

## The Problem of Sustainability

If today is a typical day on planet earth, humans will add fifteen million tons of carbon to the atmosphere, destroy 115 square miles of tropical rainforest, create seventy-two square miles of desert, eliminate between forty to one hundred species, erode seventy-one million tons of topsoil, add twenty-seven hundred tons of CFCs to the stratosphere, and increase their population by 263,000. Yesterday, today, and tomorrow. By year's end the total numbers will be staggering: an area of tropical rainforest the size of the state of Kansas lost; seven to ten billion tons of carbon added to the atmosphere; a total population increase of ninety million. Looking further into the future, three crises are looming. The first is a food crisis evident in two curves that intersect in the not too distant future: one showing worldwide soil losses of twenty-four billion tons, the other a rapidly rising world population. The second crisis on the horizon is that caused by the end of the era of cheap energy. We are in a race between the exhaustion of fossil fuels, global warming, and the 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 as we know it. These three crises feed upon each other. 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 decade or two 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 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.<sup>1</sup> 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, as theologian Thomas Berry puts it,<sup>2</sup> that links us to the planet in more life-centered ways. The causes of the crisis are related to those described by Marx, Weber, Durkheim, Dostoevsky, Freud, and Gandhi. But they dealt principally with the social effects of industrialization, not with its biophysical prospects. Even if these prospects were unclouded, we would have reason to question the human and societal effects of our present course. 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.

Differences exist whether these collectively represent a set of problems, which by definition are solvable with enough money, the right policies, and technology, or 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 consciously creating a postmodern world? These questions have to do with the causes of unsustainability. Where and how did we go wrong? What problems are we attempting to solve? How do these mesh with different policies, technologies, and behavior now proposed as solutions?

Four 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 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 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."<sup>3</sup> Arms races, traffic jams, cigarette smoking, population explosions, and overconsumption are all 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 stability of the system. In Garrett Hardin's 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.<sup>4</sup> He can ignore the costs to others and eventually to himself, because payoffs reward irresponsibility. Similarly, in the name of national security, the Pentagon deploys a new weapon only to be matched or overmatched by others, which raises the costs of deadlock and increases the risks of ultimate catastrophe. In both cases the rewards are short-term (profit and prestige) and 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 bottle bills and proposals for life-cycle or full 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 decisionmaker willingly pays higher costs for no 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 some important 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 effect 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 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 (I remain unconvinced by arguments to the contrary made by sociobiologists).

Efforts to build a sustainable society on assumptions of human rationality must be regarded as partial solutions and first steps. Acknowledgement of social traps and designing policies to avoid them in the first place would, however, 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 political scientist Henry Teune's words: "An individually based secular morality cannot accept a world without growth."<sup>5</sup> (Since sooner or later we will have to accept such a world, perhaps Professor Teune has unwittingly sounded the death knell for an "individually based secular morality.") 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 forty percent of the net primary productivity of terrestrial ecosystems on the planet,<sup>6</sup> thus changing climate, exterminating species, and toxifying ecosystems. How much more of nature can we coopt 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 just 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."<sup>7</sup> 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."<sup>8</sup> Webb would not have been surprised either by the frantic expectations raised by the prospect of cold fusion, or by its rapid demise. 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.<sup>9</sup> Their results showed that population and resource use could not continue to grow exponentially without catastrophic collapse within a 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. The world economy has expanded by thirteen hundred percent in the twentieth century. Can this expansion continue indefinitely? 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.<sup>10</sup>

Or as Harvard economist Robert Solow once said: "The world can, in effect, get along without natural resources."<sup>11</sup> For Julian Simon, resources "are not finite in any economic sense."<sup>12</sup> Human ingenuity is "the ultimate resource" (the title of Simon's book) and will enable us to overcome constraints that are merely biophysical.

Outside the mainstream, a postmodern economics is emerging.<sup>13</sup> It begins with the fact that the economic process is governed by the laws of thermodynamics: "The economic process consists of a continuous transformation of low entropy into high entropy, that is, into irrevocable waste."<sup>14</sup> The laws of thermodynamics (that is, we can neither create nor destroy energy and matter; and 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."<sup>15</sup>

Economic growth is the sum total of what individual people do. And at the heart of conventional growth economics 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.<sup>16</sup> 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 puts it, "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. As Hirsch puts it:

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.<sup>17</sup>

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.”<sup>18</sup>

The economist Joseph Schumpeter once made a similar argument. Capitalism, he thought, would ultimately undermine the noncapitalist attitudes and morale necessary to its stability. “There is in the capitalist system,” he wrote in 1942, “a tendency for self-destruction.”<sup>19</sup> 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.”<sup>20</sup> 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 “vitiation of the spirit that is sapping business civilization from within.”<sup>21</sup> 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 suggest 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. The rapid growth of the 1980s increased the concentration of wealth in the United States: the top one percent now control 34.3 percent of the wealth.<sup>22</sup> The same pattern is evident worldwide, as the gap between the richest and poorest has widened from 3:1 in 1800 to 25:1 at present. Within poor countries, the benefits of growth 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.”<sup>23</sup> 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, which is a polite way of saying that it has confused bloatedness with prosperity. Second, 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."<sup>24</sup> 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, a great deal of the propensity for 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 materials and by 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 Judaic-Christian values.<sup>25</sup> The writers of Genesis commanded us to be fruitful, multiply, and to 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.<sup>26</sup>

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."<sup>27</sup> Each contributed to the destruction of an organic world view 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."<sup>28</sup>

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.<sup>29</sup> 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. In C. S. Lewis's words:

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.<sup>30</sup>

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?"<sup>31</sup> *Frankenstein* was Mary Shelley's way of asking a similar question one hundred sixty years earlier: Is there knowledge for which we are unwilling or unable to take responsibility? Thoroughly modern humans believe quite fervently that all knowledge is good and its embodiment in technology unproblematic. These articles

of faith rest, as Sinsheimer notes, on the belief that "nature does not set 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."

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 have become sanctified 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, compounds the difficulties of building a sustainable 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, ten thousand 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..."<sup>32</sup> 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 (the cornucopians) or to the development of 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 "old and solid knowledge," which used to be called wisdom.<sup>33</sup> 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."<sup>34</sup> 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 for those who advocate controls on scientific inquiry and technology, three major problems arise. 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, the knowledge of how to build healthy cities and to revitalize rural areas, how to grow food in an environmentally sound manner, and research on the conditions of peace. These are things on which our survival, health, peace, and peace of mind 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 can it be enforced at all times. 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 R and D 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 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 given license to bigots and charlatans. 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 becomes dangerous only later when converted into weapons, reactors, PCBs, 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 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...to make the world safe for little fat men."<sup>35</sup> Our goal, Orwell thought, should be to "make life simpler and harder instead of softer and more complex." Making life simpler, ecologically sustainable, more friendly, and more conducive to human growth 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 some stable harmony with the natural world is of some embarrassment to the defenders of the faith in progress, as is the fact that they did so at a high quality of life, with ample leisure time for cultural pursuits and with high levels of equality.<sup>36</sup> 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. 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—the immediate and ramifying sense of the person, and...an existential humanity—we have largely lost.”<sup>37</sup>

If civilization represents a mistaken evolutionary path, what can we do? Paul Shepard proposes a radical program of cultural restructuring that would combine elements of hunter-gatherer cultures with high technology and the wholesale redesign of contemporary civilization.<sup>38</sup> Recently, he has proposed a more modest course that requires 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 believes, 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.”<sup>39</sup>

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 by 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, but an acknowledgment 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 aggressive-



ness, 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, in reinterpreting much of the prehistorical record, concludes that the norm prior to the year 5000 was peaceful societies that were neither matriarchal nor patriarchal.<sup>40</sup> 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 fifth 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. It's us. Philosophers call this the 'human condition'. In Ernest Becker's words: "We are doomed to live in an overwhelmingly tragic and demonic world."<sup>41</sup> 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."<sup>42</sup> We are caught between the drive for Promethean immortality, which 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 Bateson's 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."<sup>43</sup> The essence of Leopold's Land Ethic is "respect for his fellow members, and also respect for the (biotic) community as such."<sup>44</sup> 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."<sup>45</sup> 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."<sup>46</sup> 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 sustainable. 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 physics of goodness 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 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 hyperintellectual-

ty 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 grass-roots 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."<sup>47</sup>

#### CONCLUSION: CAUSATION IN HISTORICAL PERSPECTIVE

The crisis of sustainability is without precedent, as is the concept of a sustainable society. 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 are anticipated. 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, in Chateaubriand's words, for "forests to precede civilization, deserts to follow." The normal response to crises of carrying capacity has not been to develop a carefully calibrated response meshing environmental demands with what the ecosystem can sustain over the long run. Rather, the record reveals either the 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.<sup>48</sup>

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 is qualitatively different, without any historical precedent. It is the first truly global crisis. It is also unprecedented in its sheer complexity.<sup>49</sup> Whether by economics, policy, passion, edu-

cation, 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 and 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. In their range, number, and urgency, these are not modest goals.

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 thousand-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 several centuries. But the major actions to stabilize the vital signs of earth and stop the hemorrhaging of life must be made within the next decade or two.

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. In historian Peter Gay's words:

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.<sup>50</sup>

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."<sup>51</sup> 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. In one historian's words:

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.<sup>52</sup>

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.<sup>53</sup>

History is a record of many things, most of which were not planned or foreseen. And in the same century as Auschwitz, Hiroshima, and the H-bomb, 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 Alfred Schweitzer suggesting 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."<sup>54</sup>

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.