comment and without any presumption that they are exhaustive or scriptural, including the one presumptuously titled "Orr's Laws." The second part, on the challenges of sustainability, is a bit like a brush-clearing operation that aims to get the lay of the land. However conceived, described, or analyzed, sustainability is *the* issue of our time, all others being subordinate to the global conversation now under way about whether, how, and under what terms the human experiment will continue.

The third part deals with possible responses to the challenges of sustainability. Most, if not all, of our environmental problems result from poor design—factories that produce more waste than product; buildings that squander energy; farms that bleed soil, excess nitrogen, and pollution; cities designed to sprawl; and so forth. The logical response, then, is better design or what is coming to be known as ecological design. It includes

the design professions such as architecture and engineering but is a much bigger enterprise. It is quite literally about what McHarg described as "design with nature" in order to remake the human place on Earth. But the change toward ecological design in the fields of urban planning, agriculture, manufacturing, and energy systems as well as architecture will require a major change in how we think and so changes in education at all levels.

The fourth part, then, deals with education and specifically with the problem *of* education, not problems *in* education. Tinkering at the edge of the status quo characteristic of most educational reforms is a kind of nickel solution to a dollar-sized problem. But in the not-too-distant future, I can imagine schools, colleges, and universities designed ecologically, becoming models for the transition ahead and leaders toward a better future than the one now on the horizon. But that future is now clouded by the largest challenge humankind has ever faced, which is the onset of rapid climate destabilization.

The final part of the book is the most troubling of all and requires more explanation. We are, indeed, evicting ourselves from the very conditions in which we emerged as a species. Everything we've done—all of our accomplishments and failures, our arts, literatures, cultures, history, and organizations—occurred under, and partially because of, conditions that we are now changing for the worse. The increasing temperature of Earth, rising seas, extinction of species, changing hydrology, and shifting ecologies are effectively permanent changes that will render the future progressively more difficult for our descendants. That fact runs against the grain of the American tendency to regard problems as always solvable with enough technology or money. But the climate destabilization now under way is not solvable in that sense. We hope that the worst can be contained, but as geophysicist David Archer and others point out, we have already set planet-changing forces in motion that cannot be stabilized for centuries. If there was ever an issue that required clarity of mind, steadiness of purpose, and wisdom, this is it. I close with thoughts on the nature of hope in a progressively hotter and less stable ecosphere. But *hope* is a verb with its sleeves rolled up. In contrast to optimism or despair, hope requires that one actually do something to improve the world. Authentic hope comes with an imperative to act. There is no such thing as passive hope.

My thinking and writing have been much influenced by some of the great minds and personalities of our time. This book is gratefully



dedicated to one such person, David Ehrenfeld, who is a physician, a biologist, a teacher, a renaissance man, and a friend and a teacher to me and many others. As the founding editor of *Conservation Biology*, David invited me to write many of the essays included here and helped to improve the results.

I also gratefully acknowledge Gary Meffe, who, like David Ehrenfeld, served with great distinction as editor of *Conservation Biology* and in that capacity improved the column I wrote for 20 years. Whatever clarity and felicity are evident in those essays included here owe much to David and Gary's skill, judgment, and, not the least, friendship.

For many years Wes Jackson has been a friend, provocateur, teacher, and a source of some of the best humor I've ever heard. His life has been one long seminar on soils, farming, civilization, philosophy, religion, ecology, literature, and more and how all of this is related. In long telephone conversations and visits to the Land Institute in Salina, I have been privileged to be a part of many of those mostly impromptu and brilliant sessions which I count mostly as a blessing, occasionally as an irritant, but always as convivial and often profound stimulation.

It is not possible to acknowledge Wes Jackson without saying an appreciative word about Wendell Berry. One of the most interesting and important dialogues of our time is that between Jackson and Berry, who over three decades have mutually influenced each other in a synergy of science, literature, good stories, friendship, inspiration, and devotion to land, agriculture, and rural people. Wendell Berry is described variously as a prophetic voice, one of the great writers of our time, and the wisest among us, all of which I believe to be true. For more than 40 years he has eloquently probed and defined our connections to land and community without ever being repetitive or tiresome. Above all, he has taught us the importance of words faithfully spoken and lived and our connectedness to places and real communities.

Finally, I thank Barbara Dean, Todd Baldwin, and Chuck Savitt at Island Press for their editorial help, advice, and friendship. And I gratefully confess to having been improved, instructed, inspired, sometimes chastised, but always nurtured by many others too numerous to list. But to all, my thanks for much that is beyond the saying.

# Hope Is an Imperative

*The Essential David Orr*



## Chapter 9

# Four Challenges of Sustainability

(2006)

*The destiny of the human species is to choose a truly great  
but brief, not a long and dull career.*

NICHOLAS GEORGESCU-ROEGEN

THE CONCEPT OF SUSTAINABILITY first came to public notice in Wes Jackson's work on agriculture in the late 1970s (Jackson 1980), Lester Brown's *Building a Sustainable Society* (Brown 1980), and *The World Conservation Strategy* (Allen 1980). The Brundtland Commission made it a central feature of its 1987 report, defining it as meeting the needs of the present generation without compromising the ability of future generations to do the same (World Commission on Environment and Development 1987). Their definition confused sustainable growth, an oxymoron, and sustainable development, a possibility. Ambiguities notwithstanding, the concept of sustainability has become the keystone of the global dialogue about the human future. But what exactly do we intend to sustain, and what will that require of us?

Such questions would have had little meaning to generations prior to, say, 1950, when nuclear annihilation became possible. Other than a collision between Earth and a large meteor, there was no conceivable way that civilization everywhere could have been radically degraded or terminated.

This article was originally published in 2006.

But now any well-informed high school student could make a long list of ways in which humankind could cause its own demise, ranging from whimpers to bangs. The dialogue about sustainability is about a change in the human trajectory that will require us to rethink old assumptions and engage the large questions of the human condition that not long ago were thought to have been solved once and for all.

The things that cannot be sustained are clear. The ongoing militarization of the planet, along with the greed and hatred that feeds it, are not sustainable. Sooner or later a roll of the dice will come up Armageddon, whether in the Indian subcontinent, in the Middle East, or by an accidental launch, acts of a rogue state, or an act of terrorism. A world with a large number of desperately poor cannot be sustained, because they have power to disrupt lives of the comfortable in ways that we are only beginning to appreciate, and it would not be worth sustaining anyway. The perpetual enlargement of the human footprint in nature cannot be sustained, because it will eventually overwhelm the capacity and fecundity of natural systems and cycles. The unrestrained development of any and all technology cannot be sustained without courting risks and adversity that we often see only in hindsight. A world of ever-increasing economic, financial, and technological complexity cannot be sustained, because sooner or later it will overwhelm our capacity to manage. A world divided by narrow, exclusive, and intense allegiances to ideology or ethnicity cannot be sustained, because its people will have too little humor, compassion, forgiveness, and wisdom to save themselves. Unrestrained auto-mobility, hedonism, individualism, and conspicuous consumption cannot be sustained, because they take more than they give back. A spiritually impoverished world is not sustainable, because meaninglessness, anomie, and despair will corrode the desire to be sustained and the belief that humanity is worth sustaining. But these are the very things that distinguish the modern age from its predecessors. Genuine sustainability, in other words, will come not from superficial changes but from a deeper process akin to humankind growing into a fuller stature.

The question then is, not whether we change, but whether the transition is done with more or less grace and whether the destination is desirable or not. The barriers to a graceful transition to sustainability, whatever form it may take, are not so much technological as they are social, political, and psychological. It is possible that we will be paralyzed by information overload leading to a kind of psychic numbness. It is possible that we will suffer what Thomas Homer-Dixon calls an "ingenuity gap" in which

problems outrun our problem-solving capacities (Homer-Dixon 2000). It is possible that the sheer scale and complexity of human systems will become utterly unfathomable, hence unmanageable. It is possible that we will fail to comprehend the nature of nature sufficiently to know how to live well on the Earth in large numbers. It is possible that we will fail to make a smooth transition, because of political ineptitude and a lack of leadership and/or because power is co-opted by corporations and private armies. It is possible that we will fail because the powers of denial and wishful thinking cause us to underestimate the magnitude of our problems and overlook better possibilities. And it is possible that we might fail because of what can only be called a condition of spiritual emptiness. The challenges of sustainability come hard on the heels of a century in which perhaps as many as 200 million people were killed in wars, ethnic conflicts, and extermination camps, taking a psychic toll that we dimly understand.

On the other hand it is possible, and I think likely, that the challenge of survival is precisely what will finally bring humankind together in the realization of the fragility of civilization and the triviality of most of our causes relative to the one central issue of survival. The overall challenge of sustainability is to avoid crossing irreversible thresholds that damage the life systems of Earth while creating long-term economic, political, and moral arrangements that secure the well-being of present and future generations. We will have to acknowledge that the Enlightenment faith in human reason is, in some measure, wrong. But this does not mean less enlightenment, but rather a more enlightened enlightenment tempered by the recognition of human fallibility—a more rational kind of reason. In this light the great discovery of the modern era is not how to make nuclear fire, or alter our genes, or communicate 24/7 at the speed of light but, rather, the discovery of our interconnectedness and implicatedness in the web of life (Capra 1996, 2002). What Thomas Berry calls the “Great Work” of the twenty-first century will be to comprehend what that awareness means in every area of life in order to calibrate human demands with what the Earth can sustain. Broadly speaking, the transition to sustainability poses four challenges.

First, we need more accurate models, metaphors, and measures to describe the human enterprise relative to the biosphere. We need a compass that defines true north for a civilization long on means and short on direction. On the one hand the conventional wisdom describes us as masters of the planet, destined to become ever more numerous and rich

without explaining how this is possible or why it might be desirable. In contrast, Howard and Elisabeth Odum argue, for example, “that many, if not all, of the systems of the planet have common properties, organize in similar ways, have similar oscillations over time, have similar patterns spatially, and operate within universal energy laws” (Odum and Odum 2001, 5). From the perspective of systems ecology, the efflorescence of humanity in the twentieth century is evidence of a natural pulsing. But having exhausted much of the material basis for expansion (Odum and Odum 2001, 85), like other systems, we are entering a down cycle, a “long process of reorganizing to form a lesser economy on renewable resources,” before another upward pulse (Odum and Odum 2001, 8). The pattern of growth/retreat they find in all systems stands in marked contrast to the rosy assumptions of perpetual economic growth. For the Odums smart policy would include plans for a prosperous descent, to avoid an otherwise catastrophic collapse. The specific tasks they propose are to “stabilize capitalism, protect the Earth’s production of real wealth, and develop equity among nations” (Odum and Odum 2001, 133).

Archeologist Joseph Tainter (1988) proposes a similar model based on the rise and collapse of complex societies. Collapse eventually occurs when “investment in sociopolitical complexity . . . reaches a point of declining marginal returns” (Tainter 1988, 194). In Tainter’s view, this is “not a fall to some primordial chaos, but a return to the normal human condition of lower complexity” (Tainter 1988, 198). Patterns of declining marginal returns he believes are now evident in some contemporary industrial societies in areas of agriculture, minerals and energy production, research, health care, education, and military and industrial management. Like the Odums, Tainter regards expansion and contraction as parts of a normal process. But how do we know whether we are in one phase or the other? The answer requires better accounting tools that relate human wealth generation to some larger measure of biophysical health. The Odums propose the concept of *emergy*, or what they define as “the available energy of one kind that has to be used up directly and indirectly to make a product or service” (Odum and Odum 2001, 67). By their accounting, the amount of embodied energy in solar equivalent units gives a more accurate picture of our relative wealth than purely financial measures. Others are developing different tools to the same purpose of including natural capital otherwise left out of purely economic accounting.

Second, the transition to sustainability will require a marked improvement and creativity in the arts of citizenship and governance (Carley and

Christie 2000). There are some things that can be done only by an alert citizenry acting with responsive and democratically controlled governments. Only governments moved by an ethically robust and organized citizenry can act to ensure the fair distribution of wealth within and between generations. Only governments prodded by their citizens can act to limit risks posed by technology or clean up the mess afterward. Only governments and an environmentally literate public can choose to adopt and enforce standards that move us toward a cradle-to-cradle materials policy. Only governments acting on a public mandate can license corporations and control their activities for the public benefit over the long term. Only governments can create the financial wherewithal to rebuild ecologically sound cities and dependable public transportation systems. Only governments acting with an informed public can set standards for the use of common property resources, including the air, waters, wildlife, and soils. And only governments can implement strategies of resilience that enable the society to withstand unexpected disturbances. Resilience means dispersed, not concentrated, assets, control, and capacity. A resilient society, for instance, would have widely dispersed manufacturing, many small farms, many small cities and towns, greater self-reliance, and few if any technologies vulnerable to catastrophic failure, acts of God, or human malice. Sustainability, in short, constitutes a series of public choices that require effective institutions of governance and a well-informed and politically engaged citizenry.

The third challenge, then, is to inform the discretion of the public through greatly improved education. The kind of education needed for the transition to sustainability, however, has little to do with improving SAT or GRE scores or advancing skills necessary to an expansionist phase of human culture. "During growth," in the Odums' words, "emphasis was on getting new information . . . but as resource availability declines, emphasis [will be] on efficiency in teaching information that we already have" (Odum and Odum 2001, 258). They suggest a curriculum organized around the study of the relationships between energy, environment, and economics and how these apply across various scales of knowledge. Students of all ages will need the kind of education and skills appropriate to building a society with fewer cars but more bicycles and trains, fewer large power plants but more windmills and solar collectors, fewer supermarkets and more farmers' markets, fewer large corporations and more small businesses, less time for leisure but more good work to do, and less public funding but more public spirit. The rising generation, then, must restore

natural capital of soils, forests, watersheds, and wild areas; clean up the toxic messes from the expansionist phase; build habitable cities; relearn the practices of good farming; and learn the arts of powering civilization on efficiency and sunlight. Education appropriate to their future, not the least, will require the courage to provide "intellectual leadership for the Long Run" based on a clear understanding of where we stand relative to larger cycles and trends (Odum and Odum 2001, 262).

Fourth, it is easy to offer long lists of solutions and still not solve the larger problem. The difficulty, once identified by E. F. Schumacher, is that human problems, like those posed by the transition to sustainability, are not solvable by rational means alone. These are what he called "divergent" problems formed out of the tensions between competing perspectives that cannot be solved, but can be transcended (Schumacher 1977, 120-33). In contrast to "convergent" problems that can be solved by logic and method, divergent problems can only be resolved by higher forces of wisdom, love, compassion, understanding, and empathy. The logical mind does not much like divergent problems, because it operates more easily with "either/or, or yes/no . . . like a computer" (Schumacher 1977). Recognizing the challenge of sustainability as a series of divergent problems leads to the fourth and most difficult challenge of all.

The transition to sustainability will require learning how to recognize and resolve divergent problems, which is to say a higher level of spiritual awareness. By whatever name, something akin to spiritual renewal is the *sine qua non* of the transition to sustainability. Scientists in a secular culture are often uneasy about matters of spirit, but science on its own can give no reason for sustaining humankind. It can, with equal rigor, create the knowledge that will cause our demise or that necessary to live at peace with each other and nature. But the spiritual acumen necessary to solve divergent problems posed by the transition to sustainability cannot be a return to some simplistic religious faith of an earlier time. It must be founded on a higher order of awareness that honors mystery, science, life, and death.

Specifically, the kind of spiritual renewal essential to sustainability must enable us to forgive the terrible wrongs at the heart of the bitter ethnic and national rivalries of past centuries and move on. There is no convergent logic or scientific solution that will enable us to transcend self-perpetuating hatreds and habitual violence. The only solution to this divergent problem is a profound sense of forgiveness and mercy that rises above the convergent logic of justice. The spiritual renewal necessary for

the transition must provide convincing grounds by which humankind can justify the project of sustainability. We are, in Lynn Margulis's words, "upright mammalian weeds" (Margulis 1998, 149). But is this all that we are or all that we can be? If so, we have little reason to be sustained beyond our sheer will to live. Perhaps this is enough, but I doubt it. A robust spiritual sense may not mean that we are created in the image of God, but it must offer hope that we may grow into something better than a planetary plague. A robust spirituality must help us go deeper in order to resolve what Ernest Becker once described as the "terror of death" (Becker 1973, 11) that "haunts the human animal like nothing else" (Becker 1973, ix). The effort, to deny the reality of our death, he believed, serves as "a mainspring of human activity" including much that we now see cannot be sustained. "Modern man is drinking and drugging himself out of awareness or he spends his time shopping, which is the same thing" (Becker 1973, 284). "Taking life seriously," he wrote, "means that whatever man does on this planet has to be done in the lived truth of the terror of creation, of the grotesque, of the rumble of panic underneath everything." In words written shortly before his own death Becker concluded, "The urge to cosmic heroism, then, is sacred and mysterious and not to be neatly ordered and rationalized by science and secularism" (Becker 1973, 284). No culture has gone farther than our own to deny individual mortality, and in the denying, it is killing the planet. A spirituality that allows us to face our own mortality honestly without denial or terror contains the seeds of the daily heroism necessary to preserve life on Earth. Instead of terror, a deeper spirituality would lead us to a place of gratitude and celebration.

## The Problem of Sustainability

(1992)

**T**HREE CRISES LOOM DEAD AHEAD. The first is a food crisis evident in two curves that intersect in the not too distant future: one showing worldwide soil losses of 24 billion tons, the other a rapidly rising world population. The second crisis is that caused by the era of cheap fossil energy and its conclusion. We are in a race between the exhaustion of fossil fuels, global warming, and the policy requirements necessary to transition to a new era based on efficiency and solar energy. The third crisis, perhaps best symbolized by the looming prospect of a global climate change, has to do with ecological thresholds and the limits of natural systems. We can no longer assume that nature will be either bountiful or stable or that the Earth will remain hospitable to civilization. These three crises feed upon one another. They are interactive in ways that we cannot fully anticipate. Together they constitute the first planetary crisis, one that will either spur humans to a much higher state or cause our demise. It is not too much to say that the decisions about how or whether life will be lived in the next century are being made now. We have a few decades, perhaps, in which we must make unprecedented changes in the way we relate to each other and to nature.

In historical perspective, the crisis of sustainability appeared with unprecedented speed. Very little before the 1960s prepared us to understand the dynamics of complex interactive systems and the force of exponential

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growth. A few prescient voices, including those of George Perkins Marsh, John Muir, Paul Sears, Fairfield Osborn, Aldo Leopold, William Vogt, and Rachel Carson, warned of resource shortages and the misuse of nature. But their warnings went largely unheard. Technological optimism, economic growth, and national power are deeply embedded in the modern psyche. The result is an enormous momentum in human affairs without as yet any good end in sight.

The crisis is unique in its range and scope including energy, resource use, climate, waste management, technology, cities, agriculture, water, biological resilience, international security, politics, and human values. Above all else it is a crisis of spirit and spiritual resources. We have it on high authority that without vision people perish. We need a new vision, a new story that links us to the planet in more life-centered ways. The causes of the crisis are related to those described by the early critics of modernity such as Marx, Weber, Durkheim, Dostoevsky, Freud, and Gandhi. But they dealt principally with the social effects of industrialization, not with its biophysical effects. It is our challenge to see both as parts of a single system. The anomie, rootlessness, and alienation of the modern world are part of a larger system of values, technologies, culture, and institutions which also produce acid rain, climate change, toxic wastes, terrorism, and nuclear bombs.

From one perspective these represent a set of problems, which by definition are solvable with enough money, the right policies, and technology. From another they are more accurately regarded as dilemmas for which there can be no purely technical solution. Put differently, can the values, institutions, and thrust of modern civilization be adapted to biophysical limits, or must we begin the task of creating something different? The answer hinges on what we believe to be the causes of unsustainability, which is to say, where and how we went wrong. What problems are we attempting to solve? How do these mesh with different policies, technologies, and behavior now proposed as solutions?

Five possibilities stand out. The crisis can be interpreted as a result of one or more social traps; it may stem from flaws in our understanding of the relation between the economy and the Earth; it could be a result of the drive to dominate nature evident in our science and technology; it may have deeper roots that can be traced to wrong turns in our evolution; or finally, it may be due to sheer human perversity. I am inclined to believe that any full explanation of the causes of our plight would implicate all five. They are like the layers of an onion: peel one off and you discover yet

another below. In the intellectual peeling, asking why leads to the next layer and to deeper levels of causation. I will consider these from the "outside in," from the most apparent and, I think, least problematic causes to deeper ones that become harder to define and more difficult to resolve.

### *The Crisis as a Social Trap*

The crisis of sustainability, in Robert Costanza's words, is in part the result of rational behavior in "situation(s) characterized by multiple but conflicting rewards. . . . Social traps draw their victims into certain patterns of behavior with promises of immediate rewards and then confront them with consequences that the victims would rather avoid" (Costanza 1987). Arms races, traffic jams, cigarette smoking, population explosions, and overconsumption are traps in which individually rational behavior in the near term traps victims into long-term destructive outcomes. With each decision, players are lured into behavior that eventually undermines the health and the stability of the system. In Garrett Hardin's famous essay "The Tragedy of the Commons," the villager rationally decides to graze an additional cow on an already overgrazed commons because the system rewards him for doing so. He can ignore the costs to others and eventually to himself because the system rewards individual irresponsibility. Similarly, the dynamic of technological competition, such as arms races, creates pressures to deploy a new device or weapon, only to be matched or overmatched by others, thereby raising the costs of deadlock and increasing the risks of system failure. In both cases the rewards are short-term and the costs are long-term and paid by all.

To the extent that the crisis of sustainability is a product of social traps in the way we use fossil energy, land, water, forests, minerals, and biological diversity, the solutions must in one way or another change the timing of payoffs so that long-term costs are paid up front as part of the purchase price. This is the rationale behind proposals for carbon taxes and life-cycle costing. Hardin's villager would be deterred from grazing another cow by having to pay the full cost of additional damage to the commons. The Pentagon's weapons addiction might be reversed by something like a tax on all weapons that could be used offensively in direct proportion to their potential destructiveness. In these and other instances, honest bookkeeping would deter entry into social traps.

The theory is entirely plausible. No rational decision maker willingly pays higher costs for zero net gain, and no rational society rewards

members to undermine its existence. To the contrary, rational societies would reward decisions that lead to long-term collective benefits and punish the contrary. A sustainable society, then, will result from the calculus of self-interest. This approach requires minimal change in existing values, and fits most of our assumptions about human behavior derived from economics.

The theory is vulnerable, however, to some of the same criticisms made of market economics. Do we have, or can we acquire, full information about the long-term costs of our actions? In most cases the answer is "no." Consumers who used freon-charged spray cans in the 1960s, thereby contributing to ozone depletion, could not be charged because no one knew the long-term costs involved. Given the dynamism of technology and the complexity of most human/environment interactions, it is not likely that many costs can be predicted in advance and assigned prices to affect decisions in a timely way. Some may not even be calculable in hindsight. But assuming complete information, would we willingly agree to pay full costs rather than defer costs to the future and/or to others? There is a peculiar recalcitrance in human affairs known to advertisers, theologians, and some historians. It has the common aspect of preference for self-aggrandizement in the short term, devil take the hindmost in the long term. People who still choose to smoke or who refuse to wear seatbelts persist, not because they are rational, but because they can rationalize. Some who risk life and livelihood for others do so not because these represent "rational" choices, as that word is commonly understood, but because of some higher motivation.

Efforts to build a sustainable society on assumptions of human rationality must be regarded as partial solutions and first steps. But recognition of social traps and designing policies to avoid them would constitute important steps in building a sustainable society. Why we fall into social traps and generally find it difficult to acknowledge their existence—that is, to behave rationally—leads to the consideration of deeper causes.

### *The Crisis as a Consequence of Economic Growth*

A second and related cause of the crisis of sustainability has to do with the propensity of all industrial societies to grow beyond the limits of natural systems. Economic growth is commonly regarded as the best measure of government performance. It has come to be the central mission of all developed and developing societies. In the words of political scientist

Henry Teune, "an individually based secular morality cannot accept a world without growth" (Teune 1988, 111). Growth, he asserts, is necessary for social order, economic efficiency, equitable distribution, environmental quality, and freedom of choice. In the course of his argument we are instructed that agribusiness is more efficient than family farms, which is not true, that forests are doing fine, which is not true, and that we are all beneficiaries of nuclear power, which deserves no comment. Nowhere does Teune acknowledge the dependence of the economy on the larger economy of nature, or the unavoidable limits set by that larger economy. For example, humans now use, directly and indirectly, 40 percent of the net primary productivity of terrestrial ecosystems on the planet and are changing climate, exterminating species, and toxifying ecosystems. How much more of nature can we take without undermining the biophysical basis of civilization, not to mention growth? Professor Teune does not say.

The most striking aspect of arguments for unending growth is the presumption that it is the normal state of things. Nothing could be further from the truth. The growth economy along with much of the modern world is, in a larger view, an aberration. For perspective, if we compare the evolutionary history of the planet to a week's time, as David Brower proposes, the industrial revolution occurred 1/40th of a second before midnight on the seventh day, and the explosive economic growth since 1945 occurred in the last 1/500th of a second before midnight. In the words of historian Walter Prescott Webb, the years between 1500 and 1900 were "a boom such as the world had never known before and probably never can know again" (Webb 1975, 13). The discovery of a "vast body of wealth without proprietors" in the New World radically altered ratios of resources to people. But by the time Frederick Jackson Turner announced the closing of the American frontier in 1893, these ratios were once again what they had been in the year 1500. Technology, for Webb, offered no way out: "On the broad flat plain of monotonous living [he was from Texas] we see the distorted images of our desires glimmering on the horizons of the future; we press on toward them only to have them disappear completely or reappear in a different form in another direction" (Webb 1975, 282). Webb would not have been surprised either by the frantic expectations raised by various technological magic bullets or the ways in which they fail to meet overblown expectations. For him, the inexorable facts were the ratios of people to land and resources.

Twenty-two years later, a team of systems scientists at MIT armed with computer models came to similar conclusions about the limits to growth

(Meadows 1972). Their results showed that population and resource use could not continue to grow exponentially without catastrophic collapse in the later decades of the twenty-first century. Marked increases in resource efficiency and pollution control did not appreciably alter the results. Catastrophe in exponentially growing systems is not necessarily evident until it is too late to avert.

The assumption of perpetual growth raises fundamental questions about the theoretical foundations of modern economics. Growth does not happen without cause. It is in large part the result of a body of ideas and theories that inform, motivate, and justify economic behavior. In the twentieth century the world economy expanded by 1300 percent, but can growth continue at this pace in the next century? Mainstream economists are evidently still in agreement with conclusions reached by Harold Barnett and Chandler Morse in 1963:

Advances in fundamental science have made it possible to take advantage of the uniformity of matter/energy—a uniformity that makes it feasible, without preassignable limit, to escape the quantitative constraints imposed by the character of the earth's crust. . . . Science, by making the resource base more homogeneous, erases the restrictions once thought to reside in the lack of homogeneity. In a neo-Ricardian world, it seems, the particular resources with which one starts increasingly become a matter of indifference. The reservation of particular resources for later use, therefore, may contribute little to the welfare of future generations. (Daly 1980, 8)

Or as Harvard economist Robert Solow once said, "The world can, in effect, get along without natural resources." For Julian Simon, resources "are not finite in any economic sense" (Simon 1980, 17). Human ingenuity is "the ultimate resource" (the title of Simon's book) and will enable us to overcome constraints that are merely biophysical.

Nonetheless, a different economics is emerging, rooted in the fact that "the economic process consists of a continuous transformation of low entropy into high entropy, that is, into irrevocable waste" (Georgescu-Roegen 1971, 281). The laws of thermodynamics, which say that we can neither create nor destroy energy and matter and that the process goes from ordered matter, or "low entropy," to waste, or "high entropy," set irrevocable limits to economic processes. We burn a lump of coal, low entropy, and create ashes and heat, high entropy. Faster economic growth only increases the rate at which we create high entropy in the form of waste, heat, garbage, and disorder. The destiny of the human species, according

to Georgescu-Roegen, "is to choose a truly great, but brief, not a long and dull, career" (Georgescu-Roegen 1971, 304).

Economic growth is the sum total of what individuals make, grow, buy, sell, and discard. And at the heart of conventional growth economics, which purports to explain all of this, one meets a theoretical construct that economists have named "economic man," a proudly defiant moral disaster programmed to maximize his utility, which is whatever he is willing to pay for. By all accounts this includes a great many things and services that used to be freely included as a part of the fabric of life in societies with village greens, front porches, good neighbors, sympathetic saloon keepers, and competent people. Economic man knows no limits of discipline, or obligation, or satiation, which may explain why the growth economy has no logical stopping point, and perhaps why good neighbors are becoming harder to find. Psychologists identify this kind of behavior in humans as "infantile self-gratification." When this kind of behavior is manifested by entire societies, economists describe it as "mature capitalism."

In a notable book in 1977, economist Fred Hirsch described other limits to growth that were inherently social (Hirsch 1976). As the economy grows, the goods and services available to everyone theoretically increase, except for those that are limited, like organizational directorships and lakeside homes, which Hirsch calls "positional goods." After basic biological and physical needs are met, an increasing portion of consumption is valued because it raises one's status in society. But, "if everyone in a crowd stands on tiptoe," as Hirsch writes, "no one sees better." Rising levels of consumption do not necessarily increase one's status. Consumption of positional goods, however, gives some the power to stand on a ladder. The rest are not necessarily worse off physically but are decidedly worse off psychologically. The attendant effects on economic psychology "become an increasing brake" on economic growth. Growing numbers of people whose appetites have been whetted by the promise of growth find only social congestion that limits leadership opportunities and status. Hirsch puts it this way:

The locus of instability is the divergence between what is possible for the individual and what is possible for all individuals. Increased material resources enlarge the demand for positional goods, a demand that can be satisfied for some only by frustrating demand by others. (Hirsch 1976, 67)

The results, which he describes as the "economics of bad neighbors," include a decline in friendliness, the loss of altruism and mutual obligation,



increased time pressures, and indifference to public welfare. Moreover, the pursuit of private and individual satisfaction by corporations and consumers undermines the very moral underpinnings—honesty, frugality, hard work, craftsmanship, and cooperation—necessary for the system to function. In short, after basic biological needs are met, further growth both “fails to deliver its full promise” and “undermines its social foundations” (Hirsch 1976).

The economist Joseph Schumpeter once made a similar argument. Capitalism, he thought, would ultimately undermine the attitudes and values necessary to its stability. “There is in the capitalist system,” he wrote in 1942, “a tendency for self-destruction” (Schumpeter 1962, 162). Robert Heilbroner argues similarly that business civilization will decline, not only because of pollution and “obstacles of nature,” but also because of the “erosion of the ‘spirit’ of capitalism” (Heilbroner 1976, 111). A business civilization inevitably becomes more “hollow” as material goods fail to satisfy deeper needs, including those for truth and meaningful work. Its demise will result from the “vitiating of the spirit that is sapping business civilization from within” (Heilbroner 1976, 115). At the very time that the system needs the loyalty of its participants most, they will be indifferent or hostile to it.

If the evidence suggests that economic growth is ecologically destructive, and soon to be constrained by biophysical and/or social limits, why do most economists want even more of it? A common answer is that growth is necessary to improve the situation of the poor. But this has not happened as promised. Rapid growth between 1980 and the market collapse of 2008 dramatically increased the concentration of wealth in the United States. The same pattern is evident worldwide, as the gap between the richest and poorest has widened from 3:1 in 1800 to perhaps 25:1 or more at present. Within poor countries, the benefits of growth predominantly go to the wealthiest, not to those who need them most. The importance of growth to the modern economy cannot be justified empirically on the grounds that it creates equity. Growth serves other functions, one of which is the avoidance of having to face the issue of fair distribution. As long as the total pie is growing, absolute but not relative wealth can be increased. If growth stops for any reason, the questions of distribution become acute. Political scientist Volkmar Lauber has made a good case that “the main motivation of growth . . . is not the pursuit of material gratification by the masses but the pursuit of power by elites” (Lauber 1978, 200). His case rests in part on analysis of public opinion polls in Europe and the United States showing only indifferent

support for economic growth and much stronger support for quality of life improvements. In other words, economic growth occurs, not because people demand it, but because elites do. Growth makes the wealthy more so, but it also gives substantial power to government and corporate elites who manage the economy, its technology, and all of its side effects.

From the perspective of physics and ecology, the flaws in mainstream economics are fundamental and numerous. First, the discipline lacks a concept of optimal size for the economy. Second, as Daly argues, it mistakenly regards an increasing gross national product as an achievement, rather than as a cost required to maintain a given level of population and artifacts. Third, it lacks an ecologically and morally defensible model of the “reasonable person,” helping to create the behavior it purports only to describe. Fourth, growth economics has radically misconceived nature as a stock to be used up. The faster a growing volume of materials flows from mines, wells, forests farms, and oceans through the economic pipeline into dumps and sinks, the better. Depletion at both ends of this stream explains what Wendell Berry calls the “ever-increasing hurry of research and exploration” driven by the “desperation that naturally and logically accompanies gluttony” (Berry 1987, 68). Fifth, growth economics assumes that the human economy is independent of the larger economy of nature, with its cycles and ecological interdependencies, and of the laws of physics that govern the flow of energy.

The prominence of the economy in the modern world, and that of growth economics in the conduct of public affairs, explains, I think, why we fall into social traps. The cultivation of mass consumption through advertising promotes the psychology of instant gratification and easy consumer credit, which create pressures that lead to risky technological fixes, perhaps the biggest trap of all. The discipline of economics has taught us little or nothing of the discipline imposed on us by physics and by natural systems. To the contrary, these are regarded as minor impediments to be overcome by substitution of one material for another, more ingenious technology, and the laws of supply and demand. But economics is, in turn, a part of a larger enterprise to dominate nature through science and technology.

#### *The Crisis as the Result of the Urge to Dominate Nature*

At a deeper level, then, the crisis of sustainability can be traced to a drive to dominate nature that is evident in Western science and technology. But what is the source of that urge? One possibility, according to historian

Lynn White, is that the drive to dominate nature is inherent in Judeo-Christian values (White 1967). The writers of Genesis commanded us to be fruitful, multiply, and have dominion over the Earth and its creatures. We have done as instructed. And this, according to White, is the source of our problems. But the Bible says many things, some of which are ecologically sound. Even if it did not, there is a long time between the writing of Genesis and the onset of the problems of sustainability. An even larger gap may exist between biblical commandments generally and human behavior. We are enjoined, for example, to love our enemies, but as yet without comparable results. Something beyond faith seems to be at work. That something is perhaps found in more proximate causes: capitalism, the cult of instrumental reason, and industrial culture.

Lewis Mumford attributes the urge to dominate nature to the founders of modern science: Bacon, Galileo, Newton, and Descartes. Each, in Mumford's words, "lost sight of both the significance of nature and the nature of significance" (Mumford 1970, 82). Each contributed to the destruction of an organic worldview and to the development of a mechanical world that traded the "totality of human experience . . . for that minute portion which can be observed within a limited time span and interpreted in terms of mass and motion" (Mumford 1970, 57).

Similar themes are found earlier in writings of Martin Heidegger and Alfred North Whitehead and in the recent work of Carolyn Merchant, William Leiss, Morris Berman, Jacques Ellul, and nearly all critics of technology. With varying emphases, all argue that modern science has fundamentally misconceived the world by fragmenting reality, separating observer from observed, portraying the world as a mechanism, and dismissing nonobjective factors, all in the service of the domination of nature. The result is a radical miscarriage of human purposes and a distortion of reality under the guise of objectivity. Beneath the guise, however, lurks a crisis of rationality in which means are confused with ends and the domination of nature leads to the domination of other persons. C. S. Lewis said:

At the moment, then, of man's victory over nature, we find the whole human race subjected to some individual men, and individuals subjected to that in themselves which is purely "natural"—to their irrational impulses. Nature, untrammelled by values, rules the Conditioners and, through them, all humanity. (Lewis 1947, 79–80)

The crisis of rationality of which Lewis wrote is becoming acute with the advent of nuclear weapons and genetic engineering. In a remarkable

article entitled "The Presumptions of Science" in the journal *Daedalus* in 1978, biologist Robert Sinsheimer asked, "Can there be forbidden or inopportune knowledge?" (Sinsheimer 1978, 23–35). *Frankenstein* was Mary Shelley's way of asking a similar question 160 years earlier: is there knowledge for which we are unwilling or unable to take responsibility? It is common to believe that all knowledge—whatever its effects—is good and all technology unproblematic. These articles of faith rest, as Sinsheimer notes, on the belief that "nature does not set booby traps for unwary species" and that our social institutions are sufficiently resilient to contain the political and economic results of continual technological change. He recommends that "we forgo certain technologies, even certain lines of inquiry where the likely application is incompatible with the maintenance of other freedoms" (Sinsheimer 1978).

The idea that science and technology should be limited on grounds of ecological prudence or morality apparently struck too close to the presumptions of establishment science for comfort. Sinsheimer's article was met with a thundering silence. Science and technology are religion in Western culture. Research, adding to society's total inventory of undigested bits of knowledge, is now perhaps as holy a calling as saving the heathen was in other times. Yet the evidence mounts that unfettered scientific exploration, now mostly conducted in large, well-funded government or corporate laboratories, can sometimes add to the difficulties of building a durable society. Weapons labs create continual upward pressures on the arms race, independent of political and policy considerations. The same is true in the economy where production technologies displace workers, threaten the economies of whole regions, and introduce a constant stream of environment-threatening changes (for example, thousands of new chemicals introduced each year; synthetic fabrics substituted for cotton and wool; plastics for leather and cellulose; detergents for soap; chemical fertilizers for manure; fossil or nuclear energy for human, natural, or animal energy). In each case, the reason for the change has to do with economic pressures and technological opportunities. In historian Donald Worster's words, the problem posed by science and technology lies "in that complex and ambitious brain of *Homo sapiens*, in our unmatched capacity to experiment and explain, in our tendency to let reason outrun the constraints of love and stewardship" (Worster 1987, 101). For Worster, as for Sinsheimer, we need "the most stringent controls over research."

On the other side of the issue is the overwhelming majority of scientists, engineers, and their employers who regard science and technological innovation as inherently good and essential, either to surmount

natural constraints or to develop energy and resource efficiency necessary for sustainability. These two positions differ, not on the importance of knowledge, but over the kind of knowledge necessary. On the minority side are those seeking what Erwin Chargaff calls "old and solid knowledge," which used to be called wisdom. It has less to do with specialized learning and the cleverness of means than with broad, integrative understanding and the careful selection of ends. Such knowledge, in Wendell Berry's phrase, "solves for pattern." It does not result, for example, in the expenditure of millions of federal research dollars to develop genetically derived ways to increase milk production at the same time that the U.S. Department of Agriculture is spending millions to slaughter dairy herds because of a milk glut.

No one, of course, is against wisdom. But while we mass-produce technological cleverness in research universities, we assume that wisdom can take care of itself. The results of technical research are evident and most often profitable. Wisdom is not so easy—what passes for wisdom may be only eloquent foolishness. Real wisdom may not be particularly useful. The search for integrative knowledge would probably not contribute much to the gross national product, or to the list of our technological achievements, and certainly not to our capacity to destroy. As often as not, it might lead us to stop doing a lot of things that we are now doing, and to reflect more on what we ought to do.

But any attempt to control scientific inquiry and technology runs into three major problems. The first is that of separating the baby from the bathwater. Research needs to be done, and appropriate technologies will be important building blocks of a sustainable world. In this category, I would include research into energy efficiency and solar technologies, materials efficiency, the restoration of damaged ecosystems, how to build healthy cities and to revitalize rural areas, how to grow food in an environmentally sound manner, and the conditions of peace. These are things on which our survival, health, and prosperity depend. Without much effort, we could assemble another list of research that works in the opposite direction. The challenge before us is to learn how to make distinctions between knowledge that we need from that which we do not need, including that which we cannot control. This distinction will not always be clear in advance, nor would it always be enforceable. What is possible, however, is to clarify the relationship between technology, knowledge, and the goals of sustainability and to use that knowledge to shift public research and development expenditures accordingly.

A second problem is the real possibility that controls will undermine freedom of inquiry and First Amendment guarantees. Sinsheimer argues that freedom of inquiry should be balanced against other freedoms and values. Freedom of inquiry, in short, is not an absolute but must be weighed against other values, including the safety and survival of the system that makes inquiry possible in the first place. A third concern is the effectiveness of any system of controls. Sinsheimer proposes that limits be placed on funding and access to instruments, while admitting that past efforts to control science have often given license to bigots and book burners. Part of the difficulty lies in our inability to predict the consequences of research and technological change. Most early research is probably innocent enough, and only later does research become dangerous when converted into weapons, reactors, toxic chemicals, and production systems. Even these cannot automatically be regarded as bad without reference to their larger social, political, economic, and ecological context. If one society successfully limits potentially dangerous scientific inquiry, however, work by scientists elsewhere continues unless similarly proscribed. The logic of the system of research and technological development operates by the same dynamics evident in arms races or Hardin's tragedy of the commons. Failure to pursue technological developments, regardless of their side effects, places a corporation or a government at a potential disadvantage in a system where competitiveness and survival are believed to be synonymous.

There are no easy answers to issues posed by technology and science, but there is no escape from their consequences. At every turn, the prospects for sustainability hinge on the resolution of problems and dilemmas posed by that double-edged sword of unfettered human ingenuity. At the point where we choose to confront the effects of science and technology, we will discover no adequate philosophy of technology to light our path. Technology has expanded so rapidly, and initially with so much promise, that few thought to ask elementary questions about its relation to human purposes and prospects. Intoxication replaced prudence.

There is another way to see the problem. Perhaps much of our technology is not taking us where we want to go anyway. The thrust of technology has almost always been to make the world more effortless and efficient. The logical end of technological progress, as George Orwell once put it, was to "reduce the human being to something resembling a brain in a bottle" or "to make the world safe for little fat men." Our goal, Orwell thought, should be to "make life simpler and harder instead of softer

and more complex" (Orwell 1958, 201, 210). Making life simpler, however, requires only a fraction of the technology now available.

Technological extravagance is most often justified because it makes our economy more competitive, that is, it enables us to grow faster than other economies. In doing so, however, we find ourselves locked into behavior patterns that impose long-term costs for short-term gains. Beyond social traps, growth economics, and the drive to dominate nature are more distant causes having to do with human evolution and the human condition.

### *The Crisis as the Result of an Evolutionary Wrong Turn*

Perhaps in the transition from hunter-gatherer societies to agricultural and urban cultures we took the wrong fork in the road. That primitive hunter-gatherer societies more often than not lived in relative harmony with the natural world is of some embarrassment to the defenders of the faith in progress, and as anthropologist Marshall Sahlins reports, they did so at a high quality of life, with ample leisure time for cultural pursuits and with high levels of equality (Sahlins 1972). The designation of hunter-gatherers as "primitive" is a useful rationalization for cultural, political, and economic domination. In spite of vast evidence to the contrary, we insist that Western civilization should be the model for everyone else, but for most anthropologists there is no such thing as a superior culture, hence none that can rightly be labeled as primitive. Colin Turnbull concluded in *The Human Cycle* that in many respects hunter-gatherer tribes handled various life stages better than contemporary societies (Turnbull 1983). In Stanley Diamond's words, the reason "springs from the very center of civilization, not from too much knowledge but from too little wisdom. What primitives possess is the immediate and ramifying sense of the person, and . . . an existential humanity—we have largely lost" (Diamond 1981, 173).

If civilization represents a mistaken evolutionary path, what can we do? Human ecologist Paul Shepard once proposed a radical program of cultural restructuring that would combine elements of hunter-gatherer cultures with high technology and the wholesale redesign of contemporary civilization (Shepard 1973). Later, he argued for a more modest course that required rethinking the conduct of childhood and the need to connect the psyche with the Earth in the earliest years. Contact with earth, soil, wildlife, trees, and animals, he thought, is the substrate that orients adult

thought and behavior to life. Without this contact with nature, maturity is spurious, resulting in "childish adults" with "the world's flimsiest identity structures" (Shepard 1982, 124).

For all of the difficulty in translating the work of Sahlins, Diamond, Shepard, and others into a coherent strategy for change, they offer three perspectives important for thinking about sustainability. First, from their work we know more about the range of possible human institutions and economies. In many respects, the modern world suffers in comparison with earlier cultures from a lack of complexity, if not complicatedness. This is not to argue for a simple-minded return to some mythical Eden of the sort described by Rousseau but an acknowledgement that earlier cultures were not entirely unsuccessful in wrestling with the problems of life, nor we entirely successful. Second, from their work, we know that aggressiveness, greed, violence, sexism, and alienation are in large part cultural artifacts not inherent in the human psyche. Earlier cultures did not engender these traits nearly as much as mass-industrial societies have. Riane Eisler reinterprets much of the prehistorical record and concludes that the norm prior to the year 5,000 was peaceful societies that were neither matriarchal nor patriarchal (Eisler 1987). Third, the study of other cultures offers a tantalizing glimpse of how culture can be linked to nature through ritual, myth, and social organization. Our alienation from the natural world is unprecedented. Healing this division is a large part of the difference between survival and extinction. If difficult to embody in a programmatic way, anthropology suggests something of lost possibilities and future potentials. A fourth possibility remains to be considered, having to do with the wellsprings of human behavior.

### *The Crisis of Sustainability and the Human Condition*

In considering the causes of the crisis of sustainability, there is a tendency to sidestep the possibility that we are a flawed, cantankerous, willful, perhaps fallen, but certainly not entirely planet-broken race. These traits, however, may explain evolutionary wrong turns, flaws in our culture and science, and an affinity for social traps which describe the human condition. In psychologist Ernest Becker's words, "we are doomed to live in an overwhelmingly tragic and demonic world" (Becker 1973, 281). The demonic is found in our insatiable restlessness, greed, passions, and urge to dominate, whether fueled by Eros, Thanatos, fear of death, or the echoes of our ancient reptilian brain. At the collective level, there may be

what John Livingston calls "species ambition" that stems from our chronic insecurity. "The harder we struggle toward immortality," he writes, "the fiercer becomes the suffocating vise of alienation" (Livingston 1982, 79). We are caught between the drive for Promethean immortality, which likely takes us to extinction, and what appears to be a meaningless survival in the recognition that we are only a part of a larger web of life. Caught between the prospect of a brief, exciting career and a long, dull one, the anxious animal chooses the former. In this statement of the problem we can recognize a variant of Gregory Bateson's description of a double bind from which there is no purely logical escape.

Can we build a sustainable society without seeking first the Kingdom of God or some reasonable facsimile thereof? Put differently, is cleverness enough, or will we have to be good in both the moral and ecological sense of the word? And if so, what does goodness mean in an ecological perspective? The best answer to this question, I believe, was given by Aldo Leopold: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (Leopold 1966, 224-25). The essence of Leopold's land ethic is "respect for his fellow members, and also respect for the (biotic) community as such" (Leopold 1966). Respect implies a sense of limits, things one does not do, not because they cannot be done but because they should not be done. But the idea of limits, or even community, runs counter to the Promethean mentality of technological civilization and the individualism of laissez-faire economics. At the heart of both, David Ehrenfeld argues, is an overblown faith in our ability "to rearrange the world of nature and the affairs of men and women." But "in no important instance," he writes, "have we been able to demonstrate comprehensive successful management of our world, nor do we understand it well enough to be able to manage it in theory" (Ehrenfeld 1979, 105). Even if we could do so, we could never outrun all of the ghosts and fears that haunt Promethean men.

All theological explanations, then, lead to proposals for a change in consciousness and deeper self-knowledge that recognize the limits of human rationality. In Carl Jung's words, "we cannot and ought not to repudiate reason, but equally we must cling to the hope that instinct will hasten to our aid" (Jung 1965, 341). The importance of theological perspectives in the dialogue about sustainability lies in their explicit recognition of persistent and otherwise inexplicable tragedy and suffering in history, and in history to come—even in a world that is otherwise sustain-

able. This realism can provide deeper insight into human motives and potentials, and an antidote to giddy and breathless talk of new ages and paradigm shifts. Whatever a sustainable society may be, it must be built on the most realistic view of the human condition possible. Whatever the perspectives of its founders, it must be resilient enough to tolerate the stresses of human recalcitrance. Theological perspectives may also alert us to the need to cultivate qualities of compassion and tolerance in the certainty that a sustainable society will require a great deal of it. They also alert us to the desirability of scratching where we itch. If we can fulfill all of our consumer needs, desires, and fantasies, as cornucopians like Julian Simon or devotees of technology and efficiency predict, there may be other nightmares ahead, of the sort envisioned by Huxley in *Brave New World* or that which afflicted that early student of paradox, King Midas. There is good reason not to get everything we want, and some reason to believe that in the act of consumption and fantasy fulfillment, we are scratching in the wrong place. But it is difficult to link these insights into a program for change; indeed the two may be antithetical. Jung, for one, dismissed the hyper intellectuality found in most rational schemes in favor of the process of metanoia arising from the collective unconscious. After a lifetime of reflection on these problems, Lewis Mumford could only propose grassroots efforts toward a decentralized, "organic" society based on "biotechnics" and "something like a spontaneous religious conversion . . . that will replace the mechanical world picture with an organic world picture" (Mumford 1970, 413).

#### *Conclusion: Causes in Historical Perspective*

The crisis of sustainability is without precedent, as is the dream of a sustainable global civilization. In attempting to build a durable social order, we must acknowledge that efforts to change society for the better have a dismal history. Societies change continually—but seldom in directions hoped for, for reasons that we fully understand, and with consequences that we can anticipate. Nor, to my knowledge, has any society planned and successfully moved toward greater sustainability on a willing basis. To the contrary, the historical pattern is, as Chateaubriand said, for forests to precede civilization, deserts to follow. The normal response to crises of carrying capacity has not been to develop a careful and thoughtful response meshing environmental demands with what the ecosystem can

sustain over the long run. Rather, the record reveals either collapse of the offending culture, or technological adaptation that opens new land (new sources of carbon), water, or energy (including slave labor to contemporary use of fossil fuels). Economic development has largely been a crisis-driven process that occurs when a society outgrows its resource base (Wilkinson 1973).

The argument, then, that humankind has always triumphed over adversity in the past and will therefore automatically meet the challenges of the future has the distinction of being at once bad history and irrelevant. Optimists of the "ultimate resource" genre neglect the fact that history is a tale written by the winners. The losers, including those who violated the commandments of carrying capacity, disappeared mostly without writing much. We know of their demise, in part, through painstaking archeological reconstruction that reveals telltale signs of overpopulation, desertification, deforestation, famine, and social breakdown—what ecologists call "overshoot."

Even if humankind had always triumphed over challenges, the present crisis of sustainability would be qualitatively different, without any historical precedent. It is the first truly global crisis. It is also unprecedented in its sheer complexity. Whether by economics, policy, passion, education, moral suasion, or some combination of the above, advocates of sustainability propose to remake the human role in nature, substantially altering much that we have come to take for granted, from Galileo to Adam Smith to the present. Most advocates of sustainability recognize that it will also require sweeping changes in the relations between people, societies, and generations. And all of these must, by definition, have a high degree of permanence.

Still, history may provide important parallels and perspectives, beginning with the humbling awareness that we live on a planet littered with ruins that testify to the fallibility of our past judgments and foresight. Human folly will undoubtedly accompany us on the journey toward sustainability, which further suggests something about how that journey should be made. This will be a long journey. The poet Gary Snyder writes of a 1000-year process. Economists frequently write as if several decades will do. Between the poet's millennia and the economist's decades, I think it is reasonable to expect a transition of at least several centuries. But the major actions to stabilize the vital signs of Earth and stop the hemorrhaging of life must be made much sooner.

History, however, gives many examples of change that did not occur,

and of other changes that were perverted. The Enlightenment faith in reason to solve human problems ended in the bloody excesses of the French Revolution. Historian Peter Gay said:

The world has not turned out the way the philosophes wished and half expected that it would. Old fanaticisms have been more intractable, irrational forces more inventive than the philosophes were ready to conjecture in their darkest moments. Problems of race, of class, of nationalism, of boredom and despair in the midst of plenty have emerged almost in defiance of the philosophes' philosophy. We have known horrors, and may know horrors, that the men of the Enlightenment did not see in their nightmares. (Gay 1977, 567)

So to the extent that the faith in reason survives, it is applied to narrow issues of technology. The difference, in Leo Marx's words, "turns on the apparent loss of interest in, or unwillingness to name, the social ends for which the scientific and technological instruments of power are to be used" (Marx 1987, 71). Similarly, Karl Marx's vision of a humane society became the nightmare of Stalin's Gulags.

In our own history, progressive reforms far more modest than those necessary for sustainability have run aground on the shoals of corporate politics. The high democratic ideals of late-nineteenth-century populism gave way to a less noble reality. One historian put it this way:

A consensus thus came to be silently ratified: reform politics need not concern itself with structural alteration of the economic customs of the society. This conclusion, of course, had the effect of removing from mainstream reform politics the idea of people in an industrial society gaining significant degrees of autonomy in the structure of their own lives. . . . Rather, . . . the citizenry is persuaded to accept the system as "democratic"—even as the private lives of millions become more deferential, anxiety-ridden, and less free. (Goodwyn 1978, 284)

A similar process is apparent in the decline of the reforms of the 1960s, which began with the high hopes of building "participatory democracy" described in the Port Huron Statement, only to tragically fall apart in chaos, camp, racism, assassinations, domestic violence, FBI surveillance, and a war that never should have been fought.

History is a record of many things, most of which were not planned or foreseen. And after Auschwitz, Hiroshima, the H-bomb, gulags, and killing fields we know that at best it is only partially a record of progress. It is

easy at this point to throw up one's hands and conclude with the Kentucky farmer who informed the lost traveler that "you can't get there from here." That conclusion, however, breeds self-fulfilling prophecies, fatalism, and resignation—perhaps in the face of opportunities, but certainly in the face of an overwhelming need to act. We also have the historical examples of Gandhi, Martin Luther King, and Albert Schweitzer that suggest a different social dynamic, one that places less emphasis on confrontation, revolution, and slogans and more on patience, courage, moral energy, humility, and nonpolarizing means of struggle. And we have the wisdom of E. F. Schumacher's admonition to avoid asking whether we will succeed or not and instead to "leave these perplexities behind us and get down to work" (Schumacher 1977, 140).

Finally, the word *crisis*, based on a medical analogy, misleads us into thinking that after the fever breaks, things will revert to normal. This is not so. As long as anything like our present civilization lasts, it must monitor and restrain human demands against the biosphere. This will require an unprecedented vigilance and the institutionalization (or ritualization) of restraints through some combination of law, coercion, education, religion, social structure, myth, taboo, and market forces. History offers little help, since there is no example of a society that was or is both technologically dynamic and environmentally sustainable. It remains to be seen how and whether these two can be harmonized.

## Two Meanings of Sustainability

(1988)

A SUSTAINABLE SOCIETY, as commonly understood, does not undermine the resource base and biotic stocks on which its future prosperity depends. In the words of Lester Brown, Christopher Flavin, and Sandra Postel, "a sustainable society is one that satisfies its needs without jeopardizing the prospects of future generations" (Brown et al. 1990, 173). To be sustainable means living on income, not capital. The word *sustainable*, however, conceals as much as it reveals. Hidden beneath the rhetoric are assumptions about growth, technology, democracy, public participation, and human values. The term entered wide public use with Lester Brown's book *Building a Sustainable Society* and with the International Union for Conservation of Nature's *World Conservation Strategy*, both of which appeared in 1980. In 1987, the Brundtland Commission adopted "sustainable development" as the pivotal concept in its report *Our Common Future*. As defined by the Brundtland Commission, development is sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987, 43). Sustainable development requires "more rapid economic growth in both industrial and developing countries." The commission, therefore, politely appeased both sides of the debate. The word *sustainable* pacifies

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environmentalists, while *development* has a similar effect on businessmen and bankers.

The phrase *sustainable development* raises as many questions as it answers. It presumes that we know, or can discover, levels and thresholds of environmental carrying capacity, which is to say, what is sustainable and what is not. But a society could be sustainable in a number of technology, population, and resource configurations. To be sustainable, for example, a larger population would have to live with less of almost everything per capita than a smaller society drawing on the same resource base. The phrase also deflects consideration about the sustainability and resilience of political and economic institutions, which certainly have their own limits. Third, the phrase seems to imply social engineering on an unlikely scale. Finally, the phrase suggests agreement about the causes of unsustainability, which does not exist. The dialogue about environment and development is mostly centered on discussion about policy adjustments or technological fixes of one sort or another. The deeper causes discussed in the previous chapter are seldom mentioned, perhaps because they raise the possibility that we are in much more dire straits than most care to believe.

In effect, the commission hedged its bets between two versions of sustainability, the first of which I will call "technological sustainability," the second, "ecological sustainability." In the most general terms, the difference is whether a society can become sustainable within the modern paradigms through better technologies and more accurate prices, or whether sustainability requires the transition to a culture that transcends the individualism, anthropocentrism, consumerism, nationalism, and militarism of modern societies. If regarded as successive stages, these are not necessarily mutually exclusive. To the contrary, I consider both to be necessary parts of a sustainable world. To use a medical analogy, the vital signs of the heart attack victim must be stabilized first or all else is moot. Afterward comes the longer-term process of dealing with the causes of the trauma, which have to do with diet and lifestyle. If these are not corrected, however, the patient's long-term prospects are bleak. Similarly, technological sustainability is about stabilizing planetary vital signs. Ecological sustainability is the task of finding alternatives to the practices that got us in trouble in the first place; it is necessary to rethink agriculture, shelter, energy use, urban design, transportation, economics, community patterns, resource use, forestry, the importance of wilderness, and our central values. These two perspectives are partly complementary,

nonetheless their practitioners tend to have very different views about the extent of our plight, technology, centralized power, economics and economic growth, social change and how it occurs, the role of public participation, and the importance of value changes and ultimately very different visions of a sustainable society.

### *Technological Sustainability*

Advocates of technological sustainability tend to believe that every problem has either a technological answer or a market solution. There are no dilemmas to be avoided, no domains where angels fear to tread. Resource scarcity will be solved by materials substitution, or genetic engineering. Energy shortages will be solved by more efficiency improvements, better technology, and, for some, nuclear power. The belief in technological sustainability rests on the following beliefs.

The first and most important of these is the assertion that humans, as Herman Kahn once said, should be "numerous, rich, and in control of the forces of nature." The goal of sustainable development in this sense is familiar to devout readers of the dominion passage in Genesis and to acolytes of Francis Bacon. From Bacon we found justification for the union of science and power that, in his words, would "command nature in action." Bacon sought, not truth as such, but a particular kind of truth that would lend itself to specific outcomes. His means of "vexing" nature were aimed to "squeeze and mould" her in ways more desirable to her interrogators and molders. Bacon's legacy is found in our time in the belief that nature can be "managed" by understanding and manipulating natural processes. The goal is to manage all "assets," whether human or natural, to promote economic growth. This assumes a great deal about human management abilities. For advocates of technological sustainability, ecology provides the scientific underpinnings for a system of planetary management. Technological sustainability is the total domination of nature plus population control. It is Gifford Pinchot with high technology.

Advocates of technological sustainability, second, believe that humans are best described by the model of economic man, who knows no limits of sufficiency, satiation, or appropriateness. Economic man maximizes gains and minimizes losses according to an internal schedule of preferences that does not distinguish between right and wrong. These assumptions are familiar to students of sociobiology and behaviorist psychology. In varying ways, both assume that humans are products of their



neurological structure, conditioning, genes, and appetites, not free choice informed by considerations of ethics and morality. This view, in Clifford Geertz's words, "is the moral equivalent of fast food, not so much artlessly neutral as skillfully impoverished" (Schwartz 1986, 325). The issue is not whether people are capable of being greedy or selfish—they most certainly are—but whether human nature makes them inescapably so, and whether society rewards such behavior or not. After reviewing what passes for scientific literature about human nature drawn from economics, sociobiology, and behavioral psychology, psychologist Barry Schwartz concludes that "each discipline is importantly incomplete or inaccurate even within its own relatively narrowly defined domain. . . . Even if we accept what the disciplines have to say within their own domains, there is no reason to accept their principles as a general account of what people are" (Schwartz 1986, 317).

The society created in the belief that people are incapable of rising above narrow self-interest will differ from one in which other assumptions prevail. In other words, our beliefs about our nature tend to become self-fulfilling prophecies which produce the behavior they purport only to describe.

Arguments for technological sustainability rest heavily on beliefs that humans as economic maximizers are incapable of the discipline implied by limits, even though they are somehow capable of the wisdom and good judgment necessary to manage all of the Earth's resources in perpetuity. This deeply pessimistic view of human potentials assumes that we cannot control our appetites, act for the common good, or wisely direct our collective energies.

Advocates of technological sustainability, moreover, believe that economic growth is essential. The World Commission on Environment and Development, for example, calls for a "new era of growth," by which they mean "more rapid economic growth in both industrial and developing countries, freer market access for the products of developing countries, lower interest rates, greater technology transfer, and significantly larger capital flows" (World Commission on Environment and Development 1987, 89). The commission plainly regards growth as the engine for sustainable development everywhere. James Gustave Speth, president of the World Resources Institute, in a more resigned fashion believes that "economic growth has its imperatives; it will occur." He cites a projection of a "five-fold expansion in world economic activity." Instead of the radical disbelief such numbers should elicit, he is "excited" by the prospects for

"greening" technology, as he puts it, and for the transformation of industry, eventually permeating "the core of the economies of the world" with ecological good sense (Speth 1989, 3–5).

*AUTHOR'S NOTE 2010: Speth has since come to a more pessimistic and, I think, realistic view. See Speth, 2008.*

This view raises several questions. First, since growth and environmental deterioration have occurred in tandem, how could they now be disassociated? It is not easy to envision sustainable growth in the main sectors of the industrial economy—energy, chemicals, automobiles, and the extractive industries. Newer parts of the economy, such as genetic engineering, remain unproven; they may spawn entirely new threats to the habitability of the planet. They will also lead to vast new concentrations of wealth with all that portends for democracy. And growth in the industrial world has not consistently helped the poor at home or abroad; to the contrary, the gap between the richest and the poorest is mostly widening. Why would growth in the developed world in even more precarious times lead to different results?

*AUTHOR'S NOTE 2010: "From 1979 to 2005 incomes for the highest earners increased almost fourfold, while the median income went up only 12 percent" (New York Times, March 24, 2010, p. A19).*

Second, advocates of technological sustainability are not clear on what it is that is being sustained: development, a new concept, or growth as more of the same with greater efficiency. The Brundtland Commission compounded the confusion by defining sustainable development as economic growth. Sustainable growth, in economist Herman Daly's words, "implies an eventual impossibility" of unlimited growth in a finite system (Daly 1988). Sustainable development, implying qualitative change, not quantitative enlargement, might be sustainable. The distinction is fundamental and usually overlooked. Because growth cannot be sustained in a universe governed by the laws of thermodynamics, we must confront issues of scale and sufficiency. "We need something like a Plimsoll line," Daly writes, "to keep the economic scale within ecological carrying capacity" (Daly 1988, 3). Carrying capacity, the total population times resource-use level that a given ecosystem can maintain, cannot be specified with precision. But neither can we be absolutely clear about other concepts in economic theory, such as time and money. Daly proposes three criteria to determine optimal scale: (1) it must be sustainable over the long term;

(2) there must be limits to human appropriation of global net primary productivity, which is now 25 percent or 40 percent of terrestrial primary productivity; and (3) from the work of Charles Perrings, "the economy [must] be small enough to avoid generating feedbacks from the ecosystem that are so novel and surprising as to render economic calculation impossible" (Daly 1988).

A related ambiguity concerns the relationships between developed and less developed economies. For example, growth in the developed economies depends on a steady flow of food, energy, and raw materials from the less developed world. The acres from which such food, timber, minerals, and materials are extracted and on which industrial economies depend constitute "ghost acreage," the land and resources outside national boundaries which supply the difference between consumption and resources. The use of ghost acres creates two problems. First, an imbalance is created by the price differential between exports of raw materials and imports of finished goods. Second, sellers of raw materials are highly vulnerable to price fluctuations and materials substitution. Together, they give ample reason for developing countries to selectively disengage from the global economy and chart alternative strategies for meeting basic needs. For theorists of sustainability, they raise practical and ethical questions. To what extent must population and resource use stay within the limits of regional or national carrying capacity? What level of imports of which commodities constitutes unsustainability? The Japanese, for example, have preserved their remaining forests at the expense of those in Alaska, Brazil, and Southeast Asia. In Daly's words, "a single country may substitute man-made for natural capital to a very high degree if it can import the products of natural capital from other countries which have retained their natural capital to a greater degree" (Daly 1988, 26). Either some must agree to remain undeveloped while others develop, or the structural disparity between developed economies and less developed economies must be rectified.

Advocates of technological sustainability often assume that the problems are those of inaccurate pricing and poor technology. Sustainability merely means getting the policy right, adjusting prices to reflect true scarcity and real costs, and developing greater efficiency in the use of energy and resources. And who will do this? For advocates of technological sustainability, the answer is policy makers, scientists, corporate executives, banks, and international agencies. Advocates rarely mention citizens, citizen groups, or grassroots efforts around the world. This perspective perhaps explains why the poor are often regarded as the cause of problems.

The authors of the World Resources Institute's (1985) study of tropical deforestation, for example, state that "it is the rural poor themselves who are the primary agents of destruction," none of whom were included as "task force members." Not surprisingly, those who control decisions about land tenure, or those who have systematically uprooted and undermined village economies that were once sustainable, were not mentioned. This perspective may reflect an inordinate desire to appear "reasonable," or it may come from the parochialism that enfogs (a new word) too many conferences in expensive settings that exclude people with calloused hands. Technological sustainability is largely portrayed as a painless, rational process managed by economists and policy experts sitting in the control room of the fully modern, totally computerized society, coolly pulling levers and pushing buttons. There is little evidence that its proponents understand democratic process or comprehend the power of an active, engaged, and sometimes enraged citizenry. This may also explain the near total neglect of environmental education in the Brundtland Commission report and other policy reports coming regularly from Washington think tanks. If sustainability is a top-down process, then an active, ecologically competent citizenry is irrelevant, and the effort to create such a citizenry through education is a diversion of scarce funds.

### *Ecological Sustainability*

A second approach to the issues of sustainability holds that we will not get off so easily. Wendell Berry, for example, writes, "We must achieve the character and acquire the skills to live much poorer than we do. We must waste less, we must do more for ourselves and each other" (Berry 1989, 19). This, however, has less to do with policy levers than it does with general moral improvement in society, which may not otherwise care to find policy levers. Ivan Illich similarly regards the goals of development as a fundamental mistake:

The concept implies the replacement of widespread, unquestioned competence at subsistence activities by the use and consumption of commodities; the monopoly of wage labor over all other kinds of work; redefinition of needs in terms of goods and services mass-produced according to expert design; finally, the rearrangement of the environment in such fashion that space, time, materials and design favor production and consumption while they degrade or paralyze use-value oriented activities that satisfy needs directly. (Illich 1981, 15)

According to Wolfgang Sachs, "eco-developers" (his term for advocates of technological sustainability) "transform ecological politics from a call for new public virtues into a set of managerial strategies." Without questioning the economic worldview, Sachs argues, one cannot question the "notion that the world's cultures converge in a steady march toward more material production" (Sachs 1989, 16-19). The alternative he proposes is one that regards development as a cultural process in which needs and their satisfaction arise from a vernacular culture. Ecological sustainability can be portrayed in terms of four characteristics.

#### *First*

Humans, they argue, are limited, fallible creatures. Wendell Berry, for example, writes:

We only do what humans can do, and our machines, however they may appear to enlarge our possibilities, are invariably infected with our limitations. . . . The mechanical means by which we propose to escape the human condition only extend it. And further: No amount of education can overcome the innate limits of human intelligence and responsibility. We are not smart enough or conscious enough or alert enough to work responsibly on a gigantic scale. (Berry 1989, 22)

Berry describes two different kinds of limits: those on our ability to coordinate and comprehend things beyond some scale and those inherent in our nature as creatures with a limited sense of the good and willingness to do it. Even if the first could be overcome, the second limit would remain to infect the results. In other words, we cannot escape our creaturehood, and we can compound our problems many times over in the attempt to do so.

#### *Second*

A second component of ecological sustainability has to do with the role of the citizen in the creation of a sustainable future. The modern world is one in which the corporation and the state are dominant over the small enterprise and the community. People in the modern world have become increasingly passive in their roles as consumers and employees. Sustainability in the postmodern world will rest on different foundations that require an active, competent citizenry. Lewis Mumford, writing in 1938, described this task, or what he called "regional development," in these words:

We must create in every region people who will be accustomed, from school onward, to humanist attitudes, co-operative methods, rational controls. These people will know in detail where they live and how they live: they will be united by a common feeling for their landscape, their literature and language, their local ways, and out of their own self-respect they will have a sympathetic understanding with other regions and different local peculiarities. (Mumford 1938, 386)

His approach to regional planning was based on the need to "educate citizens; to give them the tools of action, to make ready a background for action, and to suggest socially significant tasks to serve as goals" (Mumford 1938). Political scientist John Friedmann proposes a similar "escape" from our plight which involves the

re-centering of political power in civil society, mobilizing from below the countervailing actions of citizens and recovering the energies for a political community that will transform both the state and the corporate economy from within. (Friedmann 1987, 314)

His approach to "radical planning" is premised on the belief that

the great strength of American radicals is the self-organizing capacity of the American people on a local level, and the bastion of the national state is too powerful and too remote from the centers of radical practice to become an arena in its own right. This is not to say that the struggle cannot occasionally be carried to Washington, but in this huge country, America, the political life that holds promise is, for the time being, better concentrated in the diversity of its many local communities and the fifty states of the Union. (Friedmann 1987, 374)

Friedmann proposes to center the political life of the community on "restructured households that have shed their passivity and embraced the 'production of life' as their central concern." While acknowledging that the interdependent global economy will not unravel anytime soon, Friedmann, along with Daly and Cobb, proposes a selective de-linking of the economics and politics of local communities from those of the larger world (Friedmann 1987, 375-82). It is important to note that none of these advocate a return to parochial and closed communities or nations. Rather, they propose a process of rebuilding from the bottom up, seeing an active and competent citizenry as the foundation for a world appropriately linked.

Wendell Berry's comments about the "futility of global thinking" must be understood in this context. For Berry, global problems begin in the

realm of culture and character, for which there can be no national or international solutions separate from those that begin with competent, caring, and disciplined people living artfully in particular localities. Biologist Garrett Hardin similarly argues that most "global problems" are, in fact, aggregations of national or local problems, for which effective solutions can only occur at the same level. Even if this were not the case, top-down solutions are often inflexible, destructive, and unworkable. Even if this were not true, the best policies in the world will not save ecologically slovenly, self-indulgent people who are not likely to tolerate such policies in any case. In other words, the constituency for global change must be created in local communities, neighborhoods, and households from people who have been taught to be faithful first in little things.

Proponents of ecological sustainability, then, aim to restore civic virtue, a high degree of ecological literacy, and ecological competence throughout the population. This, in contrast to recent conservatism, begins by conserving people, communities, energy, resources, and wildlife. It is rooted in the Jeffersonian tradition of an active, informed, competent citizenry. A citizenry capable of conservation is a product of good homes, good farms, good communities, good churches and synagogues, good schools, and right livelihood. There is a synergy between an active, competent citizenry and visionary leadership. A country made up of good communities will tend to foster and support leadership, and real leaders will empower citizens and communities.

### *Third*

Ecological sustainability is rooted as much in past practices, folkways, and traditions as in the creation of new knowledge. Anthropologist Michael Redclift, for example, writes that "if we want to know how ecological practices can be designed which are more compatible with social systems, we need to embrace the epistemologies of indigenous people, including their ways of organizing their knowledge of their environment" (Redclift 1987, 151). One of the conceits of modern science is the belief that knowledge can be applied everywhere in the same manner. Traditional knowledge is mostly specific to a particular place and evolved over centuries. It is rooted in a local culture and serves as a source of community cohesion, a framework that explains the origins of things (cosmology), and provides the basis for preserving fertility, controlling pests, and conserving biological diversity and genetic variability. Knowledge is not separated from

the multiple tasks of living well in a specific place over a long period of time. The crisis of sustainability has occurred only when and where this union between knowledge, livelihood, and living has been broken and knowledge is used for the single purpose of increasing productivity. It may be, as Redclift says, that the "question is whether 'we' [the "developed" nations] are prepared for the cultural adaptation that is required of us" (Redclift 1987). For the most part, we have systematically uprooted both the kind of traditional knowledge of this sort and the people who created and preserved it. The loss of traditional knowledge, economist Richard Norgaard argues, is directly related to increased species extinction and the risks inherent in the rise of a single knowledge-economic system controlling agriculture worldwide. He writes:

The patchwork quilt of traditional agroeconomies consisted of social and ecological patches loosely linked together. The connections between beliefs, social organization, technology, and the ecological system were many and strong within each patch for these things co-evolved together. Between patches, however, linkages were few, weak, and frequently only random. The global agroeconomy, on the other hand, is tightly connected through common technologies, and international crop, fertilizer and pesticide, and capital markets. (Norgaard 1987)

For the present system, any failure of knowledge, technology, research, capital markets, or weather can prove highly destabilizing or fatal. Disruptions of any sort ripple throughout the system. Not so for traditional agroeconomic systems. A failure of one does not threaten others.

Finally, Norgaard notes that the "global exchange economy" treats all parts of the world the same regardless of varying ecological conditions. Since "the diversity of the ecological system is intimately linked to the diversity of economic decisions people make," there is a steady reduction of biological diversity. Biological diversity is a factor in social risks, since "agroeconomic systems with many components have more options for tinkering and happening upon a stable combination or for learning and systematically selecting combinations with stabilizing negative feedbacks" (Norgaard 1987).

Ecological sustainability will require a patient and systematic effort to restore and preserve traditional knowledge of the land and its functions. This is knowledge of specific places and their peculiar traits of soils, microclimate, wildlife, and vegetation, as well as the history and the

cultural practices that work in each particular setting. Sustainability will not come primarily from homogenized top-down approaches but from the careful adaptation of people to particular places. This is as much a process of rediscovery as it is of research.

#### *Fourth*

Proponents of ecological sustainability regard nature not just as a set of limits but as a model for the design of housing, cities, neighborhoods, farms, technologies, and regional economies. Sustainability depends upon replicating the structure and function of natural systems. John and Nancy Todd, for example, propose nine design precepts (Todd and Todd 1984, 18-92):

- The living world is the matrix for all design.
- Design should follow the laws of life.
- Biological equity must determine design.
- Design must reflect bioregionality.
- Projects should be based on renewable energy sources.
- Design should integrate living systems.
- Design should be coevolutionary.
- Building and design should heal the planet.
- Design should follow a sacred ecology.

Ecology is the basis for their work on the design of bioshelters (houses that recycle waste, heat and cool themselves, and grow a significant portion of the occupants' food needs) and in the design and construction of solar aquatic systems for purifying wastewater. In the design of solar aquatic waste systems, John Todd asks how nature would deal with organic wastes. The answer, he believes, lies in the creation of "living machines," ensembles of plants that perform specific functions necessary to remove human wastes, heavy metals, and toxics from water. Three working models confirm the theory at costs and performance levels superior to standard waste systems that require great amounts of energy and chemicals. Todd's living machines "are engineered with the same design principles used by nature to build and regulate its great ecologies in forests, lakes, prairies, or estuaries. Their primary energy source is sunlight. Like the planet they have hydrological and mineral cycles."

Todd sees the world as a "vast repository of biological strategies and components that might be integrated into a more coherent science and into economies wrapped in the wisdom of the natural world" (Todd 1990).

Amory and Hunter Lovins, cofounders of the Rocky Mountain Institute, similarly draw on ecology for the design of resilient technological systems. Resilience implies the capacity of technological systems to withstand external disturbances and internal malfunctions. Resilient systems absorb shock more gracefully and forgive human error, malfeasance, or acts of God. Resilience does not imply a static condition, but rather flexibility that permits a system "to survive unexpected stress; not that it achieve the greatest possible efficiency all the time, but that it achieve the deeper efficiency of avoiding failures so catastrophic that afterwards there is no function left to be efficient." Resilient systems exhibit certain qualities, including (Lovins and Lovins 1982)

- modular, dispersed structure;
- multiple interconnections between components;
- short linkages;
- redundancy;
- simplicity;
- loose coupling of components in a hierarchy.

Like the process of evolution, designers of resilient systems tend to follow the old precepts, such as, keep it simple stupid; if it ain't broke, don't fix it; you don't put all your eggs in one basket; and if anything can go wrong, it will. Resilience implies small-scale, locally adaptable, resource-conserving, culturally suitable, and technologically robust solutions whose failure does not jeopardize much else.

Wes Jackson uses the prairie as a model for ecologically complex farms that do not rely on tillage and chemical fertilizers. Ecologically and esthetically, they would resemble the original prairie that once dominated the Great Plains. For Wes Jackson, "the patterns and processes discernible in natural ecosystems still remain the most appropriate standard available to sustainable agriculture . . . what is needed are countless elegant solutions keyed to particular places" (Jackson and Piper 1989). Jackson's work follows that of Sir Albert Howard, who once proposed the forest as the model for agriculture:

Mother earth never attempts to farm without livestock; she always raises mixed crops; great pains are taken to preserve the soil and to prevent erosion; the mixed vegetable and animal wastes are converted into humus; there is no waste; the processes of growth and the processes of decay balance one another; ample provision is made to maintain large reserves of fertility; the greatest care is taken to store the rainfall; both plants and animals are left to protect themselves against disease. (Howard 1979, 4)

The case for regarding nature as a model for farms, housing, cities, technologies, and economies rests on three beliefs. First, the biosphere is a catalogue recorded over millions of years of what works and what does not, including life-forms and biological processes. The sudden intrusion of new technologies, chemicals, and other massive human impacts disrupts established patterns and introduces novel elements for which nature has no adaptive experience. In other words, human activity will be disruptive unless it is designed to fit within ecological processes and the carrying capacity of natural systems.

Second, ecosystems are the only model we have of stable organization in a world of change. The energy efficiency, closed loops, redundancy, and decentralization characteristic of ecosystems allow them to swim upstream against the force of entropy. Industrial systems, on the contrary, assume linearity, perpetual growth, and progress which increase entropy and decrease stability.

A third argument has overtones of mysticism and theories of vitalism. The Todds' "sacred ecology," for example, reflects the belief in an underlying structure which connects the human and natural worlds in an unknowable "metapattern." Similar interpretations are often made of the biosphere as portrayed in the Gaia hypothesis of James Lovelock and of Teilhard de Chardin's "noosphere," in which human intelligence and communications technology are presumed to be something like a planetary nervous system in the making.

Advocates of ecological sustainability use nature as a model, but they do not necessarily agree on how the model should be used. Does sustainable development require the restoration of natural systems as authentically as possible, or only the imitation of their structure and ecological processes? Restoration ecology is the best example of the former, while Wes Jackson's efforts to breed perennial polycultures that resemble prairies exemplifies the latter. Attempts to mimic nature and ecological processes may in time come to resemble Baconian science with its goal of total mastery. If, on the other hand, sustainability is interpreted to mean the restoration (and/or preservation) of natural systems as authentically as possible, letting natural selection do most of the work, then its advocates must develop a clear understanding of what is natural, what is not, and why the difference is important.

Among the most important implications of using nature as a model for human systems are issues of scale and centralization. If ecology is the model, should society be more decentralized? Surface-to-volume ratios

limit the size of biological organisms and physical structures. Are there similar principles of optimum size for cities, nations, corporations, and technologies? Leopold Kohr, E. F. Schumacher, and other proponents of decentralization supported decentralization and appropriate scale on three grounds, the first of which has to do with human limits to understand and manage complex systems. Wendell Berry similarly argues that the ecological knowledge and level of attention necessary to good farming limits the size of farms. Beyond that limit, the "eyes to acres" ratio is insufficient for land husbandry. At some larger scale it becomes harder to detect subtle differences in soil types, changes in plant communities and wildlife habitat, and variations in topography and microclimate. The memory of past events like floods and droughts fades. As scale increases, the farmer becomes a manager who must simplify complexity and homogenize differences in order to control. Beyond some threshold, control requires power, not stewardship. Grand scale creates islands of ignorance, small things that go unnoticed, and costs that go unpaid.

Is the same true of things other than farms? I think so, even if we cannot prescribe the ideal size of a city or corporation any more than we can define the exact number of acres one person can farm responsibly. To know the optimum farm size requires that we know the farmer's intelligence, skill, depth of motivation, energy level, age, state of marriage, type of land, and so forth. Appropriate scale is not an absolute but a continuum, bounded by the limits of nature and those of the mind. Disorder, breakdown, ugliness, and disease suggest that these limits have been transgressed. In the transition from Plato's ideal polis of 5000 to global cities of 20 million, neighborhoods unravel, pollution overwhelms local ecosystems, public health deteriorates, transportation becomes congested, civility declines, crime increases. But not all of these things happen at once. As scale increases, good things happen as well. Growing cities support symphony orchestras, but when they continue to grow, people are mugged leaving the symphony and acid rain dissolves the exterior marble of the civic auditorium. So we can speak only of a ratio of good to bad that gradually or precipitously declines as scale crosses some unknown threshold.

When obscure place names—Seveso, Bhopal, Three Mile Island, Chernobyl, Love Canal, Times Beach, Prince William Sound—become synonymous with disasters, a similar dynamic is at work in technological systems. In each case, large scale, complexity, improbability, and human error led in due time to what Charles Perrow describes as "normal

accidents," that is, events which are entirely predictable given enough time (Perrow 1984).

The thread connecting all questions of appropriate scale from farms to technological systems, then, has to do, first, with the human limits to comprehend and manage beyond some threshold of scale and complexity. Increasing scale increases the number of things that must be attended to and the number of interactions between components. Rising scale also increases the costs of carelessness. Preoccupation with quantity replaces the concern for quality: the farm becomes an agribusiness, the city become a megalopolis, the shop becomes a corporation, tools become complicated technologies, the legitimate concern for livelihood becomes an obsession with growth, and weapons become instruments of total destruction.

The second ground for decentralization and appropriate scale is that centralization and large scale undermine the potential for ethical action and increase the potential for mischief. As scale increases, it becomes easier to separate costs and benefits, creating winners and losers who are mostly strangers to each other. Ethical responsibility means paying the full costs for one's actions, or mutually agreed-upon compensation to those whose lot is it to pay them initially. Ethical behavior seems most likely when the decision maker's own hide is at stake. It still works fairly well if costs are levied against friends, neighbors, and relatives encountered face to face. The likelihood of ethical behavior, however, decreases with distance in time and space between beneficiaries and losers.

Scale can also make it difficult to assign responsibility. Who can be blamed for acid rain, human-induced climate change, species extinction, or "normal" accidents? In each case the costs are widely distributed while responsibility is diffused among political leaders, utilities, corporations, government agencies, and the consuming public.

Leopold Kohr argues, as the third ground for decentralization, that large scale, whether in nations or social organizations, provides the impetus for imperialism, war, and aggression: "For whenever a nation becomes large enough to accumulate the critical mass of power . . . it will become an aggressor" (Kohr 1978, 35). He draws the conclusion that wickedness derives from bigness and that "no misery on earth can be handled, except on a small scale" (Kohr 1978, 79). Smallness is nature's principle of health, bigness the principal cause of disease.

The paradigm of ecological sustainability has evolved an epistemology of sorts around the concept of interrelatedness. This epistemology

involves what Gregory Bateson called the "pattern that connects." This pattern always includes both observer and observed, subject and object. "We are not outside the ecology for which we plan," he says, "we are always and inevitably a part of it" (Bateson 1975, 1979). The search for interrelatedness is a revolt from Cartesian logic, reductionism, and the fragmentation characteristic of modern science, conventional economics, and even some of modern ecology. It also recognizes that the world is paradoxical and that our understanding of it will always be incomplete. We are makers of and participants in reality, not just observers. Where science has dismantled nature, we must study whole systems, linkages, processes, patterns, context, and emergent properties at higher systems levels. "Holistic science" cannot be conducted through the reductionist methods characteristic of much science. We cannot reach valid knowledge of nature simply by taking it apart and studying the pieces any more than we could understand human behavior from the study of anatomy.

The recognition of interrelatedness leads to equally radical changes in the conduct of human affairs. Conflict has often been essential to the existence of nations, churches, movements, and ideologies that identify themselves in opposition to something else. The tendency is to presume one's side to be the sole possessor of truth. But truth is no less uncertain, incomplete, relative, and paradoxical in human affairs than it is in the physical world described by Heisenberg or Einstein. It is a truism to say that we become that which we hate, but life is often like a dance of opposites, each necessary to the other. "Truth," in William Irwin Thompson's words, "cannot be expressed except in relationships of opposites" (Thompson 1987). We cannot fathom the unconscious drives and purposes which create irony and counterintuitive effects; anything like total truth is beyond our comprehension. We intend one thing and do the opposite. From this we can learn humility in the fact of unfathomable mystery and paradox. We can make no absolute distinctions between the self and the world. Treating others as we would have them treat us isn't just good for them; it's also in our own self-interest whether we like it or not. Goodness, mercy, justice, and ecological prudence have both survival value and spiritual rewards. Before rushing out to do good, however, we might reflect on how much of the world's misery began with good intentions. Competence in doing good is still an underdeveloped art.

*The Limits of Metaphors*

As with all concepts and metaphors, we must ask where that of ecological sustainability applies and where it does not. Two categories are particularly problematic. Cities will always be something of an exception to the model of natural systems. Under the best conditions, large urban areas will import substantial amounts of food, energy, water, and materials, and they will export roughly equivalent amounts of sewage, garbage, pollution, and heat. Many of these impacts could be reduced by better mass transit, careful urban planning that includes parks, systematic use of solar energy, urban-regional agriculture, urban reforestation, laws (like bottle bills) reducing material flows, and biological treatment of organic wastes. Nevertheless, although these measures significantly reduce environmental damage, they do not make cities "sustainable" such that the net environmental impact of urban concentrations is within the absorptive and healing capacities of the surrounding natural systems. The sheer concentration of large numbers of people will reduce environmental resilience, encroach on wildlife habitat, and impose significant ecological costs elsewhere. Urban concentrations must be justified on their contributions to intellectual, economic, and cultural life, not their sustainability. I do not think that cities have to be as ugly, formless, inhuman, and inefficient as we have made them. But given that we have urbanized badly, and cannot quickly undo what we have done, urban conglomerations cannot easily be made a harmonious part of a sustainable society. This is not an argument against cities, but rather one against megapolitan areas without plan or form. It is also one for "green cities" with greenbelts, urban parks, urban agriculture, and urban wilderness preserves.

Another and increasingly problematic area is that of technology. The cumulative effects of technology extend human power over nature so that we can transcend the limits of gravity, space, time, and biology and now, with computers, those of mind. In the process, we remove ourselves further and further from the natural conditions, both good and bad, that previously constrained human development. In a society that worships technology, questions of this sort are heresy. Technology is our declaration of independence from nature. As a user of airplanes, automobiles, computers, cell phones, and more, I am a cosigner. These things allow me to avoid a great many things about nature that I do not like. But this may be a Pyrrhic victory of convenience over substance. It may also reflect the domination of technology over free choice, since many of the technologies

I use I do so out of necessity. I would much prefer to travel by train, for example, but the passenger rail service is virtually nonexistent. Regardless, there can be no question that the use of technology is now the preeminent fact in modern societies. Whether it can be controlled and harnessed to the long-term benefit of humanity is the question of our civilization. If so, the goal of a sustainable society based on the model of natural systems is not necessarily antithetical to technology. The question then becomes what kind of technology, at what scale, and for what purposes. But we lack a philosophy of technology that could help us decide such things, and without much clarity, we are prone to what Langdon Winner has called "technological somnambulism," a "willing sleepwalk," a passive acceptance of whatever technologies are thrust upon us by whomever for whatever purposes. Because artifacts do have politics, in Winner's words, any decent philosophy of technology will be a political philosophy that clarifies the effects of technology on the distribution of power and control in society. It will also be a philosophy of nature because technological choices often have sweeping effects on ecosystems. An alternative, post-modern technology, in philosopher Frederick Ferre's view, would aim to optimize rather than maximize, to cultivate rather than manipulate, and to differentiate rather than centralize. The beginnings of postmodern technology are evident in solar technologies, in the development of regenerative farming practices, and, perhaps, in computers. Future advances in ecological technology will combine artifice and nature in subtle and ingenious ways representing a radically new departure that is neither a rejection of technology nor a sleepwalk along the edge of catastrophe.

The modern world has failed; a decent alternative world is still to be born. Transitions such as this are times of both promise and peril. The promise comes from the opportunity driven by necessity to reconsider, rethink, reform, restore, and rebuild our world and worldview. This process raises old issues and some new ones having to do with the balance between centralization and decentralization, urban and rural, freedom and order, individual and community, sacred and secular, organic and mechanical. The peril comes from the urgency, scope, and sheer numbers of problems coming down on us. The question is whether we can muster the intellectual clarity, goodwill, and moral power needed to make wise choices about the issues having to do with whether and how humanity survives.



libertarian idea of individual freedom. The original idea helped humanity surmount arbitrary authority of church, monarchy, and rigid hierarchy. But if we are to preserve diversity and a habitable Earth, we will need a more inclusive idea that does not confuse freedom with license. Edmund Burke, the founder of modern conservatism, put it this way:

Men are qualified for civil liberty in exact proportion to their disposition to put moral chains on their own appetites . . . society cannot exist unless a controlling power upon will and appetite be placed somewhere, and the less of it there is within the more there must be without. It is ordained in the eternal constitution of things, that men of intemperate minds cannot be free. Their passions forge their fetters. (Ophuls 1977, quoted in frontispiece)

Burke understood there can be no freedom amidst social chaos, nor can freedom exist in a state of ecological ruin. This level of sophistication requires that people understand the linkages between the limits to human actions and ecological health.

Finally, the protection of diversity will require a larger and yet more limited view of science and what it means to know. It is assumed, wrongly I think, that knowing is equivalent to measuring, explaining, and controlling. The protection of diversity will require, to the contrary, that we recognize reality and value that exist beyond our limited ability to measure and control. The fact is that biological diversity can be measured and described at a superficial level but can never be fully explained or known. The scientific impulse is to add something like “not yet,” in the faith that we will, given time, figure it all out. I think it more likely that the right word is *never*, in the recognition of the limits of human knowledge and the many ways that knowledge can be corrupted, co-opted, and misused. This is the kind of mature knowledge, once proposed by Aldo Leopold and Rachel Carson, rooted in the recognition of the kinship of all life and the limits of human knowledge. It is a science driven by wonder and disciplined by humility in the recognition that there are mysteries that we are powerless to name.

## All Sustainability Is Local: New Wilmington, Pennsylvania

(1994)

*AUTHOR'S NOTE 2010: I grew up in New Wilmington, Pennsylvania. In 1950, like many small towns, it was a great deal more sustainable than it was a half century later. It wasn't Nirvana in 1950, but neither was it as vulnerable to outside forces as it is now. There was a local economy that is now a shadow of what it once was. The principal reasons have to do with the practical effects of bad economic ideas that gave little thought for the morrow or consideration for real places and flesh-and-blood people. Looking back, however, is not just an exercise in nostalgia. On the contrary, it offers some standard by which to judge what we've lost and what we might relearn about practical sustainability and a workable future in particular places on what is becoming a different Earth.*

**I** GREW UP IN A SMALL TOWN amidst the rolling hills and farms of western Pennsylvania. As towns go, it wasn't much different from thousands of others throughout the United States. There were four churches and a small liberal arts college. It was a “dry” town filled with serious and hard-working Protestants and a disconcertingly large number of retired preachers and missionaries. It was not the kind of

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place that greeted Elvis and rock and roll with open arms. The prevailing political sensibilities were sober and overwhelmingly Republican of the Eisenhower sort. The town would have seemed stuffy and parochial to a Sherwood Anderson or a Theodore Dreiser, and it probably was. But for a little boy on a bicycle it was a paradise. By the standards of the 1990s, the town, the college, and its residents would have failed even the most lax certification for political correctness. It was a man's world, neither multicultural nor multiracial. The sexual revolution lay ahead. And almost everyone who was anyone in town bought without question the assumptions of midcentury America about our inherent virtue, the certainty of economic progress, the evils of Communism, and the beneficence of technology. J. Edgar Hoover was a hero. Boys were measured for manhood on the baseball diamond or the basketball court. It was also a place, like most others, in transition from one kind of economy to another.

Typical of most small towns, the main street of New Wilmington, Pennsylvania, still reflected bits of the nineteenth-century agrarian economy. There was, for example, a dilapidated and unused livery stable behind the main street, where a funeral parlor parked a hearse. On Main Street, Mr. Meeks operated his watch repair shop and Mr. Fusco had his shoe repair shop. There were locally owned and operated businesses, including two grocery stores, a hardware and plumbing store, a five and dime, a good bakery, an electronics/appliance store, a dairy store, a bank, a dry goods store, a magazine and tobacco shop, a movie theater, a building supply store, and a butcher shop. The train station was located two blocks from Main Street. A half mile to the east a local entrepreneur operated a tool-making plant. A quarter mile beyond, the town dump festered on the banks of Neshannock Creek.

The small-town, repair-and-reuse economy was predominantly locally owned and operated. My mother bought groceries from the store on Main Street. She bought vegetables from local farmers, including the Amish who went door to door selling everything from farm fresh eggs to maple syrup. Milk was delivered daily in returnable glass bottles by a locally owned dairy company. Soda pop also came in returnable glass bottles from a bottling plant 8 miles distant. Broken machinery could be repaired in town. Mr. Hoover sharpened dull saws for a dime, but his tales of local history were told for free. Grown men played summer "town ball" on baseball diamonds that sometimes doubled as pastures. Hand-me-down clothing was standard, and as the youngest of three I was the last stop for

lots of items. And some of the best Christmas presents I ever received were made by hand.

The forces that would undermine that sheltered world of small-town, midcentury America were on the march. But I knew nothing of these as I joined the great exodus of self-assured and expectant young people leaving their hometowns for some other place thought to offer greater opportunity and more excitement. Few of us could say with certainty why we were going or where we were headed other than that it was somewhere else and presumably upward. Nor could we have said what we were leaving behind.

Looking back, I can see that even then, things were changing as the larger industrial economy began to undermine local economies nearly everywhere. We bought our first television set the same year that Congress passed the National Interstate and Defense Highway Act. I recall the lights on the big shovel at the strip mine across the valley burning into the night. The contractor for whom I worked in the summer went out of business shortly after I graduated from college. The farmer who gave me part-time employment, and was thought to be the most progressive in the county, went bankrupt in 1975. He was not alone. People in New Wilmington now buy their milk in plastic jugs from interstate dairy cooperatives. The local bottling plant disappeared and with it the practice of returning bottles to the store. The nearby industrial cities of New Castle and Youngstown, Ohio, which I knew as busy and thriving manufacturing places, are now mostly derelict and abandoned, as are other cities in what was once a blue-collar industrial corridor stretching from Pittsburgh to Cleveland and on to Detroit. Interstate highways to the north and east of town now slash across what was once farm country. Tourism is the main economic hope. Drugs and interstate crime are growing problems.

In the years since the class of 1961 set out to find its way, world population has grown from 3.2 billion to 7 billion; carbon dioxide in the atmosphere went from about 318 parts per million to 392 and is still rising; perhaps a tenth of the life-forms on the Earth disappeared in that time, but no one knows for sure; a quarter of the world's rain forests were cut down; half or more of the forests in Europe were damaged by acid rain; careless farming and development caused the erosion of some 600 billion tons of topsoil worldwide; and the ozone shield was severely damaged. Before the class of 1961 is just a faint memory, the Earth may be about 2°C hotter, with consequences we can barely imagine; world population will be

pushing on to 9 billion; perhaps 25 percent of the Earth's species will have disappeared; and humans will have turned an area roughly equivalent to the size of the United States into desert. Something of earth-shattering importance went wrong in our lifetime, and we were not prepared to see it and so we became unwitting accomplices in the undoing of lots of things.

Looking back with more or less 20/20 hindsight, I believe that despite all of the many good things in my town, there were blind spots. First, and most obvious, we were taught virtually nothing of ecology, systems, and interrelatedness. But neither were many others. This was a blind spot for a country determined to grow and armed with the philosophy of economic improvement. As a consequence we knew little of our ecological dependencies or, for that matter, our own vulnerabilities. The orchard beside our house was drenched with pesticides every spring and summer, and we never objected. The blight of nearby strip mines grew year by year, and we saw little wrong with that either.

We grew up in a bountiful region, which was virtually opaque to us. In school I learned about lots of other places, but I did not learn much about my own. We were not taught to think about how we lived in relation to where we lived. The Amish farms nearby, arguably the best example we have of a culture that fits sustainably in its locality, were regarded as a quaint relic of a bygone world that had nothing to offer us. There was no course in high school or the local college on the natural history of the area. To this day, little has been written about the area as a bioregion. So we grew up mostly ignorant of the biological and ecological conditions in which we lived and what these required of us.

I finished high school the year before publication of Rachel Carson's (1962) *Silent Spring* but not before M. King Hubbert's 1957 projections of peak U.S. oil production and some of the best writings of Lewis Mumford, Paul Sears, Fairfield Osborn, and William Vogt and earlier writings of John Muir, John Burroughs, George Perkins Marsh, and Henry David Thoreau. Our teachers and mentors had been through the Dust Bowl years, the Great Depression, and World War II, but it was the Depression that seemed to have affected them most, and that fact could not help but affect us. Almost by osmosis we absorbed the purported lessons of economic hardship, but not those of ecological collapse, which can also lead to privation and economic failure. When it came time to rebel, we did so over such things as "lifestyle" and music. But we in the class of 1961 had little concept of *enough* or any reason to think that limits of any sort

were very important. Inadequate though it was, we did have an economic philosophy, but we had no articulate or ecologically solvent view of nature. We were sent out into the world armed with a creed of progress but had scarcely a clue about our starting point or how to "find our place and dig in," as poet Gary Snyder said we should. And none of us in 1961 would have had any idea of what those words meant.

Looking back, I can see a second missing element. On one hand I recall no skepticism or even serious discussion about technology. On the other, the college-bound students were steered into academic courses and away from vocational courses. As a result the upwardly mobile became both technologically illiterate and technologically incompetent. All the while, there was a gee-whiz kind of naïveté reinforced by advertisers hawking messages from a cartoon character "Reddy Kilowatt" about "living better electrically" and those from General Electric saying that progress was their "most important product." We bought it all without much thought. We were good at detecting the benefits of technology in parts per billion and did not suspect what it would someday cost us. Nor could we see the web of dependencies that was beginning to entrap us. The same "they" who would somehow figure it all out were taking the things that Americans once did for themselves as competent people, citizens, and neighbors and selling them back at a good markup. We were turned out into the world with the intellectual equivalent of a malfunctioning immune system, unable to think critically about technology. If we read Marlowe's *Faust* at all, we read it as a fable, not as a prophecy.

Had we known our place better, and had we been ecologically literate and technologically savvy, we still would have lacked the political wherewithal to be better stewards of our land and heritage. Our version of small-town, flag-waving patriotism was disconnected from the tangible things of livelihood and location, soils and stewardship. We mistook the large abstractions of nationalism, flag, and presidential authority for patriotism. Accordingly, we were vulnerable to the chicanery of Joe McCarthy and J. Edgar Hoover, and later to Lyndon Johnson's lies about Vietnam, Richard Nixon's lies about nearly everything, and Ronald Reagan's fantasies about "morning in America."

My classmates and I are, I think, typical of most Americans born and raised in the middle decades of the twentieth century. Ours has been a time of cheap energy, economic and technological optimism, lots of patriotic self-righteous huffing and puffing, and "auto-mobility." We are movers and we move on average 8 to 10 times in a lifetime. We were educated

to be competent in an industrial world and nigh onto useless in any other. We did not much question the values and assumptions of the industrial "paradigm" or those underlying notions of progress. Those were givens. We were turned out into the world, vulnerable to whatever economic, technological, or even political changes would be thrust upon us, as long as they were said to be economically necessary or simply inevitable. We were not taught to question the physical, biological, and psychological reordering of the world going on all around us. Nor were we enabled to see it for what it was—a kind of large-scale vandalism.

New Wilmington, Pennsylvania, is still a nice town. Having little industry, it has not suffered the rusting fate of the nearby industrial cities. It has also been spared some of the uncontrolled growth that has desecrated many other regions. Housing developments outside town, though, are now filling up what was once good farmland. Aside from the Amish, the local farm economy is a shadow of what it once was. The effects of acid rain are beginning to show on trees. To make ends meet, the region is increasingly dependent on tourism. New Wilmington, like most small towns, is an island at the mercy of decisions made elsewhere. It has been spared mostly because no one noticed it or thought it a place likely to be profitable enough for an interstate mall, mine, regional airport, a Disney World, or a new industrial "park." Not yet anyway. In the meantime, it too has become a full-fledged member of the throwaway economy, and its young people still depart in large numbers for careers elsewhere. You can't buy much on Market Street anymore. There is no one to repair watches or shoes, or sharpen saws, or sell appliances or dry goods or hardware or baked goods. People now drive to nearby shopping centers and distant malls. The trains don't run anymore.

Still, New Wilmington has gotten off lightly so far, but other towns and regions have not. Within a few miles, New Castle and Youngstown are industrial disaster areas. The landfill on the outskirts of my present hometown sells space for garbage from as far away as New York City. In southern Ohio, the nuclear processing plant at Fernald has spread radioactive waste over several hundred square miles. The same is true of Maxey Flats, Kentucky; Rocky Flats, Colorado; and Hanford, Washington, all sacrificed in the name of "national security." Urban sprawl and decaying downtowns afflict hundreds of other towns and cities throughout the United States. Mobile capital and a large dose of economic idiocy did what no invading army could have done to Cleveland and Detroit. Large chunks of footloose capital ravage other places. In northern Alberta,

Canada, Mitsubishi Corporation has invested over \$1 billion to build a pulp mill that will impair or destroy an ecosystem along with the indigenous culture. Others are wreaking havoc on a still larger scale to convert tar sands to fuels. Thousands of square kilometers of rain forest will be destroyed to supply Europe with cheap minerals and soybeans. The resulting devastation will not show up in the prices paid by Europeans. Nor will the devastation from the other mines, wells, clear-cuts, or feedlots around the world, which supply the insatiable appetite of the industrial economy, be subtracted from calculations of wealth. We are told that the gross world economy must increase fivefold by the middle of the century. That same global economy now uses, directly or indirectly, 25 percent of the Earth's net primary productivity. Can that increase fivefold as well?

Custodians of the conventional wisdom believe that economic growth is a good and necessary thing. Growth, in turn, requires capital mobility, free trade, and the willingness to take risks and make sacrifices. For the sake of growth, whole regions and entire industries may have to be sacrificed, as production and employment go elsewhere in search of cheaper labor and easier access to materials and markets. Such sacrifices are necessary, they say, so that "we" can remain competitive in the global economy and so that the things we buy can be as cheap as profit-maximizing corporations can make them.

Conventional wisdom denies the importance of place and environment in favor of global vandalism masquerading as progress. Its more progressive adherents believe that environmental improvement itself requires further expansion of the very activities that wreck environments. Devotees of the second piece of conventional wisdom ignore the political and ecological creativity of place-centered people, wishing us to believe that the same organizations that have ruined places around the world can be trusted to save the global environment.

On the contrary, a world that takes both its environment and prosperity seriously over the long run must pay careful attention to the patterns that connect the local and the regional with the global. I do not believe that global action is unnecessary or unimportant. It is, however, insufficient and inadequate. Taking places seriously would change what we think needs to happen at the global level. It does not imply parochialism or narrowness. It does not mean crawling into a hole and pulling the ground over our heads, or what economists call autarky. While we have heard for years that we should "think globally and act locally," these words are still more a slogan than a program. The national and the international

are still given a disproportionate share of our attention, and the local not nearly enough. But places, localities, and what William Blake once called "minute particulars" matter for many reasons.

First, we are inescapably place-centric creatures shaped in important ways by the localities of our birth and upbringing (Gallagher 1993; Tuan 1977). We learn first those things in our immediate surroundings, and these we soak in consciously and subconsciously through sight, smell, feel, sound, taste, and perhaps other senses we do not yet understand. Our preferences, phobias, and behaviors begin in the experience of a place. If those places are ugly and violent, the behavior of many raised in them will also be ugly and violent. Children raised in ecologically barren settings, however affluent, are deprived of the sensory stimuli and the kind of imaginative experience that can only come from biological richness. Our preferences for landscapes are often shaped by what was familiar to us early on. There is, in other words, an inescapable correspondence between landscape and "mindscape" and between the quality of our places and the quality of the lives lived in them. In short, we need stable, safe, interesting settings, both rural and urban, in which to flourish as fully human creatures.

Second, the environmental movement has grown out of the efforts of courageous people to preserve and protect particular places: John Muir and Hetch Hetchy, Marjory Stoneman Douglas and the Everglades, Horace Kephart and the establishment of the Great Smoky Mountains National Park. Virtually all environmental activists, even those whose work is focused on global issues, were shaped early on by a relation to a specific place. What Rachel Carson (1984) once called the "sense of wonder" begins in the childhood response to a place that exerts a magical effect on the ecological imagination. And without such experiences, few have ever become ardent and articulate defenders of nature.

Third, as Garrett Hardin argues, problems that occur all over the world are not necessarily global problems, and some truly global problems may be solvable only by lots of local solutions. Potholes in roads, according to Hardin, are a big worldwide problem, but they are not a "global" problem that has a uniform cause and a single solution applicable everywhere (Hardin 1993, 278; Hardin 1986, 145-63). Any community with the will to do so can solve its pothole problem by itself. This is not true of climate change, which can be averted or minimized only by enforceable international agreements. No community or nation acting alone can avoid climate change. Even so, a great deal of the work necessary to make the

transition to a solar-powered world that does not emit heat-trapping gases must be done at the level of households, neighborhoods, and communities.

Fourth, a purely global focus tends to reduce the Earth to a set of abstractions that blur what happens to real people in specific settings. An exclusively global focus risks what Alfred North Whitehead once called the "fallacy of misplaced concreteness" in which we mistake our models of reality for reality itself—equivalent, as someone put it, to eating the menu, not the meal. It is a short step from there to ideas of planetary management, which appeals to the industrial urge to control. Indeed, it is aimed mostly at the preservation of industrial economies, albeit with greater efficiency. Planetary managers seek homogenized solutions that work against cultural and ecological diversity. They talk about efficiency but not about sufficiency and the idea of self-limitation (Sachs 1992, III). When the world and its problems are taken to be abstractions, it becomes easier to overlook the fine grain of social and ecological details for the "big picture," and it becomes easier for ecology to become just another science in service to planet managers and corporations.

A final reason why the preservation of places is essential to the preservation of the world has to do with the fact that we have not succeeded in making a global economy ecologically sustainable, and I doubt that we will ever be smart enough or wise enough to do it on a global scale. All of the fashionable talk about sustainable development is mostly about how to do more of the same, but with greater efficiency. The most prosperous economies still depend a great deal on the ruination of distant places, peoples, and ecologies. The imbalances of power between large wealthy economies and poor economies virtually assure that the extraction, processing, and trade in primary products and the disposal of industrial wastes rarely will be done sustainably. Having entered the global economy, the poor need cash at any ecological cost, and the buyers will deny responsibility for the long-term results, which are mostly out of sight. As a result, consumers have little or no idea of the full costs of their consumption. Even if the sale of timber, minerals, and food were not ruinous to their places of origin, moving them long distances would still be. The fossil fuels burned to move goods around the world add to pollution and global warming. The extraction, processing, and transport of fossil fuels is inevitably polluting. And the human results of the global trading economy include the effects of making people dependent on the global cash economy with all that it portends for those formerly operating as self-reliant, subsistence

economies. Often it means leaving villages for overcrowded shantytowns on the outskirts of cities. It means growing for export markets while people nearby go hungry. It means undermining economic and ecological arrangements that worked well enough over long periods of time to join the world economy. It means Coca-Cola, automobiles, cigarettes, television, and the decay of old and venerable ways. The rush to join the industrial economy in the late years of the twentieth century is a little like coming on board the *Titanic* just after icebergs are spotted dead ahead. In both instances, celebrations should be somewhat muted.

The idea that place is important to our larger prospects comes as good news and bad news. On the positive side, it means that some problems that appear to be unsolvable in a global context may be solvable on a local scale if we are prepared to do so. The bad news is that much of Western history has conspired to make our places invisible and therefore inaccessible to us. In contrast to “dis-placed” people who are physically removed from their homes but who retain the idea of place and home, we have become “de-placed” people, mental refugees, homeless wherever we are. We no longer have a deep concept of place as a repository of meaning, history, livelihood, healing, recreation, and sacred memory and as a source of materials, energy, food, and collective action. For our economics, history, politics, and sciences, places have become just the intersection of two lines on a map, suitable for speculation, profiteering, another mall, another factory. So many of the abstract concepts that have shaped the modern world, such as economies of scale, invisible hands, the commodification of land and labor, the conquest of nature, quantification of virtually everything, and the search for general laws, have rendered the idea of place impotent and the idea of people being competent in their places an anachronism. This, in turn, is reinforced by our experience of the world. The velocity of modern travel has damaged our ability to be at home anywhere. We are increasingly indoor people whose sense of place is indoor space and whose minds are increasingly shaped by electronic stimuli. But what would it mean to take our places seriously?

It would mean restoring the idea of place in our minds by reordering educational priorities. It is commonly believed, however, that the role of education is only to equip young people for work in the new global economy in which trillions of dollars of capital roam the Earth in search of the highest rate of return. Those equipped to serve this economy, whom Robert Reich calls “symbolic analysts,” earn their keep by “simplifying reality into abstract images that can be rearranged, juggled, experimented

with, communicated to other specialists, and then, eventually, transformed back into reality” (Reich 1991, 177–9). Symbolic analysts “rarely come into direct contact with the ultimate beneficiaries of their work”; rather, they mostly

sit before computer terminals—examining words and numbers, moving them, altering them, trying out new words and numbers, formulating and testing hypotheses, designing or strategizing, They also spend long hours in meetings or on the telephone, and even longer hours in jet planes and hotels—advising, making presentations, giving briefings, doing deals. (Reich 1991, 179)

Symbolic analysts seem to be a morally anemic bunch whose services “do not necessarily improve society,” a fact that does not seem to matter to them, perhaps because they are too busy “mov[ing] from project to project . . . from one software problem to another, to another movie script, another advertising campaign, another financial restructuring” (Reich 1991, 185, 237). They are, in Reich’s words, “America’s fortunate citizens,” perhaps 20 percent of the total population, but they are increasingly disconnected from any interaction with or sense of responsibility for the other four-fifths (Reich 1991, 250). People educated to be symbolic analysts neither have loyalty to the long-term human prospect nor are prepared by intellect or affection to improve any place. And they are sure signs of the failure of the schools and colleges that presumed to educate them but failed to tell them what an education is for on a planet with a biosphere.

The world does not need more rootless symbolic analysts or rootless people of any kind. It needs instead millions of young people equipped with the vision, moral stamina, and intellectual depth necessary to rebuild neighborhoods, towns, and communities around the planet. The kind of education presently available will not help them much. They will need to be students of their places and competent to become, as Wes Jackson puts it, native to their places. They will need to know a great deal about new fields of knowledge, such as restoration ecology, conservation biology, ecological engineering, and sustainable forestry and agriculture. They will need a more honest economics that enables them to account for all of the costs of economic-ecological transactions. They will need to master the skills necessary to make the transition to a solar-powered economy. But who will teach them these things?

Taking places seriously means learning how to build local prosperity without ruining some other place. It will require a revolution in economic

thinking that challenges long-held dogmas about growth, capital mobility, the global economy, the nature of wealth, and the wealth of nature. My views about capital mobility and related subjects were influenced, no doubt, by growing up near a now derelict industrial city, a monument of sorts to mobile capital and failed ideas. Even the prosperous city of my memory, however, was an ecological disaster. On both counts, could it have been otherwise? What would "place-focused economies" look like (Kemmis 1990, 107)?

Historian Calvin Martin argued that the root of the problem dates back to the dawn of the Neolithic age and to the "gnawing fear that the earth does not truly take care of us, of our kind . . . that the world is not truly congenial to sapient Homo" (Martin 1992, 123). Perhaps this is why most indigenous cultures had no word for scarcity and why we, on the other hand, are so haunted by it. Long ago, out of fear and faithlessness, we broke our ancient covenant with the Earth. I believe that this is profoundly true. But we need not go so far back in time for workable ideas. Political scientist John Friedmann argued that in more recent times,

we have been seduced into becoming secret accomplices in our own evisceration as active citizens. Two centuries after the battle cries of Liberty, Fraternity, and Justice, we remain as obedient as ever to a corporate state that is largely deaf to the genuine needs of people. And we have forfeited our identity as "producers" who are collectively responsible for our lives. (Friedmann 1987, 347)

What can be done? While believing that "the general movement of the last six hundred years toward greater global interdependency is not likely to be reversed," Friedmann argued for "the selective de-linking of territorial communities from the market economy" and "the recovery of political community." This work can only be done, as he put it, "within local communities, neighborhoods, and the household" (Friedmann 1987, 385-7).

But communities everywhere are now vulnerable to the migration of capital in search of higher rates of return. In the case of Youngstown, Ohio, after the purchase of Youngstown Sheet and Tube by the Lykes Corporation and eventually the LTV Corporation, its profits were used to support corporate investments elsewhere (Lynd 1982). This money should have been used for maintenance and reinvestment in plant and equipment. Eventually the business failed, taking with it many other businesses. The decision to divert profits out of the community was made by

people who did not live in Youngstown and had no stake or interest in it as anything other than an abstraction on a balance sheet. Their decision had little to do with the productivity of the business and everything to do with shortsightedness and greed.

From this and all too many other cases like it, we can conclude that one requisite of resilient local economies is, as Daniel Kemmis states, "the capacity and the will to keep some locally generated capital from leaving the region and to invest that capital creatively and effectively in the regional economy" (Kemmis 1990, 103). This in turn means selectively challenging the "supremacy of the national market" where that restricts the capacity to build strong regional economies. It also means confronting what economist Thomas Michael Power calls a "narrow, market-oriented, quantitative definition of economics" in favor of one that gives priority to cultural, esthetic, and ecological quality (Power 1988, 3). Economic quality, according to Power, is not synonymous with economic growth. The choice between growth or stagnation is a false one that "leaves communities to choose between a disruptive explosion of commercial activity, which primarily benefits outsiders, while degrading values very important to residents and being left in the dust and decay of economic decline" (Power 1988, 114). There are alternative ways to develop that do not sell off the qualities that make particular communities desirable in the first place. Among these, Power proposed "import substitution" whereby local needs are increasingly met by local resources, not by imported goods and services. Energy efficiency, for example, can displace expensive imports of petroleum, fuel oil, electricity, and natural gas. Dollars not exported out of the community then circulate within the local economy, creating a "multiplier effect" by stimulating local jobs and investment.

Power, like Jane Jacobs in her 1984 book *Cities and the Wealth of Nations*, argues for development

built around enterprising individuals and groups seeing a local opportunity and improvising, adapting, and substituting. Initially, these efforts start on a small scale and usually aim to serve a local market. (Power 1988, 186)

This approach stands in clear contrast to the standard model of economic development whereby communities attempt to lure outside industry and capital by lowering local taxes and regulations and providing free services, all of which lower the quality of the community.

The development of place-focused economies requires questioning old economic dogmas. The theory of free trade, for example, originated

in an agrarian world in which state boundaries were relatively impermeable and capital flows stopped at national frontiers (Daly 1993; Daly and Cobb 1989, 209–35; Morris 1990, 190–95). These conditions no longer hold. Goods, services, and capital now wash around the world, dissolving national boundaries and sovereignty. Labor (i.e., people) and communities, however, are not so mobile. Workers in the developed world are forced to compete with cheap labor elsewhere, with the result of a sharp decline in workers' income (Batra 1993). For previously prosperous communities, free trade means economic decline and the accompanying social decay now evident throughout much of the United States.

In place of free trade, World Bank economist Herman Daly and theologian John Cobb recommend "balanced trade" that limits capital mobility and restricts the amount that a nation can borrow by importing more than it exports (Daly and Cobb 1989, 231). To restore competitiveness where it has been lost, they recommend enforcing national laws designed to prevent economic concentration (Daly and Cobb 1989, 291). To build resilient regional economies, they recommend enabling communities to bid for the purchase of local industries against outside buyers. To the argument that international capital is necessary for the development of third and fourth world economies, they respond that

we have come, as have many others, to the painful conclusion that very little of First World development effort in the Third World, and even less of business investment, has been actually beneficial to the majority of the Third World's people. . . . For the most part the Third World would have been better off without international investment and aid [which] destroyed the self-sufficiency of nations and rendered masses of their formerly self-reliant people unable to care for themselves. (Daly and Cobb 1989, 289–90)

Daly and Cobb believe that economies should serve communities rather than elusive and mythical goals of economic growth.

Why does the idea that economies ought to support communities sound so utopian? The answer, I think, has to do with how fully we have accepted the radical inversion of purposes by which society is shaped to fit the economy instead of the economy being tailored to fit the society. Human needs are increasingly secondary to those of the abstractions of markets and growth. People need, among other things, healthy food, shelter, clothing, good work to do, friends, music, poetry, good books, a vital civic culture, animals, and wildness. But we are increasingly offered fan-

stasy for reality, junk for quality, convenience for self-reliance, consumption for community, and stuff rather than spirit. Business spends hundreds of billions of dollars each year to convince us that this is good. But virtually nothing is spent to inform us of other alternatives that are better, cheaper, and satisfying. Our economy has not, on the whole, fostered largeness of heart or spirit. It has not satisfied the human need for meaning or roots. It is neither sustainable nor sustaining.

Taking the environment seriously means rethinking how our politics and civic life fit the places we inhabit. It makes sense, in Daniel Kemmis's words, "to begin with the place, with a sense of what it is, and then try to imagine a way of being public which would fit the place" (Kemmis 1990, 41). I do not think it is a coincidence that voter apathy has reached near epidemic proportions at the same time that our sense of place has withered and community-scaled economies have disintegrated. As with the economy, we have surrendered control of large parts of our lives to distant powers.

Rebuilding place-focused politics will require revitalizing the idea of citizenship rooted in the local community. Democracy, as John Dewey observed, "must begin at home, and its home is the neighborly community" (Dewey 1954, 213). But neighborly communities have been eviscerated by the physical imposition of freeways, shopping malls, the commercial strip, and mind-numbing sprawl. The idea of the neighborly community has receded from our minds as the centralization of power and wealth has advanced. But neither vital communities nor democracy is compatible with economic and political centralization, from either the right or the left.

We need an ecological concept of citizenship rooted in the understanding that activities that erode soils, waste resources, pollute, destroy biological diversity, and degrade the beauty and integrity of landscapes are forms of theft from the commonwealth as surely as is bank robbery. Ecological vandalism undermines future prosperity and democracy alike. For too long we have tried to deal with resource abuse from the top down and have pitifully little to show for our efforts and money. The problem, as Aldo Leopold noted, is that for conservation to become "real and important" it must "grow from the bottom up" (Leopold 1991, 300). It must, in other words, become fundamental to the day-to-day lives of millions of people, not just to those few professional resource managers working in public agencies.

Ecologically literate people, engaged in and by their place, will discover



ways to conserve resources, to implement energy-efficiency programs that save thousands of dollars per household. They will discover ways to save farms through "community supported agriculture," where people pay farmers directly for a portion of their produce. They will limit absentee ownership of farmland and enable young farmers to buy farms. They will find the means to save historic and ecologically important landscapes. They will develop procedures to accommodate environmentalists and loggers, as did the residents of Missoula, Montana. They may even discover, as did residents of the Mondragon area of Spain or the state of Kerala in India, how to successfully address larger issues of equitable development (Whyte and Whyte 1988; Franke and Chasin 1991).

We are not without models and ideas, but we lack the vision of politics as something other than a game of winners and losers fought out by factions with irreconcilable private interests. The idea that politics is little more than the pursuit of self-interest is embedded in American political tradition, at least from the time James Madison wrote the 10th Federalist Paper. It is an idea, however, that tends to breed the very behavior it purports only to describe. In the words of political scientist Steven Kelman, "design your institution to assume self-interest, then and you may get more self-interest. And the more self-interest you get, the more draconian the institutions must become to prevent the generation of bad policies" (Kelman 1988, 51). Kelman proposed that institutions be designed not merely to restrain the unbridled pursuit of self-interest but to promote "public spirited behavior" in which "people see government as an appropriate forum for the display of the concern for others" (Kelman 1988). The norm of public spiritedness also changes how people define their self-interest. This is, I believe, what Vaclav Havel meant when he described "genuine politics" as "a matter of serving those around us: serving the community, and serving those who will come after us" (Havel 1992, 6). The roots of genuine politics are moral, originating in the belief that what we do matters deeply and is recorded "somewhere above us."

Is it utopian to believe that our politics can rise to public spiritedness and genuine service? I think not. Evidence shows that we are in fact considerably more public spirited than we have been led to believe, not always and everywhere to be sure, but more often than a cynical reading of human behavior would show (Kelman 1988, 43, notes 38-41). On the other hand, it is utopian to believe that the politics of narrow self-interest will enable us to avert the catastrophes on the horizon that can be forestalled only by foresight and collective action.

### *Conclusion*

Western civilization irrupted on the Earth like a fever, causing, in historian Frederick Turner's words, "a crucial, profound estrangement of the inhabitants from their habitat." We have become, Turner continued, "a rootless, restless people with a culture of superhighways precluding rest and a furious penchant for tearing up last year's improvements in a ceaseless search for some gaudy ultimate" (Turner 1980, 5). European explorers arrived in the "new world" spiritually unprepared for the encounter with the place, its animals, and its peoples. American settlers' discontent spread to native peoples who were caught in the way. None were able to resist either the firepower or the seductions of technology.

More than just a symbol of a diseased spiritual state, that fever is now palpably evident in the rising temperature of the Earth itself. A world that takes its environment seriously must come to terms with the roots of its problems, beginning with the place called home. This is not a simple-minded return to a mythical past but a patient and disciplined effort to learn and, in some ways, to relearn the arts of inhabitation. These will differ from place to place, reflecting various cultures, values, and ecologies. They will, however, share a common sense of rootedness in a particular locality.

We are caught in the paradox that we cannot save the world without saving particular places. But neither can we save our places without national and global policies that limit predatory capital and that allow people to build resilient economies, to conserve cultural and biological diversity, and to preserve ecological integrities. Without waiting for national governments to act, there is a lot that can be done to equip people to find their place and dig in.

## Place as Teacher

(2006)

*Once in his life a man . . . ought to give himself up to a particular landscape in his experience, to look at it from as many angles as he can, to wonder about it, to dwell upon it. He ought to imagine that he touches it with his hands at every season and listen to the sounds that are made upon it. He ought to imagine the creatures there and all the faintest motions of the wind. He ought to recollect the glare of noon and all the colors of the dawn and dusk.*

N. SCOTT MOMADAY

I HAVE LIVED IN NINE PLACES in my life, but I dream about only one: a small valley in the southern Ozarks carved out over the last million years or so by a clear stream that the local people know as Meadowcreek. I lived in the Meadowcreek Valley for 11 years, and in some ways I still do and probably always will. As places go, it had a lot going against it. Meadowcreek was remote from some of the essential amenities of the good life. The nearest bank was 25 miles away. The nearest shopping mall was 100 miles to the south. The nearest town, Fox, was 3 miles distant by treacherous dirt roads. It has never made anyone's annual listing of the most desirable places to live. It had no Starbucks or fine restaurants. The general store on county highway 263 stocked mostly white bread, soft drinks, canned goods, cigarettes, and some hardware items. It functioned as the de facto town hall, where the conversation was slow but nonstop until a stranger wandered in to ask directions. The post office across the road was the only other establishment of note. There you could get

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your mail, opinions about the weather, and a sympathetic hearing about what hurt. Within a quarter mile of the post office were four churches, all of the kind that connect Christianity with sin, tears, redemption in the blood, and *glory* spelled with a capital G, punctuated by hallelujahs. JD's garage was down the road a bit, along with most of the mechanical detritus he'd accumulated over a half century of repairing all manner of things. He would take nothing more than \$2 for a tire change. The vacant building across an unpaved street housed any number of dreams. Donny Branscomb tried to make a go of a café there, but people in Fox don't eat out much and selling coffee and cigarettes didn't pay his bills. His next line of work was driving a tour bus out of Little Rock.

The surrounding Ozark hills have little of the grandeur of the Rockies, or of the Appalachian Mountains, for that matter, although they are scenic enough. Summers can be brutally hot and muggy. If the heat and humidity don't kill you, the ticks and saber-toothed chiggers might. The Ozark region looks something like a parallelogram stretching along an axis from east central Missouri southwest into Oklahoma. What are called mountains in the Ozarks are not particularly mountainous; the highest elevations seldom exceed 2000 feet. For all of their rural charm, the Ozarks remain an economic backwater roughly equidistant between St. Louis and Little Rock, and Memphis and Tulsa. To the south, I-40 runs east and west. To the northwest, I-44 runs between Joplin, Missouri, and St. Louis. In between, hardly a straight stretch of highway can be found. If you manage to get in, it's not easy to get out. Stay long enough and you may not want to.

The word *Ozarks* came from the French *Aux-Arcs*, which means "to the Arkansas post" (Rafferty 1980, 4). The French named them, but geology and water shaped them. Between the Precambrian and Pennsylvanian ages, most of the Ozarks were covered by an ancient sea. Sixty-five million years ago the first of a series of uplifts occurred, raising the Ozarks above the surrounding country. The resulting plateau is the highest ground between the Appalachians and the Rockies. The rugged landscape of the Ozarks, however, is the ongoing project of water working its will on land above an ancient seabed. The Ozarks are known for limestone caves, clear springs, and spectacular bluffs overlooking pristine, slightly bluish streams below.

The first human occupants of the region reportedly were Osage Indians. They were evicted in the early nineteenth century by land-hungry Scotch-Irish settlers spilling across Tennessee and Kentucky from the

Appalachians. These self-reliant settlers came armed with axes, biblical self-assurance fortified by homemade whiskey, and strong beliefs in the rights of property. This was not, however, as the Osage and later the Cherokee peoples surely noted, an equal opportunity belief. After the native people, the first thing to go was the virgin forests, which were cut over in less than 50 years. Prime Ozark white oak went to Memphis and St. Louis to make furniture, railroad ties, and barrel staves. Having sold their forests for a pittance, Ozark settlers turned to agriculture in earnest, but without much success. Their ideas about farming originated mostly in England, where, by comparison, soils were deep, topography was rolling, and rainfall tended to be gentle. In the Ozarks, however, thin rocky soils, steep hillsides, and summer drought punctuated by violent downpours typical of the southern midcontinent conspired against prosperity. Instead, the Ozark economy formed around subsistence farming with cattle, hogs, chickens, marginal timbering, and lots of doing without. All of this is to say that the nineteenth century settlers came with habits and expectations that did not fit well with the ecology and topography of the region. It is an old story.

If geology and water shaped the Ozark landscape, its mindscape was formed in the union of isolation with hardscrabble poverty. The difference between aspiration and situation was made up by evangelical religion, alcohol, resignation, folk music, and a love of the land. But the national stereotype of the Ozark personality created by Al Capp in his Dogpatch cartoons bears scant resemblance to the human reality. Ozark people, like rural people virtually everywhere, have learned to make do with what they have, which for the most part isn't much. On the whole, they do so without much self-consciousness of being victims of economic oppression or poverty. They'd much prefer being left alone to being helped. They are independent, self-reliant, often suspicious of outsiders, resistant to new ideas, and clannish, but not more parochial in their way than, say, cosmopolitan New Yorkers are in theirs. And if you have a choice of where to have your car break down at 2 AM some dark, rainy night, you'd be smart to arrange it in the Ozarks, where the word *neighbor* is still regarded as a verb.

Ecologically and culturally the Ozark region is a meeting ground. The oak, hickory, and ash forests are similar to those of the southern Appalachians, but I often found cactus on south-facing ridgetops, survivors of a hotter and drier age. Similarly, the humble armadillo, a native of the southeast, is migrating northward to take up residence in the Ozarks.

Not a few have become imbedded in the highway system. Culturally, too, the Ozarks are a meeting ground between the mountain culture of the Appalachians and the cowboy culture of the southwest. There were as many cowboy hats as baseball caps on the hat rack in the Rainbow Café in Mountain View. A rodeo came to town each fall but did not travel much farther east. There were a scattering of mailboxes with such and such "Ranch" posted on what otherwise looked a lot like a hill farm plus a few worn-out cows.

Split personality and all, few regions of the United States arouse such devotion and loyalty in their residents. Ozark people oftentimes think of themselves as part of the region first, before listing other and lesser loyalties to state, church, and nation. Many high school graduates stay put despite the lack of local opportunities for "upward mobility." Those who do leave rarely go far away, and they tend to return when they've saved enough money. There is a rich literature about the life and natural history of the region. The contrast between a region that seems to give so little yet arouse such a strong sense of place is striking. I grew up in western Pennsylvania, which, by comparison, is a lush land of milk and honey with rolling hills, fertile soils, and a temperate climate. Yet most of the people I knew while growing up had little sense of regional identity and only a superficial knowledge of the place. To this day I know of no significant book about the natural history of the region despite its apparent economic and ecological advantages. And once gone from Pennsylvania, few return.

Meadowcreek flows through the southwestern corner of Stone County in the Boston Mountains of the southern Ozarks toward the middle fork of the Little Red River. It is in Stone County, 110 miles due north of Little Rock. On government maps, Stone County ranks as the fifth poorest county in the 49th wealthiest state of the union. State bean counters were often moved to thank God for creating Mississippi—a thin statistical film between Arkansas and the bottom of the barrel.

The Meadowcreek Valley is 3 miles west of Fox, 3 miles southeast by jeep trail and deep faith from Flag, and about 5 miles north of the ghost town of Arlberg. Coming from any direction, however, you have to want to get there to get there. Few arrived by accident. It was a test of determination, nerves, tires, tie-rods, and brakes. Some found the precipitous descent into the valley on a rough, narrow, unpaved road with a sheer drop of 200 feet on one side something of a spiritual experience. I recall the driver of a semi truck who was delivering a load of concrete and forgot to

gear down at the top of the hill. Halfway down he'd exhausted the reservoir of air for his air brakes but in that omission found an urgent need for Jesus. At the bottom, one could infer from his incoherent stammer and the color of his face that he had undergone a high-speed conversion. He swore he'd never do it again.

The valley is 3 miles long, running north-south, by a mile to a mile and a half wide. To the north the valley forks into Bear Pen Hollow and another, unnamed hollow leading to Flag. To the south, the valley opens into a U-shaped gorge through which the middle fork of the Little Red River flows on its way to the White River. On each side, the valley floor rises up to flat benches and then rises more steeply to the ridgetops above. Rock outcroppings at the same elevation all around make the valley look like a giant bathtub with a crusty ring. From valley floor to ridgetop the elevation averages 600 feet.

From the bluff known as Pinnacle Point at the southwest corner of the valley, you can see the length of the Meadowcreek Valley to the north and the gorge cut by the middle fork to the south. Below, on the east side of the valley, is what remains of the Bond family homestead, an Arkansas "dogtrot" house with two rooms on either side of an enclosed walkway. Most people in Stone County were reportedly born, courted, married, or shot there. It now sits abandoned and derelict. Southwest of Pinnacle Point is Bee Bluff with a sheer rock face on the south side that looks as if it had been cut with a knife. On the bench immediately below the eastern face of the bluff is a wooded cemetery containing a catalog of rural tragedy and hardship chiseled on primitive tombstones.

Angel sent from God 1-12-1901  
Returned to her Savior 4-7-1903

At one time the valley reportedly had some 40 homesteads and the largest school in the county. Little remains other than the stones around an occasional well or door threshold and the daffodils that bloom each spring where once cabins stood. When we first arrived in the valley in the spring of 1979, the only human residents were a Baptist preacher and his sad-faced, heavily burdened wife, who rented a rundown house at the north end, and a couple the locals called hippies, who lived in what was left of an old homestead 2 miles to the south under the shadow of Pinnacle Point. Most of the valley was owned by a local doctor who used it for grazing cattle. Otherwise the land was becoming forest again. Fencerows were overgrown with cedar and greenbrier. Lichen-covered rock walls

were falling down. Deer, raccoon, and stray hunting dogs had the run of the place.

I first saw the valley on a somber, cold, and blustery February day in 1979. The region had been through some of the worst freeze-thaw weather that anyone could remember. Creeks were swollen by heavy rains, and the roads were nearly impassable, even in a four-wheel drive vehicle. We hiked and drove around the valley until well after dark, comforted somehow that we had seen it at its worst. Later, we discovered how relative that word can be. On our way out, in the darkness of evening, the road bottomed out and we were stuck in mud that nearly covered the wheels. We had passed a house a quarter mile or so back and slogged through the dark and the mud to ask for help. Before we could knock on the door a voice inside boomed out, "I figured you'd be acoming back. I'll get the tractor." His name was Lonnie Lee, a bull of a man in his prime, and as famous for his hospitality as for his temper. A logger and woodsman by profession, but a musician and storyteller at heart, Lonnie had us on our way, or so we thought. Another mile and we heard the sound of metal on stone and discovered that we had lost a tire in the mud and were traveling on three tires and one bare wheel. Things are like that in the Ozarks. Easy becomes hard. Fast goes slow. Certainties are less certain. Tires fall off. A spare change and we were on our way again. We moved into the valley the following June.

We came as interlopers to a place to which we had neither attachments nor roots. What we had were ideas, energy, a bit of cash, and a belief that we might do great and good things in that place. Our intent was to create an educational center without the disciplinary blinders, shortsightedness, and bureaucracy of conventional educational institutions. We found this place quite by serendipity; it was a good choice for reasons that we could not have known in advance and a poor choice for obvious reasons we refused to see. We, of course, became the first students and the place itself became both our tutor and the curriculum.

Like most Americans, I had not thought much about the importance of place. By 1979 I had lived in seven other locations and could not tell you much about them that you could not discover for yourself with a map and a day's tour. I fancied myself an environmentalist, but I would have flunked the most basic test of bioregional knowledge about the seven previous places where I'd lived. In this regard I was typical. On average, Americans are increasingly ignorant about where they live and how they are provisioned with food, energy, water, material, and the services of

nature. The reasons are not hard to find. We live like nomads, moving 8 to 10 times in a lifetime. Restlessness is part of the national psyche. America was discovered by tribes that walked east across the Bering Strait when it was above water, and later by Europeans who sailed from the opposite direction looking for India. Descendants of the latter included Daniel Boone, swarms of pioneers, armies of salesmen, herds of tourists, consultants by the thousands, and tribes of migrants in their fossil-fueled SUVs and mobile homes. Our cultural heroes have usually been one variation or another on the theme of lonely stranger who wanders into town and does some awesome and mostly violent thing, departs, and is never heard from again. The settlers who clean up the mess and get the kids back to school do not make such salable or salacious movie subjects. I know of no movie about, say, Henry David Thoreau, who said he did most of his traveling at home. What is the cause of our restlessness and our fascination with restlessness?

Perhaps it is hardwired into us; after all, many of our ancestral tribes migrated with the seasons and the food supply. That's true enough, but our mobility is driven by neither calories nor the calendar. It's a deeper kind of itch for opportunity, the chance to get rich, and the lure of excitement that infects bored people. With us, in other words, it's a mind thing, not a physical or even spiritual necessity. And movement can become addictive. A friend of mine drives an 18 wheeler for a living. He's tried to settle into a nine-to-five job at home but cannot do it for long to save himself or his family. A couple of weeks at home and he comes unglued and has got to get back on the road to preserve his sanity in an insane system. He just has it a bit worse than the rest of us.

We've made it easy to get up and go. First on post roads carved into the wilderness and then, in succession, canals, railroads, interstate highways, and airports: the great American motion sickness. We talk about colonizing space, and I suppose we may try that too. More likely, however, our restlessness will be met by purveyors of virtual reality who will sell us the simulated version of any fantasy or destination we—or they—can dream up. Want to go to the moon? Step into a virtual reality simulator and off you go! Reality, or their version of it, for a price.

This gets closer to the heart of the problem. Whatever our hardwiring, motion in service to fantasy is now the core of the national economy. Imagine for a moment what would happen if Americans one day decided to stay put. Car companies would go even more broke, along with all of the other companies that sell us roads, tires, gasoline, insurance, lodging,

and hamburgers. The national economy would collapse, and I think "they" know that very well, which explains why a sizable part of the national advertising budget is spent to keep us restless and on the go. Whatever wanderlust exists in the human soul has been amplified into a positive feedback system that goes like this: more roads and airports → more oil wells, oil spills, oil refineries, oil wars, military spending, mines, malls, Disney Worlds, sprawl, ugliness, pollution, and noise → fewer neighbors, neighborhoods, livable communities, distinctive places, and solitude → more people trying to escape → more roads and airports . . . a cycle of futility, destruction, violence.

Of course the lack of a sense of place is not just a function of rootlessness. It also has to do with the way we are fed, clothed, supplied, and fueled. Modern technology has unhitched us from our places. We are no longer competent to do much for ourselves. Most of us are effortlessly provisioned from distant agribusiness, feedlots, wells, mines, and factories that we know nothing about. We consign our wastes to other, equally unknown places. All of this is said to be economically efficient, but for whom, how, and how long is never explained, because it cannot be both explained and justified.

Our relation to our places has been further weakened by the American tendency to commercialize land so that places come to be regarded solely as real estate. For many people, however, land is abstract because they neither own any nor have easy access to it. The experience of place as an enduring relationship with a landscape and all of its life forms is increasingly unlikely for the 80 percent of Americans who live in urban areas and for the growing number on the downhill side of the middle class.

The weakening sense of place and the competence necessary to live well in a particular place is now epidemic in our culture. It is, I think, at the heart of what is called the ecological crisis. All of the numbers foreshadowing one disaster or another, all of the sigmoid trend lines surging upward and others in freefall, represent the sum total of our collective disconnectedness to the places in which we live and in which we earn our livelihood. The reasons are straightforward.

The growing distance between consumers and producers creates innumerable possibilities for political and ecological mischief. An economy grown to a global scale not only invites irresponsibility, it cannot work otherwise and remain profitable for the few who run it. The global economy entices consumers to consume more than they need. To do so they must be largely ignorant about the ecological and human consequences of

their consumption, including the effects of it on themselves. The global economy created the kind of dependence that breeds what Thomas Jefferson called "venality," which inevitably corrupts political life as thoroughly as it debases citizens. A global economy can only exist at a scale beyond the possibility of democratic control, and perhaps beyond control of any kind. It is defended, nonetheless, because of its supposed efficiency. But no estimate of its true efficiency can be made unless all of its costs can be known and compared with those of alternative ways to do the same or better things. Finally, by destroying all other economies and cultural possibilities, the global economy places the human future in extreme jeopardy. By homogenizing the human enterprise in the name of "development" or "progress," we are, in effect, betting it all on one roll of the dice.



In the late fall of 1983 we moved into a passive solar house that we built on the site of what had once been a steam-powered sawmill. Little of the mill remained but the rock pad where the boiler and steam engine once sat, along with rusted pipes, wrenches, axe heads, and bolts, all overgrown with greenbrier, cedar, and sweet gum. The place had become so overgrown that it was an eyesore to the few who traveled the dirt road that ran along the east edge of the site at the foot of a steep hill. The house was nestled in the arm of a steep hill to the east and a low boulder-strewn wooded hill to the north. Looking to the west through a patch of second-growth trees, across what local people called the "sand field," past Meadowcreek, the west ridge rose 600 feet to rock bluffs and chimney rocks at the top. To the south the house looked down the 3 miles of the Meadowcreek Valley to the gorge of the Middle Fork and the bluffs beyond. At night the only visible evidence of human occupation was a light at a Methodist church camp 7 miles distant.

I began to clear the site in spare time in the late fall of 1982, mostly because it offended my idea of what an edge ought to look like. Farm boundaries, fencerows, and the edges of fields, I'd learned, should be neat and manicured. And this was a conviction for which I was, then, prepared to shed blood. Those familiar with greenbrier may know how much blood can be shed in the clearing of roughly an acre of land overrun with it. As the brush, vines, briars, and small trees gave way, traces of the old sawmill became apparent. The owners of the mill had dug out a basin, long since overgrown, that collected water from a natural seep at the back of the site. This water was used to cool the boiler, which sat on a rock pad 15 feet long

by 5 feet wide, which had become anchored at one end by a giant sycamore tree. Heat had made the upper layers of rock brittle, so they could be broken apart by hand. Still, most of the rock was useful for building retaining walls around the house.

Remnants of rusty hand-forged tools and metalware lay all about: head blocks from the sawmill, old buggy-wheel rims, pipes, and other things I could not identify. My collection, carefully cleaned and painted with rust-resistant paint, was eventually attached to the side of my woodshed. The collection testified to human ingenuity and perseverance in the face of necessity. Some nameless person, for example, had taken two pieces of strap metal, hot-welded them together, and beveled one edge to make a workable chisel. We discovered dozens of wrenches, perhaps made by the same person with similar homespun resourcefulness. I showed one piece of rusty pipe split at the seams to an itinerant philosopher with a keen sense of place and a compassionate heart. He uttered a low sigh and said he hoped that the child who had forgotten to drain the boiler some frosty night long ago was not rebuked too harshly. So did I.

While I cleared the site, the place was working on me in its own fashion. Often I would stop work to gaze down the valley or look up at the bluffs to the west. I wondered who had owned the mill. What were they like? What kind of life did they have in this place? Why did they leave? Several hundred yards to the south at the end of the sand field, where Meadowcreek had once run diagonally across the valley floor, was the site of an ancient Osage Indian village recently excavated by local archeologists. What were their lives like here? Were they, in some sense, still here? The place, I tell you, had voices.

It also had sounds. Across the sand field, Meadowcreek, on its way to the Gulf of Mexico via the Middle Fork, White River, and Mississippi, tumbles over and around boulders the size of cars. The first heavy rains in the late fall would raise the water level, and the sound of rushing water would again fill the valley. In the late evening, owls in the woods across the field would begin their nightly conversations. Occasionally I'd join in until they discovered that I had nothing sensible to say, at which point they would descend into a sullen silence so as not to encourage me further. In the spring and early summer the chuck-will's-widows and tree frogs would hold their evening serenades. Once a month or so, a pack of coyotes would interrupt their raids on the local chicken houses to hold a symposium in the valley. Unlike owls, who converse patiently throughout the night, coyotes handle their business quickly, seldom taking longer

than 30 minutes, and then get back to work. By late fall the wind, which blows hot straight up the valley all summer long, shifts and comes cold down the valley out of the Bear Pen. Pieces of ancient seabed raised to bluff height would sometimes be heard breaking loose and crashing to the forest floor below. Except for an occasional pickup truck, however, few human-made sounds intruded on the symphony of wind and rushing water. And although humans in the past century had taken a terrible toll on the valley, the wounds were healing. One could imagine this as a wilderness in the remaking.

I do not recall when the thought of building a house in this place first came to us, but the logic of the location was clear. The site was sheltered from the north wind yet open to the summer sun and winds to the south. It was shaded from the blistering summer sun by woods on the west side, and daytime heat was tempered by cooler air descending in the night. Built in the valley, it was still high enough to be above the floodplain. And the view down Meadowcreek Valley framed by high ridges on either side was an endless and ever-changing delight. But logic was just a rationalization for holding a deeper conversation with a particular place and its nameless guardian spirits. We had to build there.

Once I invited a well-known cosmopolitan writer from San Francisco to give a talk at Meadowcreek to our students and staff on the theme of the importance of place. Her talk was sophisticated, smart, and full of allusions to great writers and big ideas. But she was honest enough to admit that she had no sense of place, only words and thoughts about it. By her own admission, place was only an alluring abstraction. In the back of the room, listening intently, were several Ozark women whose daily lives were lived to the rhythms and demands of place. They competently lived the reality, privations, pains, and joys the other woman for the most part could only talk about. They, however, could no more intellectualize about place and its importance than they could repeal the law of gravity or make their husbands give up tobacco and alcohol. Afterward, I asked several of them what they thought about the talk, to which they responded that they did not understand a word of it. "One who knows does not say and one who says does not know"—Lao-tzu.

Attachment to place grows by stealth, by which mere words and thoughts give way to something deeper. In time the boundary of the person and the place can become almost indistinguishable. There are people who die quickly when uprooted from their ancestral homes. I have come to believe that driving people from the places in which they are rooted is

about the most cruel punishment that one human can inflict on another. But I do not believe that one can plan to become attached or centered in a place. It takes time, patience, perhaps poverty, but most certainly a great deal of necessity. It cannot happen during a vacation, although a kind of infatuation with a place can occur in that length of time. It will not happen without something akin perhaps to a marriage vow, a commitment to a particular location for better or for worse. Can it happen in a city? Not likely, at least not likely in the cities that we've built. My urban friends will protest that they too have a sense of place. By my reckoning, however, what they have is a sense of habitat shaped by familiarity. The sense of place is the affinity for what nature, not humans, has done in a particular location and the competence to live accordingly.

I doubt that we can ever come to love the planet as some claim to do, but I know that we can learn to love particular places, and that will require a great deal of competence and forbearance. I believe that the love of place and the acceptance of the discipline of place, far from being a quaint relic of a bygone age, will prove to be essential to anything like a fair, decent, and durable civilization.

The world is now engaged in the early stages of what will be a very long and contentious debate about the human prospect in a future without cheap oil and on the brink of nasty climate surprises. On one side are those who see problems but not dilemmas and certainly no cause for alarm. A bit of technology here, a policy change there, add a dash of luck, and we will arrive at the magic kingdom of sustainability. In other words, we don't have to prove ourselves worthy, just clever. On the other side are those who believe that we must first "become native" to our places before all of these other things can be added unto us—a more arduous route, with the aroma of brimstone and repentance to it. Advocates of the former often prefer to eat organically grown vegetables and vacation far from the ecological effects of their vocation. Advocates of the latter sometimes motor about in four-wheel drive trucks, use chainsaws, and communicate by e-mail. Meanwhile the bottleneck ahead comes closer.

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We left the Meadowcreek Valley in June of 1990 after 11 years that changed us in more ways than I can say. We'd arrived in 1979 from one of the centers of wealth and power in American society: Chapel Hill, North Carolina. Fox, Arkansas, is by every measure at the periphery, and the world of power and wealth looks very different from the outside looking

in. I'd arrived full of the self-assurance of thinking myself well educated, knowledgeable, and armed with a compelling point of view. Eleven years later I knew how phony that assurance can be. We set out to create an educational experiment, a cross between places like Black Mountain College, Deep Springs College, and a few others at the periphery of American education and imagination. I thought my own education and background in and around the academy would be adequate to the challenge. From the age of 5 onward I had been in or around higher education as the son of a college president, a student, and a faculty member. I soon discovered how irrelevant much of that experience was. In all of that time, I recall few serious conversations about the purposes and nature of education and none at all about the adequacy of formal education relative to our role as members in the community of life. It was assumed that mastery of a subject matter was sufficient in order to teach others and that those very subjects are properly conceived and important.

In the 1970s I had grown disillusioned by the rigid separation of disciplines in the academy, its complacency, and its indifference to big questions about the human future. I was disillusioned, too, about what I perceived to be the separation of head, hands, and heart in the learned world. Education, it was assumed, began at the neck and worked up, but it dealt with only half of what remained. The other half, that part of mind where feeling, humor, poetry, and integration reside, was considered lacking in rigor by people who were often, I thought, unable to distinguish between rigor and rigor mortis. The resulting wars among head, hands, and heart and between the world of theory and practical experience were fought, but without much awareness, in every classroom, school, and college in the land and in the minds and lives of every student. Problems we often diagnose as ones of bad behavior and low motivation among those to be educated more likely reflect the miscalibration between schooling and our full humanity trying to break free; they are made more difficult by bad parenting and too much television, affluence, sugar, caffeine, and drugs.

The idea behind the Meadowcreek experiment was that we would draw a line around the 1500 acres we'd bought and make everything that happened inside that line curriculum: how we farmed the 250 acres of farmland, how we built, how we managed the 1200 acres of forest, how we applied the ecological knowledge necessary to manage the place, how we supplied ourselves with energy. We intended this valley to be a laboratory to study some of the problems of sustainable living and livelihood.



Our curriculum coalesced around sustainable agriculture, forestry, applied ecology, rural economic development, and renewable energy technology delivered through internships with college graduates, January terms, conferences, seminars, and scholar-in-residence programs. Broadly, if it had to do with the subject of sustainability, it was fair game for us. Over a decade or so, the number of conference guests, students, and visitors rose to several thousand per year, and the list of attendees, visiting faculty, and conference participants included a roster of the most prominent thinkers and activists in the country.

The place itself became part of the curriculum in ways we did not anticipate. The land, as Thoreau noted, had its own expectations lurking below all of our confident talk about education and our clumsy efforts to render place into pedagogy. Places have a mind of their own that we aren't privy to. The curriculum of that place came to include particular events, such as a 500-year flood, the hottest and driest summer on record, and the coldest winter ever recorded, along with the mysterious events we sterilize and pigeonhole with academic words like *ecology*, *forestry*, *botany*, *soil science*, and *animal behavior*.

One moonlit night I decided to walk south down the valley toward the Middle Fork, about an hour-long walk. On my return through the tree breaks, the moon rising above the east ridge, I became aware that I was being followed. The safety of home was a long way off. Heart racing, I quickened my pace through a tree break dividing one field from another, went another 20 paces or so, and then turned around. Following me close behind was a lone coyote, perhaps crossed with a bit of red wolf, a formidably large animal. I had no weapon and wasn't nearly fast enough to outrun it. But when I stopped, it stopped and then did not budge. We were eye to eye in the awkward, wordless boundary between species. His intentions were unknown to me, and, I suppose, mine were to him. Not knowing what else to do, I spoke a few words, assuming we ought to talk this out and that language might be an advantage of sorts. The coyote cocked his head to one side, ears perked up. He would occasionally look away and then look back with what I interpreted hopefully as a quizzical but slightly interested look on his face. I was encouraged and greatly relieved. After a few minutes of monologue and perked ears, I decided to sit down; he reciprocated. I took this as a good sign and continued to talk softly, even tried to sing a bit, and from time to time our eyes met and I heard him make something like a low yip, yip that sounded friendly

enough. Interspecies communication of sorts. By now the moon was nearly overhead and we were fully visible to each other. After what may have been 5 or 10 minutes, I stood up and he stood as well. I took one slow step forward; he responded by splaying out his feet, ready to bolt. Another step and he bounded off, turned and looked back, and then disappeared into the night. I stood and watched him fade into the trees along the creek and then walked home blessed in some nameless way.

I had ventured into the coyote's world of night foraging and mating, and I think he was simply curious about this lone, misplaced human. I had no weapon and no machine, which made me more approachable, and I think we did communicate in a fashion. Extending a bit further, he was both curious and courteous. And those who do not believe that animals think have never ventured alone and vulnerable into a conversation with one on its terms and in its native habitat. We still regard nature as a mere commodity and animals as abstractions, much as Descartes did. For the rising generation, the experience of nature, in any form, is rare, and it is increasingly alien to the enclosed curriculum of the academy where the matters of greatest consequence have to do with grade point averages, course units, careers, routines, tenure, and *US News & World Report's* annual ranking. And I think this to be a serious loss to our ability to think and to our humanity.

I had a PhD but had not been educated to think much about *education*, the Latin root for which means to draw forth. Who is qualified, and by what standards, to midwife the birth of personhood in another, or to spark another's mind into the state of awareness, or to properly appraise the results? What does it mean to be educated, and by what standard is that mysterious process appraised? In some circles, great stock is placed in the mastery of routine knowledge, what Brazilian educator Paulo Freiere describes as the banking model of education. Others, deemed more progressive, emphasize the process of learning, which mostly means the cultivation of a kind of disciplined curiosity. Both, however, conceive education, in philosopher Mary Midgley's word, as a form of "anthropolatry," the worship of human accomplishments, history, and mastery over nature. As anthropolatry, the study of nature is mostly intended to fathom how the world works so as to permit a more complete human mastery and a finer level of manipulation extending down into genes and atoms. My experience at Meadowcreek opened the door to the different possibility that education ought, somehow, to be more of a dialogue requiring the

capacity to listen in silence to wind, water, animals, the sky, nighttime sounds, and what a Native American once described as earthsong—the sort of things dismissed by anthropologists as romantic nonsense.

Confronted by the mysteries of a place I did not know, and slightly bookish by nature, I turned to all of those writers on education that I had avoided in my earlier years as a college teacher, including John Dewey, Albert Schweitzer, Maria Montessori, J. Glenn Gray, and Alfred North Whitehead. I discovered in their writings a useful criticism of the foundations of contemporary education that emphasizes the importance of place, individual creativity, our implicatedness in the world, reverence. From a variety of sources, we know that the things most deeply embedded in us are formed by the combination of experience and doing with the practice of reflection and articulation. And we know, too, that what Rachel Carson called “the sense of wonder” requires childhood experience in nature and constant practice as well as early validation by adults. The cultivation of the sense of wonder, however, takes us to the edge, where language loses its power to describe and where analysis, the taking apart of things, goes limp before the mystery of Creation, where the only appropriate response is prayerful silence.

~ Chapter 23 ~

## The Problem of Education

(1988)

**A**FTER DEEP REFLECTION, H. L. Mencken once proposed to improve education by burning down the schools and hanging the professoriate. For better or worse, the suggestion was ignored. Made today, however, it might find a more receptive public, ready to purchase the gasoline and rope. Americans, united on little else, are joined in the belief that the educational system is too expensive, too cumbersome, and not, on the whole, very effective. But reformers are deeply divided on how to improve it. All sides of the debate, nonetheless, agree on the basic aims and purposes of education, which are to equip our nation with a “world-class” labor force, first, to compete more favorably in the global economy and, second, to provide each individual with the means for maximum upward mobility. On purposes of education both higher and lower, would-be reformers seem to be of one mind.

There are, nonetheless, better reasons to rethink education that have to do with the issues of human survival, which will dominate the world of the twenty-first century and beyond. Those now being educated will have to do what we, the present generation, have been unable or unwilling to do: stabilize and then reduce the emission of greenhouse gases, which are changing the climate, perhaps disastrously so; protect biological diversity; reverse the destruction of forests everywhere; conserve soils; and reduce the human footprint to levels consonant with the carrying capacity

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## The Problem of Education

(1988)

**A**FTER DEEP REFLECTION, H. L. Mencken once proposed to improve education by burning down the schools and hanging the professoriate. For better or worse, the suggestion was ignored. Made today, however, it might find a more receptive public, ready to purchase the gasoline and rope. Americans, united on little else, are joined in the belief that the educational system is too expensive, too cumbersome, and not, on the whole, very effective. But reformers are deeply divided on how to improve it. All sides of the debate, nonetheless, agree on the basic aims and purposes of education, which are to equip our nation with a “world-class” labor force, first, to compete more favorably in the global economy and, second, to provide each individual with the means for maximum upward mobility. On purposes of education both higher and lower, would-be reformers seem to be of one mind.

There are, nonetheless, better reasons to rethink education that have to do with the issues of human survival, which will dominate the world of the twenty-first century and beyond. Those now being educated will have to do what we, the present generation, have been unable or unwilling to do: stabilize and then reduce the emission of greenhouse gases, which are changing the climate, perhaps disastrously so; protect biological diversity; reverse the destruction of forests everywhere; conserve soils; and reduce the human footprint to levels consonant with the carrying capacity

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of Earth. They must learn how to use energy and materials with great efficiency. They must learn how to utilize solar energy in all of its forms. They must rebuild the economy in order to eliminate waste and pollution. They must learn how to manage renewable resources for the long run. They must begin the great work of repairing, as much as possible, the damage done to the Earth in the past 250 years of industrialization. And they must do all of this while reducing economic inequities.

For the most part, however, we are still educating the young as if there were no planetary emergency. Remove computers and a scattering of courses and programs throughout the catalog, and the present curriculum looks a lot like that of the 1950s. The crisis we face is first and foremost one of mind, perception, and values; hence, it is a challenge to those institutions presuming to shape minds, perceptions, and values, and that makes it an educational challenge. More of the same kind of education can only make things worse. This is not an argument against education but, rather, an argument for the kind of education that prepares people for lives and livelihoods suited to a planet with a biosphere that operates by the laws of ecology and thermodynamics.

The skills, aptitudes, and attitudes necessary to industrialize the Earth, however, are not necessarily the same as those that will be needed to heal the Earth or to build durable economies and good communities. Resolution of the great ecological challenges of the next century will require us to reconsider the substance, process, and purpose of education at all levels and to do so, in the words of Yale University historian Jaroslav Pelikan, "with an intensity and ingenuity matching that shown by previous generations in obeying the command to have dominion over the planet" (Pelikan 1992, 21). But Pelikan himself doubts whether the university "has the capacity to meet a crisis that is not only ecological and technological, but ultimately educational and moral" (Pelikan 1992, 21-22). Why should this be so? Why should those institutions charged with the task of preparing the young for the challenges of life be so slow to recognize and act on the major challenges of the coming century?

A clue can be found in a book by Derek Bok, a former president of Harvard University, who wrote:

Our universities excel in pursuing the easier opportunities where established academic and social priorities coincide. On the other hand, when social needs are not clearly recognized and backed by adequate financial support, higher education has often failed to respond as effectively as it might, even to some of the most important challenges facing America.

Armed with the security of tenure and the time to study the world with care, professors would appear to have a unique opportunity to act as society's scouts to signal impending problems. . . . Yet rarely have members of the academy succeeded in discovering emerging issues and bringing them vividly to the attention of the public. What Rachel Carson did for risks to the environment, Ralph Nader for consumer protection, Michael Harrington for problems of poverty, Betty Friedan for women's rights, they did as independent critics, not as members of a faculty. (Bok 1990, 108)

This observation, appearing on page 108 of Bok's book, is not mentioned thereafter. It should have been on page 1 and would have provided the grist for a better book. Had Bok gone further, he might have been led to ask whether the same charge of lethargy might be made against those presuming to lead American education. Bok might then have been led to rethink old and unquestioned assumptions about liberal education. For example, John Henry Newman, in his classic *The Idea of a University*, drew a distinction between practical and liberal learning that has influenced education from his time to our own. Liberal knowledge, according to Newman, "refuses to be informed by any end, or absorbed into any art" (Newman 1982, 81); knowledge is liberal if "nothing accrues of consequence beyond the using" (Newman 1982, 82). Furthermore, Newman stated that "liberal education and liberal pursuits are exercises of mind, of reason, of reflection" (Newman 1982, 80). All else he regarded as practical learning, which Newman believed has no place in the liberal arts. To this day, Newman's distinction between practical and liberal knowledge is seldom transgressed in liberal arts institutions. Is it any wonder that faculty, mindful of the penalties for transgressions, do not often deal boldly with the issues that Bok describes? I do not wish to take faculty off the hook, but I would like to note that educational institutions, more often than not, reward indoor thinking, careerism, and safe conformity to prevailing standards. Educational institutions are not widely known for encouraging boat rockers, and I seriously doubt that Bok's own institution would have awarded tenure to Rachel Carson, Ralph Nader, or Michael Harrington.

Harvard philosopher and mathematician Alfred North Whitehead had a different view of the liberal arts. "The mediocrity of the learned world," he wrote in 1929, could be traced to its "exclusive association of learning with book-learning" (Whitehead 1967, 51). Whitehead went on to say that real education requires "first-hand knowledge," by which he meant an intimate connection between the mind and "material creative

activity." Others, such as John Dewey and J. Glenn Gray, reached similar conclusions. "Liberal education," Gray wrote, "is least dependent on formal instruction. It can be pursued in the kitchen, the workshop, on the ranch or farm . . . where we learn wholeness in response to others" (Gray 1984, 81). A genuinely liberal education, in other words, ought to be liberally conducted, aiming to develop the full range of human capacities. And institutions dedicated to the liberal arts ought to be more than simply agglomerations of specializations.

Had Bok proceeded further, he would have had to address the loss of moral vision throughout education at all levels. In ecologist Stan Rowe's words, the university has

shaped itself to an industrial ideal—the knowledge factory. Now it is overloaded and top-heavy with expertness and information. It has become a know-how institution when it ought to be a know-why institution. Its goal should be deliverance from the crushing weight of unevaluated facts, from bare-bones cognition or ignorant knowledge: knowing in fragments, knowing without direction, knowing without commitment. (Rowe 1990, 129)

Many years ago William James saw this coming and feared that the university might one day develop into a "tyrannical Machine with unforeseen powers of exclusion and corruption" (James 1987, 113). We are moving along that road and should ask why this has come about and what can be done to reverse course.

One source of the corruption is the marriage between the universities and power and commerce. It was a marriage first proposed by Francis Bacon, but not consummated until the later years of the twentieth century. But marriage, implying affection and mutual consent, is perhaps not an accurate metaphor. This is instead a cash relationship, which began with a defense contract here and a research project there. At present more than a few university departments still work as adjuncts of the Pentagon and even more as adjuncts of industry in the hope of reaping billions of dollars in fields such as genetic engineering, nanotechnologies, agribusiness, and computer science. Even where this is not true, it is difficult to escape the conclusion that much of what passes for research, as historian Page Smith wrote, is "essentially worthless . . . busywork on a vast almost incomprehensible scale" (Smith 1990, 7).

Behind the glossy facade of the modern academy there is often a vacuum of purpose waiting to be filled by whomever and whatever. For

example, the college of agriculture at a nearby land-grant university of note claims to be helping "position farmers for the future." But when asked what farming would be like in the twenty-first century, the dean of the college replied by saying, "I don't know." When asked, "How can you [then] position yourself for it?" the Dean replied, "We have to try as best we can to plan ahead" (Logsdon 1994, 74). This reminds me of the old joke in which the airline pilot reports to the passengers that he has good news and bad news. The good news is that the flight is ahead of schedule. The bad news is that we're lost. And in a time of eroding soils and declining rural communities, "turf grass management" is the hot new item at the college of agriculture.

Finally, had Bok so chosen, he would have been led to question how we define intelligence and what that might imply for our larger prospects. At the heart of our pedagogy and curriculum, one finds cleverness confused with intelligence. Cleverness, as I understand it, tends to fragment things and to focus on the short run. The epitome of cleverness is the specialist whose intellect and person have been shaped by the overdevelopment of one intellectual capacity, what Nietzsche once called an "inverted cripple." Ecological intelligence, on the other hand, requires a broader view of the world and a long-term perspective. Cleverness can be adequately computed by the Scholastic Aptitude Test and the Graduate Record Examination, but intelligence is not so easily measured. In time I think we will come to see that true intelligence tends to be integrative and often works slowly while one mulls things over.

The modern fetish with smartness is no accident. The highly specialized, narrowly focused intellect fits the demands of instrumental rationality built into the industrial economy, and for reasons described by Brooks Adams many years ago, "capital has preferred the specialized mind and that not of the highest quality, since it has found it profitable to set quantity before quality to the limit the market will endure. Capitalists have never insisted upon raising an educational standard, save in science and mechanics, and the relative overstimulation of the scientific mind has now become an actual menace to order." (Smith 1984, 116) The demands of building good communities within a sustainable society will require more than the specialized, one-dimensional mind and more than instrumental cleverness.

Looking ahead to the twenty-first century, education must be guided by more comprehensive and ecologically solvent standards for truth. The architects of the modern worldview assumed that those things that could be weighed, measured, and counted were more true than those

that could not be quantified. If it could not be counted, in other words, it did not count. Cartesian philosophy was full of potential ecological mischief, a potential that has become reality. Descartes' philosophy separated man from nature, stripped all intrinsic value from nature, and then proceeded to divide mind and body. Descartes was, at heart, an engineer, and his legacy to the environment of our time is the cold passion to remake the world as if we were merely remodeling a machine. Feelings and intuition were tossed out, as were those fuzzy, qualitative parts of reality, such as esthetic appreciation, loyalty, friendship, sentiment, empathy, and charity. Descartes' assumptions were neither as simple nor as inconsequential as they might have appeared in his lifetime (1596–1650).

If sustainability is our aim, we will need a broader conception of science and a more inclusive rationality that joins empirical knowledge with the same emotions that make us love and sometimes fight. Philosopher Karl Polanyi (1958) described this as "personal knowledge," by which he meant knowledge that calls forth a wider range of human perceptions, feelings, and intellectual powers than those presumed to be narrowly "objective." Personal knowledge, according to Polanyi,

is not made but discovered. . . . It commits us, passionately and far beyond our comprehension, to a vision of reality. Of this responsibility we cannot divest ourselves by setting up objective criteria of verifiability—or falsifiability, or testability. . . . For we live in it as in the garment of our own skin. Like love, to which it is akin, this commitment is a "shirt of flame", blazing with passion and, also like love, consumed by devotion to a universal demand. Such is the true sense of objectivity in science. (Polanyi 1958, 64)

Cartesian science rejects emotion but cannot escape it. Emotion and passion are embedded in all knowledge, including the most ascetic scientific knowledge driven by the passion for objectivity. Descartes had it wrong. There is no way to separate feeling from knowledge. There is no way to separate object from subject. There is no good way and no good reason to separate mind or body from its ecological and emotional context. And some persons, with good evidence, are coming to suspect that intelligence is not a human monopoly at all but woven throughout the animal world and perhaps beyond. Science without emotional valence can give us no reason to appreciate the sunset, nor can it give us any purely objective reason to value life. These must come from deeper sources.

As a result of unquestioned assumptions that human domination of nature is good; that the growth of economy is natural; that all knowledge,

regardless of its consequences, is equally valuable; and that material progress is our right, we suffer a kind of cultural immune deficiency anemia that renders us unable to resist the seductions of technology, convenience, and short-term gain.

The modern curriculum teaches little about citizenship and responsibilities and a great deal about individualism and rights. The ecological emergency, however, can be resolved only if enough people come to hold a larger idea of what it means to be a citizen. But a pervasive cynicism about our higher potentials and collective possibilities works against us. Even my most idealistic students, for example, often confuse self-interest with selfishness, which makes it possible to equate Mother Teresa and Donald Trump, each merely doing "their thing." This is not just a social and political problem. The ecological emergency is about the failure to comprehend our citizenship in the biotic community. From the modern perspective we cannot see clearly how utterly dependent we are on the "services of nature" and on the wider community of life. Our political language gives little hint of this dependence. As it is now used, the word *patriotism*, for example, is devoid of ecological content. But logically it should include any and all threats to our land, forests, air, water, wildlife, and health, including those from within. To abuse natural "resources," to erode soils, to destroy natural diversity, to waste, to take more than one's fair share, to fail to replenish what has been used someday must be regarded as equivalent to an attack on the country from without. And "politics" once again must come to mean, in Vaclav Havel's words, "serving the community and serving those who will come after us" (Havel 1992, 6).

There is a widespread, and mostly unquestioned, assumption that our future is one of constantly evolving technology and that this is always and everywhere a good thing. Those who question this faith are dismissed as Luddites by people who, as far as I can tell, know little or nothing about the real history of Luddism. Faith in technology is built into nearly every part of the curriculum. When pressed, however, true believers describe progress to mean, not human, political, or cultural improvement, but a kind of technological juggernaut. Technological fundamentalism, like all fundamentalisms, deserves to be challenged. Is technological change taking us where we want to go? What effect does it have on our imagination and particularly on our social, political, and moral imagination? What effect does it have on our ecological prospects? George Orwell once warned that the "logical end" of technological progress "is to reduce the human being to something resembling a brain in a bottle" (Orwell 1958,

201). Decades later some propose to develop the necessary technology to “download” the contents of the brain into a machine/body (Moravic 1988). Orwell’s nightmare is coming true and in no small part because of research conducted in our most prestigious universities. Such research stands in sharp contrast to our real needs. We need decent communities, good work to do, loving relationships, stable families, the knowledge necessary to restore what we have damaged, and ways to transcend our inherent self-centeredness. Our needs, in short, are those of the spirit; yet, our imagination and creativity are overwhelmingly aimed at things that as often as not degrade spirit, nature, and true economy.

Ecological education, in Leopold’s words, is directed toward changing our “intellectual emphasis, loyalties, affections, and convictions” (Leopold 1966, 246). It requires breaking free of old pedagogical assumptions, of the straitjacket of discipline-centric curriculum, and even of confinement in classrooms and school buildings. Ecological education means changing: the substance and process of education contained in curriculum, how educational institutions actually work, the physical architecture of schools and colleges, and most important, the purposes of learning.

## What Is Education For?

(1990)

*AUTHOR’S NOTE 2010: Delivered as a commencement address at Arkansas College—now Lyon College—in May 1990. The numbers are dated but still roughly accurate, and the point of the essay is still valid.*

**I**F TODAY IS A TYPICAL DAY on planet Earth, we will lose 116 square miles of rain forest, or about an acre a second. We will lose another 72 square miles to encroaching deserts, the results of human mismanagement and overpopulation. We will lose 40 to 250 species, but no one knows the actual number. Today the human population will increase by 250,000. And today we will add 2700 tons of chlorofluorocarbons and 15 million tons of carbon dioxide to the atmosphere. Tonight the Earth will be a little hotter, its waters more acidic, and the fabric of life more threadbare. By year’s end the numbers are staggering: The total loss of rain forest will equal an area the size of the state of Washington; expanding deserts will equal an area the size of the state of West Virginia; and the global population will have risen by more than 70 million. By the year 2000 a sizeable fraction of the life-forms extant on the planet in the year 1900 will be extinct or in jeopardy.

The truth is that many things on which our future health and prosperity depend are in dire jeopardy: climate stability, the resilience and productivity of natural systems, the beauty of the natural world, and biological diversity. It is worth noting that this is not the work of ignorant

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place. Elemental things like flowing water, wind, trees, clouds, rain, mist, mountains, landscape, animal behavior, changing seasons, the night sky, and the mysteries of the life cycle gave birth to thought and language. For this reason I think it not possible to unravel the Creation without undermining human intelligence as well. The issue is not so much about what nature can do for us as resources as it is about the survival of human intelligence cut off from its source.

Cleverness would have us advance a narrowly defined, short-term, and anemic self-interest at all costs and at all risks. But cleverness, pure intellect, is just not intelligent enough. Its final destination is madness. True intelligence would lead us, on the contrary, to stabilize the climate and protect the web of life, but for reasons that go beyond the calculation of self-interest. The surest sign of the maturity of intelligence is the evolution of biocentric wisdom, by which I mean the capacity to nurture and shelter life—a fitting standard for a species calling itself *Homo sapiens*.

What can educators do to foster real intelligence? One view is that we should not try, because the best we can do is to help students avoid being stupid (Postman 1988, 87). I think we should prevent stupidity where possible, but I also think we can do more. First, we can question the standard model of pre-ecological intelligence and encourage students to think the matter out for themselves, including the matter of collective intelligence. Second, we can reward intelligence in all sorts of ways without necessarily penalizing cleverness. Third, we can develop the kind of firsthand knowledge of nature from which real intelligence grows. This means breaking down walls made by clocks, bells, rules, academic requirements, and a tired, indoor pedagogy. I am proposing a jailbreak that would put young people outdoors more often. “No child left inside,” as Richard Louv puts it. Fourth, we can liberalize the liberal arts to include ecological competence in areas of restoration ecology, agriculture, forestry, ecological engineering, landscape design, and solar technology. Fifth, we can suspend the implicit belief that a PhD is a sign of intelligence and draw those who have demonstrated a high degree of applied ecological intelligence, courage, and creativity (farmers, foresters, naturalists, ranchers, restoration ecologists, urban ecologists, landscape planners, citizen activists) into education as mentors and role models. Finally, we can attempt to teach the things that one might imagine the Earth would teach us: silence, humility, holiness, connectedness, courtesy, beauty, celebration, giving, restoration, obligation, and wildness.

## ~ Chapter 26 ~

# Ecological Literacy

(1992)

LITERACY IS THE ABILITY to read. Numeracy is the ability to count. Ecological literacy, according to 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 is being given to ecological literacy. Reading, after all, is an ancient skill. And for most of the twentieth century we have been busy adding, subtracting, multiplying, dividing, and now computing. But “What then?” questions have not come easy for us despite all of our formidable advances in other areas. Napoleon did not ask the question until he had reached Moscow, by which time no one could give any good answer except “Let’s get outta here.” If Custer asked the question, we have no record of it. His last known words at Little Big Horn were “Hurrah, boys, now we have them.” And economists, who are certainly both numerate and numerous, have not asked the question often enough. Asking “What then?” on the west side of the Niemen River, or at Fort Laramie, would have saved a lot of trouble. For the same reason, “What then?” is also 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 too much.

The failure to develop ecological literacy is a sin of omission and of commission. Not only are we failing to teach the basics about the Earth, and how it works, but we are in fact teaching a large amount of stuff that is simply wrong. By failing to include ecological perspectives in any number of subjects, we are teaching students that ecology is unimportant

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to history, politics, economics, society, and so forth. From television they learn that the Earth is theirs for the taking. The result is a generation of ecological yahoos without a clue about why the color of the water in their rivers is related to their food supply, or why storms are becoming more severe as the climate is unbalanced. The same persons, as adults, will create businesses, vote, have families, and above all, consume. If they come to reflect on the discrepancy between the splendor of their private lives and the realities of life in a hotter, more toxic and violent world, as ecological illiterates they will have roughly the same success as one trying to balance a checkbook without knowing arithmetic.

To become ecologically literate, one must certainly be able to read and, I think, even like to read. Ecological literacy also presumes an ability to use numbers and the ability to know what is countable and what is not, which is to say the limits of numbers. But these are indoor skills. Ecological literacy also requires the more demanding capacity to observe nature with insight, a merger of landscape and mindscape. "The interior landscape," in Barry Lopez's words, "responds to the character and subtlety of an exterior landscape; the shape of the individual mind is affected by land as it is by genes" (Lopez 1989b, 65). The quality of thought is related to the ability to relate to "where on this Earth one goes, what one touches, the patterns one observes in nature—the intricate history of one's life in the land, even a life in the city, where wind, the chirp of birds, the line of a falling leaf, are known" (Lopez 1989b, 65). The fact that this kind of intimate knowledge of our landscapes is rapidly disappearing can only impoverish our mental landscapes as well. People who do not know the ground on which they stand have no way to understand the difference between health and disease in the nature around them and its relation to their own health.

If literacy is driven by the search for knowledge, ecological literacy is driven by the sense of wonder, the sheer delight in being alive in a beautiful, mysterious, bountiful world. The darkness and disorder that we have brought to that world give ecological literacy an urgency it lacked a century ago. We can now look over the abyss and see the end of it all. Ecological literacy begins in childhood. "To keep alive his inborn sense of wonder," a child, in Rachel Carson's words, "needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in" (Carson 1984, 45). The sense of wonder is rooted in the emotions or what E. O. Wilson has called "biophilia," which is simply the affinity for the living world. The nourish-

ment of that affinity is the beginning point for the sense of kinship with life, without which literacy of any sort will not help much. This is to say that even a thorough knowledge of the facts of life and of the threats to it will not save us in the absence of the feeling of kinship with life of the sort that cannot entirely be put into words.

There are, I think, several reasons why ecological literacy has been so difficult for Western culture. First, it implies the ability to think broadly, to know something of what is hitched to what. This ability is being lost in an age of specialization. Scientists of the quality of Rachel Carson or Aldo Leopold are rarities who must buck the pressures toward narrowness and also endure a great deal of professional rejection and hostility. By inquiring into the relationship between chlorinated hydrocarbon pesticides and bird populations, Rachel Carson was asking an ecologic question. Many others failed to ask, not because they did not like birds, but because they had not, for whatever reasons, thought beyond the conventional categories. To do so would have required that they relate their food system to the decline in the number of birds in their neighborhood. This means that they would have had some direct knowledge of farms and farming practices and were also paying attention to birds in the neighborhood. To think in ecologic fashion presumes a breadth of experience with healthy natural systems, both of which are increasingly rare. It also presumes that the persons be willing and able to "think at right angles" to their particular specializations, as Leopold put it.

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. William Morton Wheeler once compared the naturalist with the professional biologist in these words: "[The naturalist] is primarily an observer and fond of outdoor life, a collector, a classifier, a describer, deeply impressed by the overwhelming intricacy of natural phenomena and reveling in their very complexity." The biologist, on the other hand, "is oriented toward and dominated by ideas, and rather terrified or oppressed by the intricate hurly-burly of concrete, sensuous reality . . . he is a denizen of the laboratory. His besetting sin is oversimplification and the tendency to undue isolation of the organisms he studies from their natural environment" (Wheeler 1962). Since Wheeler wrote, ecology has become increasingly specialized and, one suspects, remote from its subject matter. Ecology, like most learning worthy of the effort, is an applied subject. Its goal is not just a comprehension of how the world works but, in the light of that knowledge, a life lived accordingly. The same is true of

theology, sociology, political science, and most other subjects that grace the conventional curriculum.

The decline in the capacity for esthetic appreciation is a third factor working against ecological literacy. We have become comfortable with all kinds of ugliness and seem incapable of effective protest against its purveyors: urban developers, businessmen, government officials, television executives, timber and mining companies, utilities, and advertisers. But ugliness is not just an esthetic problem; it signals a more fundamental disharmony between people and between people and the land. Ugliness is, I think, the surest sign of disease, or what is now being called "unsustainability." Show me the hamburger stands, neon ticky-tacky strips leading toward every city in America, and the shopping malls, and I'll show you devastated rain forests, a decaying countryside, a politically dependent population, and toxic waste dumps. It is all of a fabric. And this is the heart of the matter. To see things in their wholeness is politically threatening. To understand that our manner of living, so comfortable for some, is linked to cancer rates in migrant laborers in California, the disappearance of tropical rain forests, 50,000 toxic dumps across the U.S.A., and the depletion of the ozone layer is to see the need for a change in our way of life. To see things whole is to see both the wounds we have inflicted on the natural world in the name of mastery and those we have inflicted on ourselves and on our children for no good reason, whatever our stated intentions. Real ecological literacy is radicalizing in that it forces us to reckon with the roots of our ailments, not just with their symptoms. For this reason, it can revitalize and broaden the concept of citizenship to include membership in a planet-wide community of humans and living things.

And how does this striving for community come into being? There is no one answer, but there are certain common elements. First, in the lives of most, if not all, people who define themselves as environmentalists, there is experience in the natural world at an early age. Leopold came to know birds and wildlife in the marshes and fields around his home in Burlington, Iowa, before his teens. David Brower, as a young boy on long walks over the Berkeley hills, learned to describe the flora to his nearly blind mother. Second, and not surprisingly, there is often an older teacher or mentor as a role model: a grandfather, a neighbor, an older brother, a parent, or a teacher. Third, there are seminal books that explain, heighten, and say what we have felt deeply but not said so well. In my own life, Rene Dubos and Loren Eiseley served this function of helping to bring

feelings to articulate consciousness. Ecological literacy is becoming more difficult, I believe, not because there are fewer books about nature, but because there is less opportunity for the direct experience of it. Fewer people grow up on farms or in rural areas where access is easy and where it is easy to learn a degree of competence and self-confidence toward the natural world. Where the ratio of the human-created environment to the purely natural world exceeds some point, the sense of place can only be a sense of habitat. One finds the habitat familiar and/or likeable but without any real sense of belonging in the natural world. A sense of place requires more direct contact with the natural aspects of a place, with soils, landscape, and wildlife. This sense is lost as we move down the continuum toward the totalized urban environment where nature exists in tiny, isolated fragments by permission only. Said differently, this is an argument for more urban parks, summer camps, greenbelts, wilderness areas, public seashores. If we must live in an increasingly urban world, let's make it one of well-designed compact cities that include trees, river parks, meandering greenbelts, and urban farms where people can see, touch, and experience nature in a variety of ways. In fact, no other cities will be sustainable in a greenhouse world.

The goal of ecological literacy as I have described it has striking implications for that part of education that must occur in classrooms, libraries, and laboratories. To the extent that most educators have noticed the environment, they have regarded it as a set of problems which are (1) solvable (unlike dilemmas, which are not) by (2) the analytic tools and methods of reductionist science which (3) create value-neutral, technological remedies that often create even worse side effects. Solutions, therefore, originate at the top of society, from governments and corporations, and are passed down to a passive citizenry in the form of laws, policies, and technologies. The results, it is assumed, will be socially, ethically, politically, and humanly desirable, and the will to live and to sustain a humane culture can be preserved in a technocratic society. In other words, business can go on as usual. Assuming no need for an ecologically literate and ecologically competent public, people most often regard environmental education as an extra in the curriculum, not as a core requirement pervading the entire educational process.

Clearly, some parts of the crisis can be accurately described as problems. Some of these can be solved by technology, particularly those that require increased resource efficiency. It is a mistake, however, to think that all we need is better technology, not an ecologically literate and competent

public that understands the relation between its well-being and the health of the 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 "conqueror of the land-community to plain member and citizen of it"? However it is applied in practice, the answer will rest on six foundations.

The first is the 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. Through all education we inculcate the ideas of careful stewardship or carelessness. Conventional education, by and large, has been a celebration of all that is human to the exclusion of our dependence on nature. As a result, students frequently resemble what Wendell Berry has called "itinerant professional vandals," persons devoid of any sense of place or stewardship, or inkling of why these are important.

Second, environmental issues are complex and cannot be understood through a single discipline or department. Despite a decade or more of discussion and experimentation, interdisciplinary education remains an unfulfilled promise. The failure occurred, I submit, because it was tried within discipline-centric institutions. A more promising approach is to reshape institutions as trans-disciplinary laboratories that include components such as agriculture, solar technologies, forestry, land management, wildlife, waste cycling, architectural design, and economics. Part of the task, then, of Earth-centered education is the study of interactions across the boundaries of conventional knowledge and experience.

Third, for inhabitants, education occurs in part as a dialogue with a 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 we acknowledge the existence and interests of the other. In conversation, we define ourselves, but in relation to another. The quality of conversation does not rest on the brilliance of one or the other person. It is more like a dance in which the artistry is mutual.

In good conversation, words represent reality faithfully. And words have power. They can enliven or deaden, elevate or degrade, but they

are never neutral, because they affect our perception and ultimately our behavior. The use of words such as *resources*, *manage*, *channelize*, *engineer*, *produce*, and *geoengineer* makes our relation to nature a monologue rather than a conversation. The language of nature includes the sounds of animals, whales, birds, insects, wind, and water—a language more ancient and basic than human speech. Its books are the etchings of life on the face of the land. To hear this language requires patient, disciplined study of the natural world. But it is a language for which we have an affinity.

Good conversation is unhurried. It has its own rhythm and pace. Dialogue with nature cannot be rushed. It will be governed by cycles of day and night, the seasons, the pace of procreation, and by the larger rhythm of evolutionary and geologic time. Human sense of time is increasingly frenetic, driven by clocks, computers, and revolutions in transportation and communication. Good conversation has form, structure, and purpose. Conversation with nature has the purpose of establishing, in Wendell Berry's words; "What is here? What will nature permit here? What will nature help us do here?" (Berry 1987, 146). The form and structure of any conversation with the natural world is that of the discipline of ecology as a restorative process and healing art.

Fourth, it follows that the way education occurs is as important as its content. Students taught environmental awareness in a setting that does not alter their relationship to basic life-support systems learn that it is sufficient to intellectualize, emote, or posture about such things without having to live differently. Environmental education ought to change the way people live, not just how they talk. The best learning occurs in response to real needs and the life situation of the learner. The radical distinctions typically drawn between teacher and student, between the school and the community, and between areas of knowledge are dissolved. Real learning is participatory and experiential, not just didactic. The flow can be two ways—between teachers, who function as facilitators, and students, who are expected to be active agents in defining what is learned and how.

Fifth, experience in the natural world is both an essential part of understanding the environment and an important source of intellectual clarity. Experience, properly conceived, trains the intellect to observe the land carefully and to distinguish between health and its opposite. Direct experience is an antidote to abstract, indoor learning, demanding a disciplined and observant intellect. But nature, in Emerson's words, is also "the vehicle of thought" as a source of language, metaphor, and symbol. Natural

diversity may well be the source of much of human creativity and intelligence. If so, the simplification and homogenization of ecosystems can only result in a lowering of human intelligence.

Sixth, education relevant to the challenge of building a sustainable society will enhance the learner's competence with natural systems. For reasons once explained by Whitehead and Dewey, practical competence is an indispensable source of good thinking. Good thinking proceeds from the friction between a thoughtful and well-prepared mind and real problems. Aside from its effects on thinking, practical competence will be essential if sustainability requires, as I think it does, that people must take an active part in rebuilding their homes, businesses, neighborhoods, communities, and towns. Shortening supply lines for food, energy, water, and materials—while recycling waste locally—implies a high degree of competence not necessary in a society dependent on central vendors and experts.

If these can be taken as the foundations of Earth-centered education, what can be said of its larger purpose? In a phrase, it is that quality of mind that seeks out connections. It is the opposite of the specialization and narrowness characteristic of most education. The ecologically literate person has the knowledge necessary to comprehend interrelatedness, and an attitude of care or stewardship. Such a person would also have the practical competence required to act on the basis of knowledge and feeling. Competence can only be derived from the experience of doing and the mastery of what philosopher Alasdair MacIntyre describes as a "practice."

Ecological literacy, further, implies a broad understanding of how people and societies relate to each other and to natural systems and how they might do so sustainably. It presumes both an awareness of the interrelatedness of life and knowledge of how the world works as a physical system. To ask, let alone answer, "What then?" questions presumes an understanding of concepts such as carrying capacity, overshoot, Liebig's law of the minimum, thermodynamics, trophic levels, energetics, and succession. Ecological literacy presumes that we understand our place in the story of evolution. It is to know that our health, well-being, and ultimately our survival depend on working with, not against, natural forces. The basis for ecological literacy, then, is the comprehension of the interrelatedness of life grounded in the study of natural history, ecology, and thermodynamics. It is to understand that "there ain't no such thing as a free lunch"; "you can never throw anything away"; and "the first law of

intelligent tinkering is to keep all of the pieces." It is also to understand, with Leopold, that we live in a world of wounds senselessly inflicted on nature and on ourselves.

A second stage in ecological literacy is to know something of the speed of the crisis that is upon us. It is to know magnitudes, rates, and trends of population growth, species extinction, soil loss, deforestation, desertification, climate change, ozone depletion, resource exhaustion, air and water pollution, toxic and radioactive contamination, resource and energy use—in short, the vital signs of the planet and its ecosystems. Becoming ecologically literate is to understand the human enterprise for what it is: a sudden and brief eruption of a single species in the vastness of evolutionary time.

Ecological literacy requires a comprehension of the dynamics of the modern world. The best starting place is to read the original rationale for the domination of nature found in the writings of Bacon, Descartes, and Galileo. Here one finds the justification for the union of science with power and the case for separating ourselves from nature in order to control it more fully. To comprehend the idea of controlling nature, one must fathom the sources of the urge to power and the paradox of rational means harnessed to insane ends portrayed in Marlowe's *Doctor Faustus*, Mary Shelley's *Frankenstein*, Melville's *Moby Dick*, and Dostoevsky's *Legend of the Grand Inquisitor*.

Ecological literacy, then, requires a thorough understanding of the ways in which people and whole societies have become destructive. The ecologically literate person will understand how the causes of our predicament can be traced to economic and social structures, religion, science, politics, technology, patriarchy, culture, agriculture, and garden variety orneriness.

The diagnosis of the causes of our plight is only half of the issue. But before we can address solutions, there are several issues that demand clarification. "Nature," for example, is variously portrayed as "red in tooth and claw" or, like the Disney film *Bambi*, full of sweet little critters. Economists see nature as natural resources to be used; the backpacker, as a wellspring of transcendent values. We are no longer clear about our own nature, whether we are made in the image of God, or are merely a machine or computer, or animal. These are not trivial, academic issues. Unless we can make reasonable distinctions between what is natural and what is not, and what difference that difference makes, we are liable to be at the mercy of the engineers who want to remake all of nature, including our own.

Environmental literacy also requires a broad familiarity with the development of ecological consciousness. It is not yet clear whether the science of ecology will be "the last of the old sciences, or the first of the new." As the former, ecology is the science of efficient resource management. As the first of the new sciences, ecology is the basis for a broader search for pattern and meaning. As such, it cannot avoid issues of values, and the ethical questions most succinctly stated in Leopold's "The Land Ethic."

The study of environmental problems is an exercise in futility unless it is regarded as only a preface to the study, design, and implementation of solutions. The concept of sustainability implies a radical change in the institutions and patterns that we have come to accept as normal. It begins with ecology as the basis for the redesign of technology, cities, farms, and educational institutions and with a change in metaphors from mechanical to organic, industrial to biological. As part of the change we will need alternative measures of well-being such as those proposed by Amory Lovins (least-cost end-use analysis), H. T. Odum (energy accounting), and John Cobb (index of sustainable welfare). Sustainability also implies a different approach to technology, one that gives greater priority to those that are smaller in scale, are less environmentally destructive, and rely on the free services of natural systems. Not infrequently, technologies with these characteristics are also highly cost-effective, especially when the economic playing field is level.

If sustainability represents a minority tradition, it is nonetheless a long one dating back at least to Jefferson. Students should not be considered ecologically literate until they have read Thoreau, Kropotkin, Muir, Albert Howard, Alfred North Whitehead, Gandhi, Schweitzer, Aldo Leopold, Lewis Mumford, Rachel Carson, E. F. Schumacher, and Wendell Berry. There are alternatives to the present patterns that have remained dormant or isolated, not because they did not work, were poorly thought out, or were impractical, but because they were not tried. In contrast to the directions of modern society, this tradition emphasizes democratic participation, the extension of ethical obligations to the land community, careful ecological design, simplicity, competence with natural systems, the sense of place, holism, decentralization of whatever can best be decentralized, and human-scaled technologies and communities. It is a tradition dedicated to the search for patterns, unity, and connections between people of all ages, races, nationalities, and generations and between people and the natural world. This is a tradition grounded in the belief that life is sacred and not to be carelessly expended on the ephemeral. It is a tradition that

challenges militarism, injustice, ecological destruction, and authoritarianism, while supporting all of those actions that lead to real peace, fairness, sustainability, and people's right to participate in those decisions that affect their lives. Ultimately, it is a tradition built on a view of ourselves as finite and fallible creatures living in a world limited by natural laws. The contrasting Promethean view, given force by the success of technology, holds that we should remove all limits, whether imposed by nature, human nature, or morality. Its slogan is found emblazoned on the advertisements of the age: "you can have it all" (Michelob beer) or "your world should know no limits" (Merrill Lynch). The ecologically literate citizen will recognize these immediately for what they are: the stuff of epitaphs. Ecological literacy leads in other, and more durable, directions toward prudence, stewardship, and the celebration of the Creation.

## ~ Chapter 28 ~

# The Liberal Arts, the Campus, and the Biosphere

(1990)

AUTHOR'S NOTE 2010: This essay in the Harvard Educational Review was an early statement of the rationale for what has grown into the green campus movement. It was inspired by our experience at Meadowcreek Project in the 1980s, a study we did of the food system at Hendrix College which was based on a report from the Rocky Mountain Institute by Bill Browning and Hunter Lovins ("A Trail of Two Hamburgers") and April Smith's master's thesis on the environmental impacts of the University of California, Los Angeles ("In Our Backyard").

**D**EBATES ABOUT THE CONTENT and purposes of education are mostly conducted among committees of the learned conditioned to such fare. Allan Bloom changed all of that in 1987 by writing a best seller on the subject (Bloom 1987). Professor Bloom, as far as I can tell, believes that questions about the content of education (i.e., curriculum) were settled some time ago—perhaps once and for all with Plato, but certainly no later than Nietzsche. Subsequent elaborations, revisions, and refinements have worked great mischief with the high

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culture he purports to defend. Bloom's discontent focuses on American youth. He finds them empty, intellectually slack, and morally ignorant. The "soil" of their souls is "unfriendly" to the higher learning. And he thinks no more highly of their music and sexual relationships.

In Professor Bloom's ideal academy, students of a higher sort would spend a great deal of time reading the Great Books, a list no longer universally admired. Bloom's avowed aim is to "reconstitute the idea of an educated human being and establish a liberal education again." But after 344 pages of verbal pyrotechnics—some illuminating the landscape, others merely the psyche of Professor Bloom—he leaves us only with some variation on the Great Books approach to education. The classics, he argues, "provide the royal road to the students' hearts . . . their gratitude [for being so exposed] is . . . boundless." Exclusion of the classics, he thinks, has culminated in an "intellectual crisis of the greatest magnitude which constitutes the crisis of our civilization" (Bloom 1987). Lesser minds might have related the crisis to more pedestrian causes, such as violence, nuclear weapons, technology, overpopulation, or injustice. No matter. All of this was revealed to Professor Bloom while on the faculty at Cornell during the student uprising in 1969. One may reasonably infer that Professor Bloom and his Great Books were not treated kindly. One may also infer that Professor Bloom has neither forgiven nor forgotten.

Bloom has been widely attacked as a snob and as having totally misunderstood what America is all about. In his defense, there is no reasonable case to be made against the inclusion of ancient wisdom in any good, liberal education. Nor can there be any good argument against the "idea of an educated human being." But questions about which ancient wisdom we might profitably consult, and about the intellectual and moral qualities of the educated person, have not been settled once and for all with Professor Bloom's book. At the end we know a great deal of what Professor Bloom is against, some of which is justified, but little of what he is for.

His vagueness about ends suggests that Professor Bloom, without saying so, regards education as an end in itself. In a time of global turmoil, what transcendent purposes will Bloom's academy serve? In a time of great wrongs, what injustices does he wish to right? In an age of senseless violence, what civil disorders and dangers does he intend to resolve? In a time of anomie and purposelessness, what higher qualities of mind and character does he propose to cultivate? A careful reading of *The Closing of the American Mind* (Bloom 1987) offers little insight about such matters.

Rather, it is indicative of the closure of the purely academic mind to ecological issues.

For all of his conspicuous erudition, Professor Bloom seems to regard the liberal arts as an abstraction. For example, rather than merely "reconstitute the idea" of educated human beings, why not actually educate a large number of them? Likewise, his reverence for the classics is not accompanied by any suggestion of how they might illuminate the major issues of our day. The effect is, ironically, to render them both sacred and unusable, except for purposes of conspicuous pedantry. It also distorts our understanding of the origins of some of humanity's best thinking. Many of what are now described as classics were produced by the friction of extraordinary minds wrestling with the problems of their day, which is to say that they were relevant in their time. Plato wrote *The Republic* in part as a response to the breakdown of civic order in fourth-century Athens. Locke wrote his *Two Treatises* partly to justify the English civil war. Only in hindsight does their work appear to have the immaculate qualities that they certainly lacked at birth. The progress of human thought has been hard fought, uneven, and erratic. If our descendants five centuries hence regard any books of our era as classics, they will be those that grappled with and illuminated the major issues of our time, in a manner that illuminates theirs. Beyond complaints about education, Professor Bloom does not offer an opinion about what these issues may be. He sounds rather like a fussy museum curator, irate over gum wrappers on the floor.

Amidst growing poverty, environmental deterioration, and violence in a nuclear-armed world, Professor Bloom is silent about how his version of the liberal arts would promote global justice, heal the breach with the natural world, promote peace, and restore meaning in a technocratic world. On the contrary, he arrogantly dismisses those concerned about such issues. Yet, ironically, if our era adds any "classics" to the library of human thought, they will, more likely than not, be written about these subjects.

It is now widely acknowledged that the classics of the Western tradition are deficient in certain respects. First, having been mostly composed by white males, they exclude the vast majority of human experience. Moreover, there are problems that this tradition has not successfully resolved, either because they are of recent origin or because they were regarded as unimportant. In the latter category is the issue of the human role in the natural world. Search as one may through Plato, Aristotle, and the rest of the authors of the Great Books, there is not much said about it. With a few exceptions such as Hesiod, Cicero, Spinoza, and St. Francis (who

wrote no "Great Book"), what wisdom we have from Western sources begins with the likes of Thoreau and George Perkins Marsh in the middle years of the last century. Whatever timeless qualities human nature may or may not have, Western culture has not offered much enlightenment on the appropriate relationship between humanity and its habitat. Nor does Professor Bloom.

Professor Bloom, I believe, has also missed something basic about education. Whitehead put it this way: "First-hand knowledge is the ultimate basis of intellectual life. . . . The second-handedness of the learned world is the secret of its mediocrity. It is tame because it has never been scared by the facts" (Whitehead 1967, 51). An immersion in the classics, however valuable for some parts of intellectual development, risks no confrontation with the facts of life. The aim of education is not the ability to score well on tests, do well in games like Trivial Pursuit, or even to quote the right classic on the appropriate pedagogical occasion. The aim of education is life lived to its fullest. A study of the classics is one tool among many to this end.

The purpose of a liberal education has to do with the development of the whole person. J. Glenn Gray describes this person as "one who has fully grasped the simple fact that his self is fully implicated in those beings around him, human and nonhuman, and who has learned to care deeply about them" (Gray 1984, 34). Accordingly, its function is the development of the capacity for clear thought and compassion in the recognition of the interrelatedness of life.

And what do these mean in an age of violence, injustice, ecological deterioration, and nuclear weapons? What does wholeness mean in an age of specialization? It is perhaps easier to begin with what they do not mean. We do not lack for bad models: the careerist, the "itinerant professional vandal" devoid of any sense of place, the yuppie, the narrow specialist, the intellectual snob. In different ways, these all-too-common role models lack the capacity to relate their autobiography to the unfolding history of their time in a meaningful, positive way. They simply cannot speak to the urgent needs of the age, which is to say that they have been educated to be irrelevant. They have not grasped their implicatedness in the larger world, nor have they learned to care deeply about anything beyond themselves. To the extent that this has become the typical product of our educational institutions, it is an indictment of enormous gravity. Professor Bloom's emphasis on the classics and preservation of high culture does not remedy this dereliction in any obvious way.

It might be possible to dismiss Professor Bloom as a harmless crank were it not for the wide impact of his book, and because he has become a spokesman for the powerful. The problem is not with Professor Bloom's ideas, which are toothless enough. The danger lies in the combination of vagueness, surliness, and the large number of things that he does not say. The result is that *Closing* can be cited by any number of ill-informed proponents of bad causes wanting to exit the twentieth century backwards. Bloom has not provided any coherent vision of the liberal arts relevant to our time. What he does offer is a sometimes insightful cultural critique in combination with a mummified curriculum with the distinct aroma of formaldehyde.

*Reconstruction: The Task of the Liberal Arts*

The mission of the liberal arts in our time is not merely to inculcate a learned appreciation for the classics, as Bloom would have it, or to transmit "marketable skills," as many others propose, but to develop balanced, whole persons. Wholeness, first, requires the integration of the personhood of the student: the analytic mind with feelings, the intellect with manual competence. Failure to connect mind and feelings, in Gray's words, "divorces us from our own dispositions at the level where intellect and emotions fuse" (Gray 1984, 84-85). A genuinely liberal education will also connect the head and the hands. Technical education and liberal arts have been consigned to different institutions. This division creates the danger that students in each, in Gray's words, "miss a whole area of relation to the world" (Gray 1984, 81). For liberal arts students, it also undermines an ancient source of good thought: the friction between an alert mind and practical experience. Abstract thought, "mere book learning," in Whitehead's words, divorced from practical reality and the facts of life, promotes pedantry and mediocrity. It also produces half-formed or deformed persons: thinkers who cannot do, and doers who cannot think. Students typically leave 16 years of formal education without ever having mastered a particular skill or without any specific manual competence, as if the act of making anything other than term papers is without pedagogic or developmental value.

Second, an education in the liberal arts must overcome what Whitehead termed "the fatal disconnection of subjects." The contemporary curriculum continues to divide reality into a cacophony of subjects that are seldom integrated into any coherent pattern. Whitehead's point

bears repeating: there is only one subject for education: "life in all its manifestations." Yet we routinely unleash specialists on the world, armed with expert knowledge but untempered by any inkling of the essential relatedness of things. Worse, specialization undermines the ability to communicate "plainly, in the common tongue." The academy, with its disciplines, divisions, and multiplying professional jargons, has come to resemble not so much a university as a cacophony of different jargons. I do not believe that Whitehead overstated the case. Disconnectedness in the form of excessive specialization is fatal to comprehension because it removes knowledge from its larger context. Collection of data supersedes understanding of connecting patterns, which is, I believe, the beginning of wisdom. It is no accident that connectedness is central to the meaning of the Greek root words for both *ecology* (*oikos*) and *religion* (*religio*).

A third task of the liberal arts is to provide a sober view of the world, but without inducing despair. Many college freshmen are shocked by the knowledge that this is not the happy world described by the advertising and entertainment industries and by any number of feckless politicians. This is a time of danger, terrorism, anomie, suffering, crack on the streets, changing climate, war, hunger, homelessness, toxic pollution, desertification, poverty, and the permanent threat of Armageddon. Ours is the age of paradox. The modern obsession to control nature through science and technology is resulting in a less predictable and less bountiful natural world. Material progress was supposed to have created a more peaceful world. Instead, the twentieth century was a time of unprecedented bloodshed, in which 200 million died, and the years ahead, perhaps, will be an age of terrorism. Our economic growth has multiplied wants, not satisfactions. Amidst a staggering quantity of artifacts—what economists call abundance—there is growing poverty of the most desperate sort. How many student counseling services convey this sense of peril? Or obligation? The often-cited indifference and apathy of students is, I think, a reflection of the prior failure of educators and educational institutions to stand for anything beyond larger and larger endowments and an orderly campus. The result is a growing gap between the real world and the academy, and between the attitudes and aptitudes of its graduates and the needs of their time.

Finally, a genuine liberal arts education will equip a person to live well in a place. To a great extent, formal education now prepares its graduates to reside, not to dwell. The difference is important. The resident is a temporary and rootless occupant who mostly needs to know where the



banks and stores are in order to plug in. The inhabitant and a particular habitat cannot be separated without doing violence to both. The sum total of violence wrought by people who do not know who they are because they do not know where they are is the global environmental crisis. To reside is to live as a transient and as a stranger to one's place, and inevitably to some part of the self. The inhabitant and place mutually shape each other. Residents, shaped by outside forces, become merely "consumers" supplied by invisible networks that damage their places and those of others. The inhabitant and the local community are parts of a system that meets real needs for food, materials, economic support, and sociability. The resident's world, on the contrary, is a complicated system that defies order, logic, and control. The inhabitant is part of a complex order that strives for harmony between human demands and ecological processes. The resident lives in a constant blizzard of possibilities engineered by other residents. The life of the inhabitant is governed by the boundaries of sufficiency, by organic harmony, and by the discipline of paying attention to minute particulars. For the resident, order begins from the top and proceeds downward as law and policy. For the inhabitant, order begins with the self and proceeds outward. Knowledge for the resident is theoretical and abstract, akin to training. For inhabitants, knowledge in the art of living aims toward wholeness. Those who dwell can only be skeptical of those who talk about being global citizens before they have attended to the minute particulars of living well in their place.

### *Liberal Arts and the Campus*

This brings me to the place where learning occurs, the campus. Do students in liberal arts colleges learn connectedness there or separation? Do they learn "implicatedness" or noninvolvement? And do they learn that they are "only cogs in an ecological mechanism," as Aldo Leopold put it, or that they are exempt from the duties of any larger citizenship in the community of life? A genuine liberal arts education will foster a sense of connectedness, implicatedness, and ecological citizenship and will provide the competence to act on such knowledge. In that kind of place, can such an education occur? The typical campus is the place where knowledge of other things is conveyed. Curriculum is mostly imported from other locations, times, and domains of abstraction. The campus as land, buildings, and relationships is thought to have no pedagogic value, and for those intending to be residents it need have none. It is supposed to be attractive and convenient without also being useful and

instructive. A "nice" campus is one whose lawns and landscape are well manicured and whose buildings are kept clean and in good repair by a poorly paid maintenance crew. From distant and unknown places the campus is automatically supplied with food, water, electricity, toilet paper, and whatever else. Its waste and garbage are transported to other equally unknown places.

And what learning occurs on a "nice" campus? First, without anyone saying as much, students learn the lesson of indifference to the ecology of their immediate place. Four years in a place called a campus culminates in no great understanding of the place, or in the art of living responsibly in that or any other place. I think it significant that students frequently refer to the outside world as the "real world" and do so without any feeling that this is not as it should be. The artificiality of the campus is not unrelated to the mediocrity of the learned world of which Whitehead complained. Students also learn indifference to the human ecology of the place and to certain kinds of people: those who clean the urinals, sweep the floors, haul out the garbage, and collect beer cans on Monday morning. Indifference to a place is a matter of attention. The campus and its region are seldom brought into focus as a matter of practical study. To do so raises questions of the most basic sort. How does it function as an ecosystem? From where do its food, energy, water, and materials come and at what human and ecological cost? Where do its waste and garbage go? At what costs? What relation does the campus have to the surrounding region? What is the ecological history of the place? What ecological potentials does it have? What are the dominant soil types? Flora and fauna? And what of its geology and hydrology?

The study of place cultivates the habit of careful, close observation, and with it the ability to connect cause and effect. Aldo Leopold described the capacity in these terms:

Here is an abandoned field in which the ragweed is sparse and short. Does this tell us anything about why the mortgage was foreclosed? About how long ago? Would this field be a good place to look for quail? Does short ragweed have any connection with the human story behind yonder graveyard? If all the ragweed in this watershed were short would that tell us anything about the future of floods in the stream? About the future prospects for bass or trout? (Leopold 1966, 210)

Second, students learn that it is sufficient only to learn about injustice and ecological deterioration without having to do much about them, which is to say, the lesson of hypocrisy. They hear that the vital signs of

the planet are in decline without learning to question the de facto energy, food, materials, and waste policies of the very institution that presumes to induct them into responsible adulthood. Four years of consciousness raising proceeds without connection to those remedies close at hand. Hypocrisy undermines the capacity for constructive action and so contributes to demoralization and despair.

Third, students learn that practical incompetence is de rigueur, since they seldom are required to solve problems that have consequences except for their grade point average. They are not provided opportunities to implement their stated values in practical ways or to acquire the skills that would let them do so at a later time. Nor are they asked to make anything, it being presumed that material and mental creativity are unrelated. *Homo faber* and *Homo sapiens* are two distinct species, the former being an inferior sort that subsisted between the Neanderthal era and the founding of Harvard. The losses are not trivial—the satisfaction of good work and craftsmanship, the lessons of diligence and discipline, and the discovery of personal competence. After 4 years of the higher learning, students have learned that it is all right to be incompetent and that practical competence is decidedly inferior to the kind that helps to engineer leveraged buyouts and create tax breaks for people who do not need them. This is a loss of incalculable proportions both to the personhood of the student and to the larger society. It is a loss to their intellectual powers and moral development that can mature only by interaction with real problems. It is a loss to the society burdened with a growing percentage of incompetent people, ignorant of why such competence is important.

The conventional campus has become a place where indoor learning occurs as a preparation for indoor careers. The young of our advanced society are increasingly shaped by the shopping mall, the freeway, the television, and the computer. They regard nature, if they see it at all, as through a rearview mirror receding in the haze. We should not be astonished, then, to discover rates of ecological literacy in decline, at the very time that that literacy is most needed.

### *The Upshot*

Every educational institution processes not only ideas and students but resources, taking in food, energy, water, materials and discarding organic and solid wastes. The sources (mines, wells, forests, farms, feedlots) and sinks (landfills, toxic dumps, sewage outfalls) are the least-discussed places

in the contemporary curriculum. For the most part, these flows occur out of sight and mind of both students and faculty. Yet they are the most tangible connections between the campus and the world beyond. They also provide an extraordinary educational opportunity. The study of resource flows transcends disciplinary boundaries; it connects the foreground of experience with the background of larger issues and more distant places; and it joins empirical research on existing behavior and its consequences with the study of other and more desirable possibilities.

The study of institutional resource flows is aimed to determine how much of what comes from where, and with what human and ecological consequences. How much electricity from what power plants burning how much fuel extracted from where? What are the sources of food in the campus dining hall? Is it produced “sustainably” or not? Are farmers or laborers fairly paid or not? What forests are cut down to supply the college with paper? Are they replanted? Where does toxic waste from labs go? Or solid wastes? Why is there waste at all?

The study of actual resource flows must be coupled with the study of alternatives that may be more humane, ethically solvent, ecologically sustainable, cheaper, and better for the regional economy. Are there other and better sources of food, energy, materials, water? The study of potentials must also address issues of conservation. How much does the institution waste? How much energy, water, paper, and material can be conserved? What is the potential for recycling paper, glass, aluminum, and other materials? Can organic wastes be composted on-site or recycled through solar aquatic systems? At what cost? Can the institution shift its buying power from national marketing systems to support local economies? How? In what areas? How quickly? Can the landscape be designed for educational rather than decorative purposes? To what extent can good landscaping minimize energy spent for cooling and heating?

To address these and related questions, the Meadowcreek Project (a nonprofit organization I'd cofounded in 1979) conducted studies of the food systems of Hendrix College in Conway, Arkansas, and Oberlin College in Ohio. Both institutions are served by nationwide food-brokering networks that are not sustainable and that tend to undermine regional economies. In the Hendrix study, for example, students discovered that the college was buying only 9 percent of its food within the state. Beef came from Amarillo, Texas; rice from Mississippi. Yet the college is located in a cattle and rice-farming region. Both studies uncovered ample opportunities for the institutions to expand purchases of locally grown

products. Not infrequently, these are fresher and less likely to be contaminated with chemicals, and not surprisingly, they are cheaper because transportation costs are lower. In conducting the research, which involved travel to the farms and feedlots throughout the United States that supply the campus, students confronted basic issues in agriculture, social ethics, environmental quality, economics, and politics. They were also involved in the analysis of existing buying patterns while having to develop feasible alternatives in cooperation with college officials. The results were action-oriented, interdisciplinary, and aimed to create practical results. Both colleges responded cooperatively in the implementation of plans to increase local buying. In the Hendrix case, in-state purchases doubled in the year following the study. Through video documentaries and articles in the campus newspaper, the studies became part of a wider campus dialogue. Finally, the willingness of both colleges to support local economies helped to bridge the gap between the institutions and their locality in a way no public relations campaign could have done.

### *Conclusion*

The study of institutional resource flows can lead to three results. The first is a set of policies governing food, energy, water, materials, architectural design, landscaping, and waste flows that meet standards for sustainability. A campus energy policy, for example, would set standards for conservation, while directing a shift toward the maximum use of both passive and active solar systems for hot water, space conditioning, and electricity. A campus food policy would give high priority to local and regional organic sources. A materials policy would aim to minimize solid waste and recycling. An architectural policy governing all new construction and renovation would give priority to solar design and the use of nontoxic and locally available building materials. A landscape policy would stress the use of trees for cooling and windbreaks and as a means to offset campus CO<sub>2</sub> emissions. Decorative landscaping would be replaced by "edible landscaping." A campus waste policy, aimed to close waste loops, would lead to the development of on-site composting and the exploration of biological alternatives for handling waste water.

The study of campus resource flows and the development of campus policies would lead to a second and more important result: the reinvigoration of a curriculum around the issues of human survival—a plausible foundation for the liberal arts. This emphasis would become a permanent

part of the curriculum through research projects, courses, seminars, and the establishment of interdisciplinary programs in resource management or environmental studies. By engaging the entire campus community in the study of resource flows, debate about the possible meanings of sustainability, the design of campus resource policies, and curriculum innovation, the process would carry with it the potential to enliven the educational process. I can think of few disciplines throughout the humanities, social sciences, and sciences without an important contribution to this debate.

Third, the study and its implementation as policy and curriculum would be an act of real leadership. Nearly every college and university claims to offer "excellence" in one way or another. Mostly the word is invoked by unimaginative academic officials who want their institution to be like some other. But prestige, like barnacles on the hull of a ship, often limits institutional velocity and mobility. Real excellence in an age of cataclysmic potentials consists neither in imitation nor timidity. College and university officials with courage and vision have the power to lead in the transition to a sustainable future. Within their communities, their institutions have visibility, respect, and buying power. What they do matters to a large number of people. How they spend their institutional budget counts for a great deal in the regional economy. Through alumni, they reach present leaders. Through students they reach those of the future. All of which is to say that colleges and universities are leverage institutions. They can help create a humane and livable future, rather than remaining passively on the sidelines, poised to study the outcome.

Those who presume to defend the liberal arts in the fashion of Allan Bloom ironically have undersold them. A genuinely liberal education will produce whole persons with intellectual breadth, able to think at right angles to their major field; practical persons able to act competently; and persons of deep commitment, willing to roll up their sleeves and join the struggle to build a humane and sustainable world. They will not be merely well-read. Rather, they will be ecologically literate citizens able to distinguish health from its opposite and to live accordingly. Above all, they will make themselves relevant to the crisis of our age, which in its various manifestations is about the care, nurturing, and enhancement of life. And life is the only defensible foundation for a liberal education.