

The Coming Collapse of the Age of Technology

By David Ehrenfeld (Jan. 1999)

A little-noticed event of exceptional importance occurred on the 8th of May, 1998. The conservative, power-oriented champion of science, progress, and reason, Science magazine, published an article by the distinguished British scientist James Lovelock which said: *"We have confidence in our science-based civilization and think it has tenure. In so doing, I think we fail to distinguish between the life-span of civilizations and that of our species. In fact, civilizations are ephemeral compared with species."*

Lovelock, originator of the Gaia Hypothesis -- about the central role of life in the earth's self-regulating system that includes atmosphere, climate, land, and oceans -- went on to recommend that we "encapsulate the essential information that is the basis of our civilization to preserve it through a dark age." The book would be written not on ephemeral, digital magnetic, or optical media but on "durable paper with long-lasting print." It would record in simple terms our present knowledge of science and technology, including the fundamentals of medicine, chemistry, engineering, thermodynamics, and natural selection. As the monasteries did in the Dark Ages, the book would help to keep our culture from vanishing during a prolonged period of chaos and upheaval.

Set aside the question of whether such a task could be done, or whether science ought to be described for future generations in a neutral way. What commands our attention first is that Science magazine was willing to print two precious pages based on the premise that our scientific-technological civilization is in real danger of collapse.

Can the Machine Stop?

Nearly everyone in our society, experts and lay people alike, assumes that the events and trends of the immediate future -- the next five to twenty-five years -- are going to be much like those of the present. We can do our business as usual. In the world at large, there will be a continued increase in global economic, social, and environmental management; a continued decrease in the importance of national and local governments compared with transnational corporations and trade organizations; more sophisticated processing, transfer, and storage of information; more computerized management systems along with generally decreased employment in most fields; increased corporate consolidation; and a resulting increase in the uniformity of products, lifestyles, and cultures. The future will be manifestly similar to today.

Power carries with it an air of assured permanence that no warnings of history or ecology can dispel. As John Ralston Saul has written, "Nothing seems more permanent than a long-established government about to lose power, nothing more invincible than a grand army on the morning of its annihilation." The present economic-technical-organizational structure of the industrial and most of the non-industrial world is the most powerful in history. Regardless of one's political orientation, it's very difficult to imagine any other system, centralized or decentralized, ever replacing it. Reinforcing this feeling is the fact that our technology-driven economic system

has all the trappings of royalty and empire, without the emperor. It rolls on inexorably, a giant impersonal machine, devouring and processing the world, unstoppable.

Futurists of all political varieties, those who fear and loathe the growing power as well as those who welcome it, share faith in its permanence. Even those who are aware of the earth's growing social and environmental disasters have this faith. Robert D. Kaplan originally writing in the Atlantic Monthly in 1994, is an example. "We are entering a bifurcated world," said Kaplan, in "The Coming Anarchy." Part of it, in West Africa, the Indian subcontinent, Central America, and elsewhere in the underdeveloped world, will be subject to ethnic conflict, food scarcity, massive overcrowding, militant fundamentalism, the breakdown of national governments and conventional armies, and the resurgence of epidemic disease, all against a backdrop of global climatic change. But the other part of the world will be "healthy, well-fed, and pampered by technology." We'll be all right, those of us with the money and the technology. The system will not fail us.

Despite the grip of the idea of irreversible progress on the modern mind, there are still some people who believe in the cyclical view of history. Have they generated a different scenario of the future? Not necessarily. The archaeologist Joseph Tainter notes in his book, *The Collapse of Complex Societies*, that collapse and disintegration have been the rule for complex civilizations in the past. There comes a time when every complex social and political system requires so much investment of time, effort, and resources just to keep itself together that it can no longer be afforded by its citizens. Collapse comes when, first, a society "invests ever more heavily in a strategy that yields proportionately less" and, second, when "parts of a society perceive increasing advantage to a policy of separation or disintegration."

Forget the Mayan and Roman Empires: what about our own? Certainly the problem of spending more and getting less describes our present condition. Are we receiving full value from an international banking and finance system that shores up global speculators with billions of dollars of public money, no matter how recklessly they gamble and whether they win or lose? Our NAFTA strategy has cost this country tens of thousands of jobs, reduced our food security, and thrown our neighbor, Mexico, into social, economic, and environmental turmoil; is this an adequate repayment for the dollars and time we have spent on free trade? More than 70 percent of government-supported research and development is spent on weapons that yield no social, and a highly questionable military, benefit; the Pentagon loses -- misplaces -- a billion dollars worth of arms and equipment each year. Is this a profitable investment of public funds? We may ask whether the decline in returns on investment in this system has reached the critical point. Tainter quotes from a popular sign: "Every time history repeats itself the price goes up." The price is now astronomical.

If we follow Tainter, however, we need not worry about our future. In the curiously evasive final chapter of his book, he states that "Collapse today is neither an option nor an immediate threat." Why not? Because the entire world is part of the same complex system. Collapse will be prevented, in effect, by everyone leaning on everyone else. It reminds me of that remote island, described by the great British humorist P.G. Wodehouse, where the entire population earned a modest but comfortable living by taking in each other's washing.

I don't have this kind of blind faith. I don't believe in the permanence of our power. I doubt whether the completely globalized, totally managed, centralized world is going to happen. Techno-economic globalization is nearing its apogee; the system is self-destructing. There is only a short but very damaging period of expansion left.

Now if I were playing it comparatively safe, I would stick to the more obvious kinds of support for my argument, the things I know about as an ecologist. I would write about our growing environmental problems, especially certain kinds of pollution and ecosystem destabilization: global soil erosion; global deforestation; pollution and salinization of freshwater aquifers; desertification; saline seeps, like those that have ruined so much prime agricultural land in Australia; growing worldwide resistance of insects to insecticides; acid rain and snow; on-farm transfer of genes for herbicide resistance from crops to weeds; the loss of crop varieties; the collapse of world fisheries; the decline, especially in Europe, of mycorrhizal fungi needed for tree growth; the effects of increasing CO₂ and introduced chemicals in the atmosphere, including but not limited to global warming; the hole in the ozone layer; the extinction and impending extinction of keystone species such as the pollinators needed for the propagation of so many of our crops and wild plants; the accelerated spread of deleterious exotic species such as the Asian tiger mosquito; the emergence of new, ecologically influenced diseases, and the resurgence of old diseases, including, for example, the recent discovery of locally transmitted malaria in New Jersey, New York City, Michigan, Toronto, California, and Texas; the spread of antibiotic resistance among pathogenic bacteria; and finally the catastrophic growth of the human population, far exceeding the earth's carrying capacity -- all of these things associated with the techno-economic system now in place.

Some of the problems I mentioned are conjectural, some are not; some are controversial, some are not; but even if only half or a fifth of them materialize as intractable problems, that will be quite enough to bring down this technological power structure.

The Forces of Internal Breakdown

But I am not going to dwell on the ecological side effects of our technology, important as they are; most of them have already received at least some attention. I am leaving this comparatively safe turf to discuss the forces of internal breakdown that are inherent in the very structure of the machine. Part of the system's power comes from our faith in its internal strength and cohesiveness, our bland and infuriating confidence that somebody is at the wheel, and that the steering and brakes are working well.

The causes of the problems affecting our global system are numerous, overlapping, and often obscure -- I will not try to identify them. The problems themselves, however, are clear enough. I have grouped them in six broad categories.

1. The Misuse of Information

One of the most serious challenges to our prevailing system is our catastrophic loss of ability to use self-criticism and feedback to correct our actions when they place us in danger or give bad results. We seem unable to look objectively at our own failures and to adjust the behavior that caused them. I'll start with three examples. First observation: in 1997, NASA launched the Cassini space probe to Saturn. After orbiting the earth, it is programmed to swing around Venus to gain velocity, then head back toward earth at tremendous speed, grazing us, if all control thrusters function exactly as planned, at a distance of only 312 miles, using our gravity to accelerate the probe still more and turn it into a Saturn-bound trajectory. The space probe cost \$3.5 billion and carries in its nuclear energy cell seventy-two pounds of plutonium-238, the most deadly substance in existence. Alan Kohn, former emergency-preparedness operations officer at the Kennedy Space Center, described Cassini as "criminally insane." Yet this dramatic criticism from a NASA insider, plus similar concerns expressed by many outside scientists, did not stop the project.

The second example: on February 15, 1996, President Clinton launched his Technology Literacy Challenge, a \$2 billion program which he hoped would put multimedia computers with fiber optic links in every classroom. "More Americans in all walks of life will have more chances to live up to their dreams than in any other time in our nation's history," said the president. He singled out a sixth-grade classroom in Concord, New Hampshire, where students were using Macintosh computers to produce a very attractive school newspaper. Selecting two editorials for special notice, he praised the teacher for "the remarkable work he has done." An article in New Jersey's Star Ledger of February 26, 1996 gave samples of the writing in those editorials. The editorial on rainforest destruction began: "Why people cut them down?" The editorial about the president's fights with Congress said, "Conflicts can be very frustrating. Though, you should try to stay away from conflicts. In the past there has been fights."

The third example: around the world, funds are being diverted away from enormously successful, inexpensive methods of pest control, such as the use of beneficial insects to attack pests, to the costly, risky, and unproven technologies favored by multinational, biotechnology corporations. Hans Herren, whose research in the biological control of the insect pests of cassava helped avert a famine threatening 200 million Africans, said: "When I visit [African] agricultural research institutes, I find the biological control lab half empty, with broken windows -- but the biotechnology lab will be brand new with all the latest equipment and teeming with staff."

These examples, superficially quite different, show that we are not using the information at hand about the results of our past actions to guide and direct what we plan to do next. This inability to correct ourselves when we go astray is exacerbated by the dangerously high speed of our decision-making (Jeremy Rifkin calls it the "nanosecond culture"), a consequence of modern, computer-assisted communications. This speed short-circuits the evolutionary process of reasoned decision-making, eliminating time for empirical feedbacks and measured judgment. Messages arriving by express mail, fax, and email all cry out for an immediate response. Often it is better to get a night's sleep before answering.

A final example of the misuse of information is information glut. We assume these days that information is like money: you can't have too much of it. But, in fact, too much information is at least as bad as too little: it masks ignorance, buries important facts, and incapacitates minds by overwhelming the critical capacity for brilliant selectivity that characterizes the human brain. That quantity and quality are so often inversely related in today's information flow compounds this problem. If our feedback alarm bells were sounding properly, we would curtail the flow of junk -- instead, we worship it.

2. The Loss of Information

The acceleration of obsolescence is a plague afflicting all users of contemporary technology. Although obsolescence is an inherent part of any technology that isn't moribund, several factors have combined in the last few decades to exaggerate it out of manageable proportions. One factor is the sheer number of people involved in technology, especially information technology -- each has to change something or make something new to justify a salary. Another factor is the market's insistence on steadily increasing sales, which in turn mandates an accelerated regimen of planned obsolescence.

The social disruption caused by accelerated obsolescence is well known. A less familiar, yet equally important, result is the loss of valuable knowledge. The technical side of this was described by Jeff Rothenberg in an article in the January 1995 issue of *Scientific American*, entitled "Ensuring the Longevity of Digital Documents." It turns out that neither the hardware nor the software that underlie the information revolution has much staying power. "It is only slightly facetious," says Rothenberg, "to say that digital information lasts forever -- or five years, whichever comes first." The most durable digital storage medium, the optical disk, has a physical lifetime of only thirty years and an estimated time to obsolescence of ten years. Digital documents are evolving rapidly, and shifts in their basic form are frequent. Translation backwards or forwards in time becomes difficult, tedious, and expensive -- or impossible. The result is the loss of much of each previous generation's work, a generation being defined as five to twenty years. There is always something "better" coming; as soon as it arrives, we forget all about it.

One striking example of the obsolescence nightmare, documented by Nicholson Baker in *The New Yorker* and by Clifford Stoll in his book *Silicon Snake Oil*, concerns the widespread conversion of paper library card catalogs to electronic ones. Having spent a fortune to convert their catalogs, libraries now find themselves in an electronic-economic *Catch-22*. The new catalogs don't work very well for many purposes, and the paper catalogs have been frozen or destroyed. Better electronic systems are always on the horizon. Consequently, libraries spend a third or more of their budgets on expensive upgrades of software and hardware, leaving little money for books and journals.

A second example of the effects of obsolescence is the wholesale forgetting of useful skills and knowledge -- everything from how to operate a lathe to how to identify different species of earthworms. Whole branches of learning are disappearing from the universities. The machine is

jettisoning both knowledge and diversity (a special kind of information) simultaneously. To illustrate the loss of biodiversity, biologists Stephen Hall and John Ruane have shown that the higher the GNP in the different countries of Europe -- the more integrated into "the system" they are -- the higher the percentage of extinct breeds of livestock. I'm sure that the same relationship could be shown for agricultural crop varieties or endangered languages. The system is erasing our inheritance.

Another problem involving the loss of information is incessant reorganization, made easier by information technology and causing frequent disruption of established social relationships among people who work and live together. Changes occur too rapidly and too often to permit social evolution to work properly in business, in government, in education, or in anything touched by them.

An article by Dirk Johnson in the "Money and Business" section of The New York Times of March 22, 1998 described some recent problems of the Leo Burnett advertising agency, which gave the world the Jolly Green Giant and the Marlboro Man. Johnson described one especially serious trouble for a company that prides itself on its long-term relationships with clients: "No one at Burnett can do much about a corporate world that shuttles chief executives in and out like managers on a George Steinbrenner team and that has an attention span that focuses on nothing older than the last earnings report. It is not easy to build client loyalty in such a culture, as many other shops can attest."

3. Increasing Complexity and Centralized Control

A third intrinsic problem with the techno-economic system is its increasing complexity and centralized control, features of much of what we create -- from financial networks to nuclear power plants. Nature, with its tropical rainforests, temperate prairies, and marine ecosystems, is also complex. But nature's slowly evolved complexity usually involves great redundancy, with duplication of functions, alternative pathways, and countless, self-regulating, fail-safe features. Our artificial complexity is very different: it is marked by a high degree of interlinkage among many components with little redundancy, by fail-safe mechanisms that are themselves complex and failure-prone, and by centralized controllers who can never fully comprehend the innumerable events and interactions they are supposed to be managing. Thus, our artificial systems are especially vulnerable to serious disturbances. System-wide failures -- what the Yale sociologist Charles Perrow calls "normal accidents"?occur when one component malfunctions, bringing down many others that are linked in ways that are poorly observed and understood. The fruits of this complexity and linkage are everywhere, from catastrophic accidents at chemical and nuclear plants to the myriad effects of accelerated climatic change.

Accidents and catastrophes are the most noticeable results of running a system that is beyond our full understanding, but the more routine consequences, those that don't necessarily make the front-page headlines, may be more important. Many of these consequences stem from a phenomenon first described by John von Neumann and Oskar Morgenstern in 1947, and applied to social systems by the biologist Garrett Hardin in 1968. Von Neumann and Morgenstern pointed

out that it is mathematically impossible to maximize more than one variable in an interlinked, managed system at any particular time. If one variable is adjusted to its maximum, it limits the freedom to maximize other variables -- in other words, in a complex system we cannot make everything "best" simultaneously. As we watch economists desperately juggling stock prices, wages, commodity prices, productivity, currency values, national debts, employment, interest rates, and technological investments on a global scale, trying to maximize them all, we might think about von Neumann's and Morgenstern's theory and its implications for the fate of our complex but poorly redundant techno-economic machine.

4. Confusing Simulation with Reality

The fourth group of problems is the blurring of the distinction between simulation and reality. With globalization, the ease of making large changes in a simulation on the computer screen is accompanied by a corresponding ease of ordering these large changes in the real world -- with disastrous results in activities as different as the planning of massive public works projects, the setting of monetary policy, and the conduct of war. Beginning with the Vietnam war, all contemporary American military adventures have had this through-the-looking-glass quality, in which the strategies and simulations conform poorly to actual events on the ground. As Martin van Creveld shows in his book, *The Transformation of War*, the simulated war of the military strategists is increasingly different from the realities of shifting, regional battlefields with their "low-intensity conflicts" against which high-tech weapons and classic military strategies are often worse than useless.

As we attempt to exert more complicated controls over our world, more modeling, with its assumptions and simplifications, is needed. This in turn causes all kinds of errors, some serious, most hidden. According to James Lovelock, years before the ozone hole was discovered by a lone pair of British observers using an old-fashioned and inexpensive instrument, it was observed, measured, and ignored by very expensive satellite-borne instruments which had been programmed to reject data that were substantially different from values predicted by an atmospheric model. Simulation had triumphed over reality.

What I call the "pseudocommunity problem" is another illustration of the fuzzy line that exists between simulation and reality. It began with television, which surrounded viewers with friends they did not have and immersed them in events in which they did not participate. The philosopher Bruce Wilshire, an articulate and charismatic lecturer, has observed that students who are otherwise polite and attentive talk openly and unselfconsciously during his lectures, much as if he were a figure on a television screen who could not be affected by their conversation.

Email and the Internet have made this situation much worse. Email has opened up a world of global communications that has attracted many of our brightest and most creative citizens, especially young people. Considerable good has come of this -- for the handicapped, for those who have urgent need of communicating with people in distant places, for those living in politically repressed countries, and others. But the ease and speed of email are traps that few evade. Real human interaction requires time, attention to detail, and work. There is a wealth of

subtlety in direct conversation, from body language to nuances of voice to choice of words. In email this subtlety is lost, reduced to the level of the smiley face used to indicate a joke. The result is a superficial, slipshod substitute for effective communication, often marked by careless use of language and hasty thought. Every hour spent online in the "global village" is an hour not spent in the real environment of our own communities. It is an hour of not experiencing the love and support of good neighbors; an hour of not learning how to cope with bad neighbors, who cannot be erased by a keystroke; an hour of not becoming familiar with the physical and living environment in which we actually live. Perhaps this is why a recent study of the social involvement and psychological well-being of Internet users, published in *American Psychologist*, found a significant decrease in the size of their social circle and a significant increase in their depression and loneliness after one to two years online. There are no good substitutes for reality.

5. The Unnecessary Exhaustion of Resources

Our techno-economic system is distinguished by its exceptionally high consumption of renewable and non-renewable resources. When this is pointed out, advocates of the system answer that substitutes for depleted resources will be found or new technologies will eliminate the need for them. To date, neither of these claims has been demonstrated to be true in any significant case. Meanwhile, resources -- from food to forests, from fresh water to soil -- are disappearing quickly. Blindness to warnings of impending shortage limits our options: by not responding while there are still the time and resources left to take corrective action, we are forced to work under crisis conditions, when there is little that can be done. The problem is too familiar to require much elaboration, but the most conspicuous example deserves brief mention. The global production of oil will probably peak -- and thereafter decline -- sometime between 2000 and 2010, regardless of new oil field development. Almost every part of our technology, including nuclear technology, depends on oil. Oil is not going to disappear any time soon. But we have already used more than half of the world's supply, with most of this consumption in the last few decades. As the recent report of Petroconsultants S. A. and the book, *The Coming Oil Crisis*, by the distinguished petroleum geologist C. J. Campbell make plain, we have only a very few years left of cheap oil.

The loss of cheap oil will strike far more deeply than can be predicted by economists' price-supply curves; it will fatally damage the stability of the transnational corporations that run our global techno-economic system. Transnational corporations are, ultimately, economic losers. Too often they rely on the sale of products that don't work well and don't last, that are made in unnecessarily expensive ways (usually as a result of making them very quickly), that are expensively transported, carry high environmental and human costs, and are purchased on credit made available by the seller. At present, these products are subsidized by subservient, lobbyist-corrupted governments through tax revenues and favorable regulation; their flaws are concealed by expensive advertising promotions which have coopted language and human behavioral responses in the service of sales; and they are imposed on consumers by the expensive expedient of suppressing alternative choices, especially local alternatives. All of this depends on the manipulation of a huge amount of surplus wealth by the transnationals, wealth that has been generated by cheap oil. When the oil becomes expensive, with no comparably inexpensive energy substitutes likely, when jobs disappear and the tax base shrinks, when consumers become an

endangered species, and when corporate profits dwindle and the market values of their stocks decline, the fundamental diseconomies of global corporations will finally take their toll and we will begin to see the transnationals disintegrate.

6. The Loss of Higher Inspiration

There is one final, internal problem of the system, maybe the most important: namely, a totally reductionist, managed world is a world without its highest inspiration. With no recognized higher power other than the human-made system that the people in charge now worship, there can be no imitation of God, no vision of something greater to strive for. Human invention becomes narrow, pedestrian, and shoddy; we lose our best models for making lasting, worthy societies. One such model is the noble dream of people and their communities functioning non-destructively, justly, and democratically within a moral order. The other -- long a reality -- is nature itself, whose magnificent durability we will never totally comprehend, but which has much to teach us if we want to learn. When people and communities become mere management units and nature is only something to exploit, what is left worth striving after? We become no better than our machines, and just as disposable.

The End of Global Management

The reductionist idea of a fully explainable and manageable world is a very poor model of reality by any objective standard. The real world comprises a few islands of limited understanding in an endless sea of mystery. Any human system that works and survives must recognize this. A bad model gives bad results. We have adopted a bad model and now we are living with the terrible consequences.

The present global power system is a transient, terminal phase in a process that began 500 years ago with the emerging Age of Reason. It has reached its zenith in the twentieth century, powered by the global arms trade and war and enabled by a soulless, greed-based economics together with a hastily developed and uniquely dangerous technology. This power system, with its transnational corporations, its giant military machines, its globalized financial system and trade, its agribusiness replacing agriculture -- with its growing numbers of jobless people and people in bad jobs, with its endless refugees, its trail of damaged cultures and ecosystems, and its fatal internal flaws, is now coming apart. Realization of the machine's mortality is the necessary first step before we begin to plan and work for something better. As the great British philosopher Mary Midgley says, "The house is on fire; we must wake up from this dream and do something about it."

Looming over us is an ominous conjunction of the internal sources of breakdown I have just described with the many, interlinked ecological and social threats that I only briefly listed. What can we do? Obviously a crash as comprehensive as the one that's coming will affect all of us, but that doesn't mean that there is nothing that can be done to soften the blow. We should begin by accepting the possibility that the system will fail. While others continue to sing and dance wildly at the bottom of the avalanche slope, we can choose to leave the insane party.

I do not mean going back to some prior state or period of history that was allegedly better than the world today. Even if going back were possible, there is no halcyon period that I would want to regain. Nor do I mean isolating ourselves in supposedly avalanche-proof shelters -- gated communities of like-minded idealists. No such shelter could last for long; nor would such an isolated existence be desirable. In the words of my friend, geographer Meg Holden, we should be unwilling "to admit defeat in the wager of the Enlightenment that people can create a nation based not on familial, racial, ethnic, or class ties, but on the betterment of self only through the betterment of one's fellow citizens." There is no alternative but to move forward -- a task that will place the highest demands on our ability to innovate and on our humanity.

Moving forward requires that we provide satisfying alternatives to those who have been most seriously injured by the present technology and economics. They include farmers, blue-collar workers suddenly jobless because of unfair competition from foreign slave labor or American "workfare," and countless souls whose lives and work have been made redundant by the megastores in the shopping malls. If good alternatives are not found soon, the coming collapse will inevitably provoke a terrible wave of violence born of desperation.

Creating a Shadow System

Our first task is to create a shadow economic, social, and even technological structure that will be ready to take over as the existing system fails. Shadow strategies are not new, and they are perfectly legal. An illustration is Winston Churchill's role in Britain before the start of World War II. Churchill was a member of the governing Conservative Party but was denied power, so he formed his own shadow organization within the party. During the 1930s, while Hitler was rearming Germany and the Conservative leadership was pretending that nothing was happening, Churchill spoke out about the war he knew was coming, and developed his own plans and alliances. When Hitler's paratroopers landed in Holland and Belgium in 1940, and Prime Minister Neville Chamberlain's silk umbrella could not ward them off, Churchill was chosen by popular acclaim to replace him as prime minister. He created a dynamic war cabinet almost overnight, thanks to his shadow organization.

The shadow structure to replace the existing system will comprise many elements, with varying mixes of the practical and theoretical. These elements are springing up independently, although linkages among them are beginning to appear. I will give only two examples; both are in the early stages of trial and error development.

The first is the rapid growth of community-sponsored agriculture (CSA) and the return of urban farmers' markets. In CSAs, farmers and local consumers are linked personally by formal agreements that guarantee the farmers a timely income, paid before the growing season, and the consumers a regular supply of wholesome, locally grown, often organic, produce. The first CSA project in the United States was started in 1985, in western Massachusetts, by the late Robyn Van En -- just thirteen years later, there are more than 600 CSAs with over 100,000 members throughout the United States. Urban farmers' markets similarly bring city-dwellers into contact with the people who grow their food, for the benefit of both. Although difficulties abound --

economic constraints for farmers whose CSAs lack enough members, the unavailability of the benefits of CSAs to the urban poor, who do not have cash to advance for subsequent deliveries of produce -- creative solutions seem possible. A related development has been the burgeoning of urban vegetable gardening in cities across the country. One of the most exciting examples is the garden project started by Cathrine Sneed for inmates of the San Francisco Jail and subsequently expanded into the surrounding urban community.

On another front, less local and immediate but equally important, is the embryonic movement to redefine the rights of corporations, especially to limit the much-abused legal fiction of their "personhood." The movement would take away from corporations the personal protections granted to individuals under the U.S. Constitution and Bill of Rights. The Constitution does not mention corporations; state charter laws originally made it plain that corporations could exist and do business only through the continuous consent of state governments. If a corporation violated the public trust, its charter could be revoked. The loss of the public right to revoke charters of corporations and the emergence of the corporation as an entity with limited liability and the property and other personal rights of citizens, was a tragic and often corrupt chapter in nineteenth-century American law. It has led to our present condition, in which transnational corporations with no local or national allegiances control many of the government's major functions, subverting democracy and doing much to create the unstable conditions I have described.

Recapturing the government's right to issue and cancel corporate charters should be a primary goal of those trying to build a more durable and decent social, economic, and technical system. Michael Lerner, editor of *Tikkun*, has suggested that we add a Social Responsibility Amendment to the Constitution containing the key provision that each corporation with annual revenues of \$20 million or more must receive a new corporate charter every twenty years. Similar ideas are being advanced by Richard Grossman and Ward Morehouse of the Program on Corporations, Law & Democracy; by Peter Montague, editor of *Rachel's Environment & Health Weekly*; and by others in the United States and Canada. Although still embryonic, the movement has drawn support from both conservatives and liberals -- the shadow structure is neither of the right nor the left, but is an emerging political alliance that may gain power when the transnationals decline.

In the words of Vaclav Havel, president of the Czech Republic, spoken in Philadelphia's Independence Hall on July 4, 1994: "There are good reasons for suggesting that the modern age has ended. It is as if something were crumbling, decaying and exhausting itself, while something else, still indistinct, were arising from the rubble." What is crumbling is not only our pretentious techno-economic system but our naive faith in our ability to control and manage simultaneously all the animate and inanimate functions of this planet. What is arising -- I hope in time -- is a new spirit and system rooted in love of community, and love of the land and nature that sustain community. And the greatest challenge will be to make this spirit and system truly new and truly enduring by finding ways to develop our love of nature and community without returning to destructive nationalisms, without losing our post-Enlightenment concern for the common good of the rest of humankind and nature.

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