The Nature of Design: Ecology, Culture, and Human Intention

David W. Orr

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Acknowledgments

For the past six years, ecological design has been more than an abstraction for me. The essays that follow originated in physical and intellectual proximity to an ecological design project on the campus of Oberlin College described in chapter 14. What began as a fairly straightforward design and construction project became a crash course in architecture, engineering, materials analysis, ecological engineering, landscape ecology, energy analysis, philosophy, institutional politics, and fund-raising. During that time it was my privilege to work with some of the most remarkable designers of our time. To all of the participants in that project I owe a large debt: Ray Anderson, David Austin, Bill Browning, Kevin Burke, Leo Evans, Carol Franklin, Chris Hays, Mark Hoberecht, Amory Lovins, John Lyle, Bill McDonough, Dave Nelson, Ron Perkins, Russell Perry, Mark Rusitsky, Bob Scheren, Michael Shaw, Stephen Strong, John Todd, Martin Troutman, and Adrian Tuluca. They persevered on a tough project. I owe a large debt to friends and colleagues here and elsewhere particularly David Benzing, Peter Buckley, Fritjof Capra, Tony Cortese, Nancy Dye, Karen Florini, Dierdre Holmes, Jon Jensen, Adam Lewis, Peter Lewis, Al MacKay, Brad Masi, Gene Matthews, Carl McDaniel, John

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Contents

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THE PROBLEM OF ECOLOGICAL DESIGN

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Introduction: The Design of Culture and the Culture of Design

Environmentalists are often regarded as people wanting to stop one thing or another, and there are surely lots of things that ought to be stopped. The essays in this book, however, have to do with beginnings. How, for example, do we advance a long-delayed solar revolution? Or begin one in forest management? Or materials use? How do we reimagine and remake the human presence on earth in ways that work over the long haul? Such questions are the heart of what theologian Thomas Berry (1999) calls "the Great Work" of our age. This endeavor is nothing less than the effort to harmonize the human enterprise with how the world works as a physical system and how it ought to work as a moral system. In the past two centuries the human footprint on earth has multiplied many times over. Our science and technology are powerful beyond anything imagined by the confident founders of the modern world. But our sense of proportion and depth of purpose have not kept pace with our merely technical abilities.

Our institutions and organizations still reflect their origins in another time and in very different conditions. Incoherence, disorder, and violence are the hallmarks of the modern world. If we are to build a better world—one that can be sustained ecologically and one that sustains us spiritually—we must transcend the disorder and fragmentation of the industrial age. We need a perspective that joins the hard-won victories of civilization, such as human rights and democracy, with a larger view of our place in the cosmos—what Berry calls "the universe story." By whatever name, that philosophy must connect us to life, to each other, and to generations to come. It must help us to rise above sectarianism of all kinds and the puffery that puts human interests at a particular time at the center of all value and meaning. When we get it right, that larger, ecologically informed enlightenment will upset comfortable philosophies that underlie the modern world in the same way that the Enlightenment of the eighteenth century upset medieval hierarchies of church and monarchy.

The foundation for ecological enlightenment is the 3.8 billion years of evolution. The story of evolution is a record of design strategies as life in all of its variety evolved in a vast efflorescence of biological creativity. The great conceit of the industrial world is the belief that we are exempt from the laws that govern the rest of the creation. Nature in that view is something to be overcome and subordinated. Designing with nature, on the other hand, disciplines human intentions with the growing knowledge of how the world works as a physical system. The goal is not total mastery but harmony that causes no ugliness, human or ecological, somewhere else or at some later time. And it is not just about making things, but rather remaking the human presence in the world in a way that honors life and protects human dignity. Ecological design is a large concept that joins science and the practical arts with ethics, politics, and economics.

In one way or another all of the important questions of our age have to do with how we get on with the Great Work, transforming human activity on the earth from destruction to participation and human attitudes toward nature from a kind of autism to a competent reverence. It would be foolish to think that what has taken several centuries or longer can be undone quickly or even entirely. But it would also be the height of folly to continue on our present course or to conclude that we are doomed and give up hope. For most of us the Great Work must begin where we are, in the small acts of everyday

life, stitching together a pattern of loyalty and faithfulness to a higher order of being. The hallmarks of those engaged in Great Work everywhere must be largeness of heart, breadth of perspective, practical competence, moral stamina, and the kind of intelligence that discerns ecological patterns.

This is a tall order, but we have a heritage of ecological design intelligence available to us if we are willing to draw on it. The starting point for ecological design is not some mythical past, but the heritage of design intelligence evident in many places, times, and cultures prior to our own. We don't need to reinvent wheels. What we will need in the decades ahead is to rediscover and synthesize, as well as invent. Let me illustrate with four examples.

1. Several days after the bombing of the Murrah Federal Building in Oklahoma City in 1995, an Amish friend of mine with a well-developed sense of humor called from a pay phone to inform me that no Amish person was involved in the crime. I responded by saying that I was not particularly surprised. "Good," he replied, "I just wanted to clarify that in your mind." After a pause he added: "You know if the Amish were involved, the getaway buggy would have been blown up."

My friend usually has a point to make. This time it was simply a humorous way of saying that if the horse is your primary mode of transportation, there are some things you cannot do. Whatever malice may be hidden in the heart, the speed and power of the horse sets limits to the havoc one can cause. If the horse is your primary form of transportation, you cannot haul enough diesel and fertilizer to blow up large buildings, and you could not escape the ensuing destruction anyway. A horse-drawn buggy has a radius of about eight miles in hilly country, and if you have chores to finish by suppertime, you cannot conveniently shop until you drop. And if you could, you still could not haul it all home. The use of draft animals also limits the amount of land one can farm, which, in turn, limits the desire to take over a neighbor's farm.

In Amish culture, in other words, the horse functions like a mechanical governor on a machine. The horse sets a standard of sorts for human activity and a way for the culture to say no to some possibilities, which means saying yes to better ones. The Amish voluntarily accept the limits imposed by the horse and the discipline of living in a close-knit community. People in industrial culture, on the other hand,

have no functional equivalent of the horse and accept few limits beyond those of what is assumed to be cost-effectiveness. The Amish and most traditional cultures can sustain themselves indefinitely within the ecological limits of their regions. They contribute little or nothing to climatic change, cancer rates, and the loss of biodiversity, and they are invulnerable to any technological failure originating within their own community. Modern societies, on the other hand, are increasingly vulnerable to a long list of ecological, economic, technological, and social threats. The question then arises whether we also need some functional equivalent of the horse in order to become sustainable. If so, what could it be?

2. The hamlet of Harberton, with a population of perhaps 100, is no more than 4 miles from the city of Totnes (Devon, U.K.) with a population of 10,000. The road connecting the two, however, is a single lane flanked by high hedgerows which traverses an ancient and competently used countryside. Drivers meeting on the lane connecting Harberton and Totnes must decide who will back up to let the other through. The process works with a civility and friendliness that is surprising to an American driver accustomed to speed and rudeness. In fact, the entire scene is unexpected. In, say, Ohio, there would be little or no countryside between the two places. Developers would have filled the four miles with malls, scenic motels, billboards, parking lots, fast-food joints, and poorly constructed housing. In contrast, the people of Devon have maintained and in some ways have improved a landscape continuously inhabited since the Neolithic era. It is a landscape of rolling hills, stone buildings clustered into villages, small fields, dairy farms, sheep pastures, hedgerows, and narrow roads. To the north is an expanse known as Dartmoor, to the south is the English channel and port towns such as Dartmouth from which the Mayflower sailed. This was an ancient landscape before the birth of Socrates and would still be mostly familiar to its early inhabitants. How is it that human occupation and use of this land for perhaps 10,000 years has not led to its desecration?

3. Western agriculture imposed on the island of Bali displaced an agricultural system of remarkable productivity that had thrived for a thousand years or more. Balinese agriculture was controlled by a system of temples presided over by a priesthood that orchestrated the distribution of irrigation water. The entire process was calibrated to the seasons, pests, and differing crop needs by a complex

calendar worked out over many centuries. That intricate, resilient, and highly productive system was displaced by the Green Revolution in the 1970s administered by experts who regarded agriculture as merely technical. The results were disastrous. Crops failed, pests multiplied, and the society unraveled. The Balinese system of agriculture had been a remarkable blend of religion with hydrological and biological management. The imposition of technocratic Western agriculture undid in a few years what had taken hundreds of years to create largely because "the managerial role of the water temples was not easily translated into the language of bureaucratic control" (Lansing 1991, 127). Now much of that system based on Western science and agronomy has been dismantled. But how can a system based on superstition work where one purportedly based on science does not?

4. Designer Victor Papenek once identified the Inuit people of northern Alaska as the best designers in the world. They are, he believed, "forced into excellence by climate, environment, and their space concepts. At least equally important is the cultural baggage they carry with them" (Papenek 1995, 223). Living in spare environments frozen through much of the year, the Inuit people have had to develop acute powers of observation, memory, and senses. They can repeat a long trek using nothing more than the memory of the same journey made years before. With eyes closed they can draw accurate maps of their coastline. And their best maps drawn long ago rival the best maps we can make with satellite data. Their homing sense resembles that of animals that can find their way home through adverse conditions. They make little distinction between space and time. They observe details with keenness lost to Western people. Can design ingenuity be bred into a culture by adversity?

Such examples reveal the importance of the relation between culture and the long-term human prospect in particular places. There are, of course, many other examples, such as Helena Norberg-Hodge's (1992) study of the impact of Westernization on the people of Ladakh and Gary Nabhan's (1982) study of the Papago peoples of the desert Southwest. The history of settled people in many places reveals the fact that culture and the ecology of particular places have often been joined together with great intelligence and skill. The results, however imperfect, are habitats in which culture and nature have flourished together over many generations. They offer clues

about how the human enterprise has, under some conditions, been sustained and what might be required to extend the life of our own.

Having been shaped by a century or more of cheap oil, industrialism, and hyperindividualism, we have a difficult time understanding what might be learned from such seemingly archaic examples. Yet as tourists we are drawn in large numbers to places like Amish country or Devon to snap a few photographs and after a brief visit return to other places that are not nearly as wholesome and to lives far more hectic. We seldom see any relation between the two. What can be learned from well-used landscapes and settled societies wherever they exist is the importance of local culture as the mediator between human intentions and nature. Design for settled peoples is more than the work of a few heroic individuals. The process by which cultures and communities evolve over long periods of time in particular places is manifest not so much in discrete and spectacular things as it is in overall stability and long-term prosperity. Indeed, it is the absence of spectacular monuments like pyramids, glittering office towers, and shopping malls that signals the intention of people to settle in and stay a while. Design in such places is a cultural process extending over many centuries that has certain identifiable characteristics.

In contrast to the frenetic pace of industrial societies, settled cultures work slowly, rather like "a patient and increasingly skillful lovemaking that [persuades] the land to flourish" (Hawkes 1951, 202). Moreover, settled cultures seldom exceed what can be called a human scale. They persist mostly, but not exclusively, on local resources. In Devon, most houses and barns are made from local timber and stone and roofed with local slate or thatch. Fences are grown as hedgerows over centuries. In Amish country, barns and houses are still built from local timber by the community in barn raisings. The culture is mostly powered by sunshine in the form of grass for animals and by wind for pumping water. Settled cultures grow most of their food. They provide their own livelihood. To their young they impart the skills and aptitudes necessary to live in a particular place, not the generic job skills necessary for the anywhere-and-everywhere industrial economy. Instead of individual brilliance, design results from an intelligence that is deeply embedded in the culture.

Settled cultures tend to limit excess in a variety of ways. Showiness, ego trips, great wealth, huge homes, hurry, and excessive consumption are mostly discouraged, while cooperation, neighborliness,

competence, thrift, responsibility, and self-reliance are encouraged. I doubt that these traits are mentioned often, but they are manifest in the routines of daily life. It is simply the way things are. Western culture with its worship of egoism, doing your own thing, consumption, the cult of wealth, and keeping one's options open is simply incomprehensible from the viewpoint of settled people. Whatever their particular theology, settled cultures limit the expression of the seven deadly sins of pride, envy, anger, sloth, avarice, gluttony, and lust simply because these vices make living in close quarters difficult if not impossible. In Western culture, as Lewis Mumford (1961, 346) once noted, the deadly sins have mutated into "virtues" that feed economic obesity. When the two cultures have clashed, settled people have regarded industrial people as seriously deranged. But more often than not settled people are either subsequently seduced by materialism or swept away by the sheer power of the more aggressive culture.

Settled cultures, without using the word "ecology," have designed with ecology in mind because to do otherwise would bring ruin, famine, and social disintegration. Out of necessity they created harmony between intentions and the genius of particular places that preserved diversity both cultural and biological capital; utilized current solar income; created little or no waste; imposed few unaccounted costs; and supported cultural and social patterns. Cultures capable of doing such things work slowly and from the bottom up. There is no amount of individual cleverness that could have created the intricate cultural patterns that have preserved the landscape of Devon or grown rice in Bali for millennia, nor any that could have created a culture as stable and nondestructive as that of the Amish. On the contrary, these evolved as a continual negotiation within a community and between the community and the ecological realities of particular places. Such cultures are not the result of scientific research so much as continual trial and error at a scale small enough to give quick feedback on cause and effect. Ecological design, then, requires not just a set of generic design skills but rather the collective intelligence of a community of people applied to particular problems in a particular place over a long period of time.

Ecological design at the level of culture resembles the structure and behavior of resilient systems in other contexts in which feedback between action and subsequent correction is rapid, people are held accountable for their actions, functional redundancy is high, and

control is decentralized. At a local scale, people's actions are known and so accountability tends to be high. Production is distributed throughout the community, which means that no one individual's misfortune disrupts the whole. Employment, food, fuel, and recreation are mostly derived locally, which means that people are buffered somewhat from economic forces beyond their control. Similarly, the decentralization of control to the community scale means that the pathologies of large-scale administration are mostly absent. Moreover, being situated in a place for generations provides long memory of the place and hence of its ecological possibilities and limits. There is a kind of long-term learning process that grows from the intimate experience of a place over time of the kind once described by English wheelwright George Sturt ([1923] 1984, 66) as "the age-long effort of Englishmen to fit themselves close and ever closer into England."

Beneath what we can see in settled cultures, there is a deeper worldview that we can barely comprehend. In contrast to the linear thinking characteristic of Westernized people, Native American cultures, for example, had a more integrated view of the world in which they lived. In Vine Deloria's words, "The traditional Indian stood in the center of a circle and brought everything together in that circle. Today we stand at the end of a line and work our way along that line, discarding or avoiding everything on either side of us" (1999, 257). There was (and for some, still is) a view that all that exists is bound in a kind of supportive kinship. These relationships imposed responsibilities on humans to perform tasks that upheld the "basic structure of the universe" and ensured that all life forms were treated with respect and dignity (ibid., 131). Humans were intended to live "as relatives" with all animals and learn from them (ibid., 237). "Apart from participation in this network," Deloria says, "Indians believe a person simply does not exist" (ibid., 132).

The idea that humans are embedded in a network of obligation and are kin to all life explains why settled cultures often regarded economics as a kind of gift relationship. "In most Indian communities in the old days the most respected person was the one who gave freely of physical wealth, who showed a concern for the unfortunate, and who allowed weaker members of the community to rely on him/her" (Deloria 1999, 132). The essence of the economy is the simple and profoundly ecological idea that "the gift must always move" (Hyde 1983, 4). Tribal people often evolved complicated cer-

emonies, like the potlatch of the Native American tribes of the North Pacific, in which wealth was given away, destroyed, or discarded. Beneath such customs is an ecological view of the world that involves understanding "that what nature gives to us is influenced by what we give to nature" (Deloria 1999, 19). When wealth is no longer regarded as a gift to be passed from person to person, then and only then does scarcity appear.

Such relationships were not religious abstractions, but central to the way Native Americans related to the places in which they lived. They made no clear distinctions between themselves physically and the land in which they dwelled. Land contained the memory of past deeds and the spirits of their ancestors. Settled people have always known where they would be buried and with whom. "Our memory of land is a memory of ourselves and our deeds and experiences," in Deloria's words (1999, 253). We who regard land as a commodity to be bought and sold or as a resource can scarcely comprehend such a view. Our lack of comprehension is, in the view of tribal people, a mark of our adolescence and immaturity.

This book is not an argument to return to some mythic condition of ecological innocence. No such place ever existed. It begins, however, with an acknowledgment that we have important things to relearn about the arts of longevity—what is now called "sustainability"—from earlier cultures and other societies. Many of those cultures appear to us as quaintly archaic if not utterly incomprehensible. But in the larger sweep of time, our emphasis on economic growth, consumption, and individualism will be even less understandable to subsequent and, one hopes, wiser generations. Carrying out the Great Work of making an ecologically durable and decent society will require us to confront the deeper cultural roots of our problems and grow out of the faith that we can meet the challenge of sustainability without really changing much. The evidence, I think, shows that we will have to change a great deal and mostly in ways that we will come to regard as vastly better than what exists now and certainly better than what is in prospect.

This is a design challenge like no other. It is not about making greener widgets but how to make decent communities that fit their places with elegant frugality. The issue is whether the emerging field of ecological design will evolve as a set of design skills applied as patchwork solutions on a larger pattern of disorder or whether design

will eventually help to transform the larger culture that is badly in need of a reformation. I hope for the latter. Green consumerism or even greener corporations are Band-Aids on wounds inflicted by economy grown too indifferent to real human needs and pressing problems of long-term human survival. Corporations certainly need to be improved, but the larger design problem has to do with the structure of an economy that promotes excess consumption and human incompetence, concentrates power in too few hands, and destroys the ties that bind people together in community. The problem is not how to produce ecologically benign products for the consumer economy, but how to make decent communities in which people grow to be responsible citizens and whole people.

The essays that follow aim to broaden the concept of ecological design, explore various pathologies that prevent it, and sketch the educational implications of design. In the final section the essays lay out a standard for design that is oriented to generosity in the large sense of the word, the preservation of wildness and wilderness, and the design of a culture that protects its children.

2

Human Ecology as a Problem of Ecological Design

> Man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords.
>
> —*George Perkins Marsh*

The Problem of Human Ecology

Whatever their particular causes, environmental problems all share one fundamental trait: with rare exceptions they are unintended, unforeseen, and sometimes ironic side effects of actions arising from other intentions.[1] We intend one thing and sooner or later get something very different. We intended merely to be prosperous and

1. Our ecological troubles have been variously attributed to Judeo-Christian religion (White 1967), our inability to manage common property resources

healthy but have inadvertently triggered a mass extinction of other species, spread pollution throughout the world, and triggered climatic change—all of which undermines our prosperity and health. Environmental problems, then, are mostly the result of a miscalibration between human intentions and ecological results, which is to say that they are a kind of design failure.

The possibility that ecological problems are design failures is perhaps bad news because it may signal inherent flaws in our perceptual and mental abilities. On the other hand, it may be good news. If our problems are, to a great extent, the result of design failures, the obvious solution is better design, by which I mean a closer fit between human intentions and the ecological systems where the results of our intentions are ultimately played out.

The perennial problem of human ecology is how different cultures provision themselves with food, shelter, energy, and the means of livelihood by extracting energy and materials from their surroundings (Smil 1994). Ecological design describes the ensemble of technologies and strategies by which societies use the natural world to construct culture and meet their needs. Because the natural world is continually modified by human actions, culture and ecology are shifting parts of an equation that can never be solved. Nor can there be one correct design strategy. Hunter-gatherers lived on current solar income. Feudal barons extracted wealth from sunlight by exploiting serfs who farmed the land. We provision ourselves by mining ancient sunlight stored as fossil fuels. The choice is not whether or not human societies have a design strategy, but whether that strategy works ecologically and can be sustained within the regenerative capacity of the particular ecosystem. The problem of ecological design has become more difficult as the human population has grown and technology has multiplied. It is now the overriding problem of our time, affecting virtually all other issues on the human agenda. How and how intelligently we weave the human presence into the natural world will re-

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such as ocean fisheries (Hardin 1968), lack of character (Berry 1977), gender imbalance (Merchant 1980), technology run amuck (Mumford 1974), disenchantment (Berman 1989), the loss of sensual connection to nature (Abram 1996), exponential growth (Meadows 1998), and flaws in the economic system (Daly 1996).