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The
Kentucky Institute
for the
Environment
and Sustainable
Development

urban design for environmental protection

A Commitment to Kentucky's Sustainable Environment

The Kentucky Institute for the Environment and Sustainable Development (KIESD) at the University of Louisville has committed itself to research, education and public service in the areas of environmental protection and sustainability. This Journal is part of the Institute's educational outreach, to inform governmental officials, industry representatives, academia and the general public on environmental issues facing the state.

This issue focuses on how design impacts, and how it can be used to enhance, environmental quality within our urban areas. More than 50% of Kentucky's 4 million residents now live in urban areas according to the 2000 Census. Urban areas pose the greatest challenges in environmental protection. Urban residents face higher concentrations of air, water and land contaminants that pose potential health risks. Ecological systems have been severely disrupted and modified by manmade development and activities. Typical regulatory programs are inadequate to address many of the environmental issues that exist in our cities. The sources of pollutants are often diffuse and largely unregulated. The extensive modifications to natural resources, including land clearing, building and road construction, storm sewer construction, and the conversion to grass lawns, have left our cities without the natural resiliency to maintain environmental quality.

Dr. David Orr, chair of environmental studies at Oberlin College, lays out some ecological design principals in his article. Urban design as currently practiced has resulted in unintended and unforeseen side effects. In his essay he argues that cities need to incorporate ecological principles in their design. An innovative design project to contain and treat a contaminated site through innovative design is described in the article by Cheri Hildreth Watts, director of the University of Louisville's Department of Health and Safety. The location of the University's new football stadium is on an old railroad yard, contaminated through years of negligence. Center cores are often viewed as being no longer able to compete with suburban areas that have grown steadily since the 1950's. Tim Barry, Executive Director of the Louisville Housing Authority, describes a successful urban renewal project that dispels this myth. The Park DeValle project has successfully attracted people back to west Louisville by creating a strong sense of community. The project utilizes design concepts known as New Urbanism which are described by Russell Barnett, with the Kentucky Institute for the Environment and Sustainable Development. Drs. John Cairns, Jr. and Sarah E. Palmer, with the Virginia Polytechnical Institute and University of Arizona respectively, argue that the restoration of urban streams and "brownfields" are needed first steps for cities to begin to restore their ecological balance.

The next issue of Sustain, scheduled for the fall of 2001, will focus on the impacts of confined animal feeding operations. The Institute welcomes any comments that you have about the journal or any of its articles. Comments should be addressed to Dr. Allan Dittmer, School of Education, UofL, Louisville, KY 40292.

Steven Myers, Ph.D.
Director of KIESD
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The Kentucky Institute for the Environment and Sustainable Development (KIESD) was created in July 1992 within the Office of the Vice President for Research, University of Louisville. The Institute provides a forum to conduct interdisciplinary research, applied scholarly analysis, pubic service and educational outreach on environmental and sustainable development issues at the local, state, national and international levels.

KIESD is comprised of eight thematic program centers: Environmental Education, Watershed Research, Environmental Law, Sustainable Urban Neighborhoods, Pollution Prevention, Environmental and Occupational Health Sciences, Environmental Policy and Management, and Environmental Engineering.

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dare to be great

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Louisville Waterfront (2000). Photo by John Gallings courtesy of Hargraves Associates

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ARCHITECTURE, ECOLOGICAL DESIGN, AND HUMAN ECOLOGY

We shape our buildings, thereafter they shape us."
-Winston Churchill

By
David Orr
Professor and Chair of Environmental Studies, Oberlin College

From the 35th floor of a downtown office tower that dominates the new Atlanta skyline, one can see two problems that all architects of high rise buildings face. The question is how to bring the thing to an end gracefully before gravity and money do so. Some architects just quit, hence the flat roof. But most embellish the finale in various ways with one kind of flourish or another, each somewhat more outlandish than the one built the year before. The result, what some call "an interesting skyline," is a kind of fever chart of the collected psyches of architects and their clients that shape the modern megalopolis. The results, however, are more than just show. These are the buildings that contribute greatly to traffic congestion, poverty, climatic change, pollution, biotic impoverishment, and land degradation. If less visually dramatic, the same could be said of the designers of the modern suburb and shopping mall. In both cases the problem is that the art and science of architecture and related applied disciplines has been whittled down by narrow gauge thinking.

The importance of regarding architecture in a larger context lies in the big numbers of our time. We have good reason to believe that humankind will build more buildings in the next fifty years than in the past five thousand. Done by prevailing design standards, we will cast a long shadow on the prospects of all subsequent generations. No longer can we substitute cheap fossil energy for design intelligence or good judgement. The implications for the education of architects and the design professions generally are striking. Let me propose three.

First, the esthetic standards for design will have to be broadened to embrace wider impacts. Designers ought to aim to cause no ugliness, human or ecological, somewhere else or at some later time. For education, this means that the architectural curriculum must include ethics, ecology, and tools having to do with whole systems analysis, and least-cost, end-use considerations. Further, educational standards need to include a more sophisticated and ecologically grounded understanding of place and culture.

Second, it should be recognized that architecture and design are fundamentally pedagogical. Churchill had it right: we are shaped by our buildings and landscapes in powerful but subtle ways. The education of all design professions ought to begin in the recognition that architecture and landscapes are a kind of crystallized pedagogy that informs well or badly, but never fails to inform. Design inevitably instructs us about our relationships to nature and people that makes us more or less mindful and more or less ecologically competent. The ultimate object of design is not artifacts, buildings, or landscapes, but human minds.

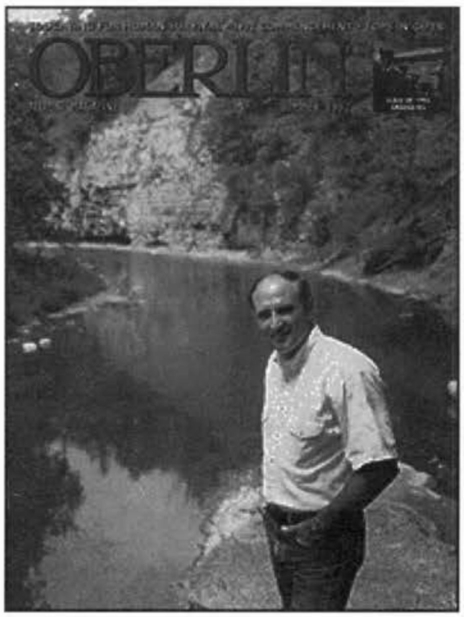
Third, architecture and design ought to be seen in their largest context that has to do with health. At the most obvious level 'sick buildings' reflect not simply bad design but a truncated concept of design. A larger design perspective would place architecture and landscape architecture as subfields of the art and science of health with more than passing affinity for healing and the holy.

Architecture is commonly taught and practiced as if it were only the art and science of designing buildings, which is to say merely as a technical subject at the mercy of the whims of clients. I would like to offer a contrary view that architecture ought to be placed into a larger context as a subfield of ecological design. The essay that follows might best be considered as a series of notes on the boundaries of this larger field of design. Earlier forays into this area by van der Ryn and Cowan (1996) laid the groundwork for a more expansive view of the design professions. I intend to build on that foundation to connect design professions, and the education of designers to the larger issues of human ecology.

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. We intend one thing and sooner or later get something very different. We intended merely to be prosperous and 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 species 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.



David Orr, Professor of Environmental Studies, Oberlin College

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. Since 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 human societies have a design strategy or not, but whether it works ecologically or not and can be sustained within the regenerative capacity of the 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 reduce or intensify other problems having to do with ethnic conflicts, economics, hunger, political stability, health, and human happiness.

At the most basic level, humans need 2200 to 3000 Calories per day, depending on body size and activity level. Early hunter-gatherers used little more energy than they required for food. The invention of agriculture increased the efficiency with which we captured sunlight permitting the growth of cities (Smil, 1991, 1994). Despite their differences, both showed little ecological foresight. Hunter-gatherers drove many species to extinction and early farmers left behind a legacy of deforestation, soil erosion, and land degradation. In other words, we have always modified our environments to one degree or another, but the level of ecological damage has increased with the level of civilization and with the scale and kind of technology.

The average citizen of the United States now uses some 186,000 Calories of energy each day, most of it derived from oil and coal (McKibben, 1998). Our food and materials come to us via a system that spans the world and whose consequences are mostly concealed from us. The average food molecule is said to have traveled over 1300 miles from where it was grown or produced to where it is eaten (Meadows, 1998). In such a system, there is no way we can know the human or ecological consequences of eating. Nor can we know the full cost of virtually anything that we purchase or discard. We do know, however, that the level of environmental destruction has risen with the volume of stuff consumed and with the distance it is transported. By one count we waste more than one million pounds of materials per person per year. For every 100 pounds of product, we create 3200 pounds of waste. (Hawken, 1997, 44) Measured as an "ecological footprint" i.e., the land required to grow our food, process our organic wastes, sequester our carbon dioxide, and provide our material needs, the average North American, by one estimate, requires some 5 hectares of arable land per person per year (Wackernagel and Rees, 1996). But at the current population level the world has only 1.3 hectares of useable land per person. Extending our lifestyle to everyone, would require the equivalent of two additional Earths!

Looking ahead, we face an imminent collision between a growing population with rising material expectations and ecological capacity. At some time in the next century, given present trends, the human population will reach or exceed

10 billion, perhaps as many as 15-20 percent of the species on earth will have disappeared forever, and the effects of climatic change will have become manifest. This much and more is virtually certain. The immediate problem is simply that of feeding, housing, clothing, and educating another 4-6 billion people and providing employment for an additional 2 to 4 billion without wrecking the planet in the process. Given our inability to meet basic needs of one-third of the present population there are good reasons to doubt that we will be able to do better with the far larger population now in prospect.

The Default Setting

The regnant faith, however, holds that science and technology will find a way to do so without our having to make significant changes in our philosophies, politics, economics, or in the directions of the growth oriented society. Rockefeller University professor, Jessie Ausubel, for example, asserts that:

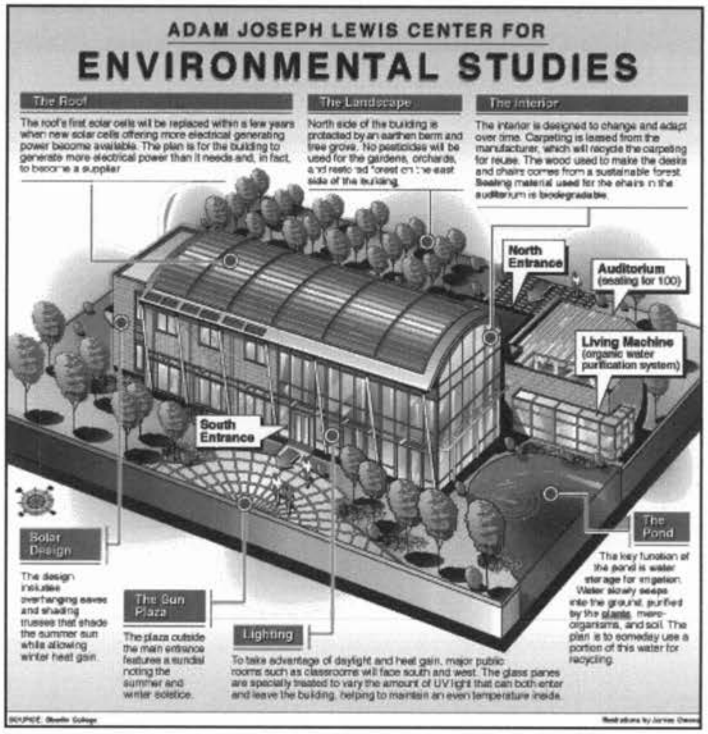
after a very long preparation, our science and technology are ready also to reconcile our economy and the environment . . . In fact, long before environmental policy became conscious of itself, the system had set decarbonization in motion. A highly efficient hydrogen economy, landless agriculture, industrial ecosystems in which waste virtually disappears: over the coming century these can enable large, prosperous human populations to co-exist with the whales and the lions and the eagles and all that underlie them (Ausubel, 1976).

We have, Ausubel states, "liberated ourselves from the environment." This view is similar to that of futurist, Herman Kahn several decades ago when he asserted that by the year 2200 "humans would everywhere be rich, numerous, and in control of the forces of nature" (Kahn and Martel, 1976). In its more recent version, those believing that we have liberated ourselves from the environment cite advances in energy use, materials science, genetic engineering, and artificial intelligence that will enable us to do much more with far less and eventually transcend ecological limits altogether. Humanity will then take control of its own fate, or more accurately, as C. S. Lewis once observed, some few humans will do so, purportedly acting on behalf of all humanity (1970).

Ausubel's optimism coincides with the widely held view that we ought to simply take over the task of managing the planet (Scientific American, 1989). In fact the technological and scientific capability is widely believed to be emerging in the technologies of remote sensing, geographic information systems, computers, the science of ecology (in its managerial version), and systems engineering. The problems of managing the Earth, however, are legion. For one thing the word 'management' does not quite capture what the essence of the thing being proposed. We can manage, say, a 747 because we made it. Presumably, we know what it can and cannot do even though they sometimes crash for reasons that elude us. Our knowledge of the Earth is in no way comparable. We did not make it, we have no blueprint of it, and will never know fully how it works. Second, the target of management is not quite what it appears to be since a good bit of what passes for managing the Earth is in fact managing human behavior. Third, under the guise of objective neutrality and under the pretext of emergency, management of the Earth is ultimately an extension of the effort to dominate people through the domination of nature. And can we trust those presuming to manage to do so with fairness, wisdom, foresight, and humility and for how long?

Another, and more modest, possibility is to restrict our access to nature rather like a fussy mother in bygone days keeping unruly children out of the formal parlor. To this end Professor Martin Lewis proposes what he calls a "Promethean environmentalism" that aims to protect nature by keeping us away from as much of it as possible (Lewis, 1992). His purpose is to substitute advanced technology for nature. This requires the development of far more advanced technologies, more unfettered capitalism, and probably some kind of high-tech virtual simulation to meet whatever residual needs for nature that we might retain in this Brave New World. Professor Lewis dismisses the possibility that we could become stewards, ecologically competent, or even just a bit more humble. Accordingly, he disparages those whom he labels "eco-radicals" including Aldo Leopold, Herman Daly, and E. F. Schumacher who question the role of capitalism in environmental destruction, raise issues about appropriate scale, and disagree with the directions of technological evolution. Lewis' proposal to protect nature by removing humankind from it, however, raises other questions. Will people cut off from nature be sane? Will people who no longer believe that they need nature be willing, nonetheless, to protect it? If so, will people no longer in contact with nature know how to do so? And was it not our efforts to cut ourselves off from nature that got us into trouble in the first place? On such matters Professor Lewis is silent.

Despite the pervasive optimism about our technological possibilities, there is a venerable tradition of unease about the consequences of unconstrained technological development from Mary Shelley's Frankenstein to Lewis Mumford's critique of the "megamachine." But the technological juggernaut that has brought us to our present situation, nonetheless, remains on track. We have now arrived, in Edward O. Wilson's view, at a choice between two very different paths of human evolution. One choice would aim to preserve "the physical and biotic environment that cradled the human species" along with those traits that make us distinctively human. The other path, based on the belief that we are now exempt from the "iron laws of ecology that bind other species," would take us in radically different directions, as "Homo proteus or 'shapechanger man'" (Wilson, 1998). But how much of the earth can we safely alter? How much of our own genetic inheritance should we manipulate before we are no longer recognizably human? This second path, in Wilson's view, would "render everything fragile". And, in time, fragile things break apart.



The sociologist and theologian, Jacques Ellul, is even more pessimistic. "Our machines," he writes, "have truly replaced us." We have no philosophy of technology, in his view, because "philosophy implies limits and definitions and defined areas that technique will not allow." (1990) Consequently, we seldom ask where all of this is going, or why, or who really benefits. The "unicity of the [technological] system" Ellul believes, "may be the cause of its fragility" (1980). We are "shut up, blocked, and chained by the inevitability of the technical system, at least until the self-contradictions of the "technological bluff," like massive geologic fault lines, give way and the system dissolves in "enormous global disorder." At that point he thinks that we will finally understand that "everything depends on the qualities of individuals" (1990).

The dynamic is, by now, familiar. Technology begets more technology, technological systems, technology driven politics, technology dependent economies, and finally, people who can neither function nor think a hair's breadth beyond the limits of one machine or another. This, in Neil Postman's view, is the underlying pattern of western history as we moved from simple tools, to technocracy, to "technopoly." In the first stage, tools were useful to solve specific problems but did not undermine "the dignity and integrity of the culture into which they were introduced" (Postman, 1992). In a technocracy like England in the 18th and 19th centuries, factories undermined "tradition, social mores, myth, politics, ritual and religion." The third stage, technopoly, however, "eliminates alternatives to itself in precisely the way Aldous Huxley outlined in Brave New World." It does so "by redefining what we mean by religion, by art, by family, by politics, by history, by truth, by privacy, by intelligence, so that our definitions fit its new requirements" (48). Technopoly represents, in Postman's view, the cultural equivalent of AIDS, which is to say a culture with no defense whatsoever against technology or the claims of expertise (63). It flourishes when the "tie between information and human purpose has been severed."

The course that Professor Ausubel and others propose fits into this larger pattern of technopoly that step by step is shifting human evolution in radically different directions. Professor Ausubel does not discuss the risks and unforeseen consequences that accompany unfettered technological change. These, he apparently believes, are justifiable as unavoidable costs of progress. This is precisely the kind of thinking which has undermined our capacity to refuse technologies that add nothing to our quality of life. A system which produces automobiles and atom bombs will also go on to make super computers, smart weapons, genetically altered crops, nano technologies, and eventually machines smart enough to displace their creators. There is no obvious stopping point, which is to say that having accepted the initial premises of technopoly the powers of control and good judgement are eroded away in the blizzard of possibilities.

Advertised as the essence of rationality and control, the technological system has become the epitome of irrationality in which means overrule careful consideration of ends. A rising tide of unanticipated consequences and "normal accidents" mock the idea that experts are in control or that technologies do only what they are intended to do. The purported rationality of each particular component in what E. O. Wilson calls a "thickening web of prosthetic devices" added together as a system lacks both rationality and coherence. Nor is there anything inherently human or even rational about words such as "efficiency," "productivity," or "management," that are used to justify technological change. Rationality of this narrow sort has been "as successful—if not more successful—at creating new degrees of barbarism and violence as it has been at imposing reasonable actions" (Saul, 1992).

Originating with Descartes and Galileo, the foundations of the modern worldview were flawed from the beginning. In time, those seemingly small and trivial errors of perception, logic, and heart cascaded into a rising tide of cultural incoherence, barbarism, and ecological degradation that have now engulfed the earth. Professor Ausubel's optimism, notwithstanding, this tide will continue to rise until it has finally drowned every decent possibility that might have been unless we choose a more discerning course.

Ecological Design

The unfolding problems of human ecology, in other words, are not solvable by repeating old mistakes in new and more sophisticated and powerful ways. We need a deeper change of the kind Albert Einstein had in mind when he said that the same manner of thought that created problems could not solve them. We need what architect Sim van der Ryn and mathematician, Steward Cowan define as an ecological design revolution. Ecological design in their words is "any form of design that minimize(s) environmentally destructive impacts by integrating itself with living processes . . . the effective adaptation to and integration with nature's processes" (van der Ryn and Cowan, 1996). For Landscape architect, Carol Franklin ecological design is a "fundamental revision of thinking and operation" (Franklin, 1997). Good design does not begin with what we can do, but rather with questions about what we really want to do (Wann, 1996). Ecological design, in other words, is the careful meshing of human purposes with the larger patterns and flows of the natural world and the study of those patterns and flows to inform human actions (Orr, 1994).

Amory Lovins, Hunter Lovins, and Paul Hawken, to this end propose a transformation in energy and resource efficiency that would dramatically increase wealth while using a fraction of the resources we currently use (1999). 1 Transformation would not occur, however, simply as an extrapolation of existing technological trends. They propose, instead, a deeper revolution in our thinking about the uses of technology so that we don't end up with "extremely efficient factories making napalm and throwaway beer cans" (Benyus, 262). In contrast to Ausubel, the authors of Natural Capitalism propose a closer calibration between means and ends. Such a world would improve energy and resource efficiency by, perhaps, ten-fold. It would be powered by highly efficient small-scale renewable energy technologies distributed close to the point of end-use. It would protect natural capital in the form of soils, forests, grasslands, oceanic fisheries, and biota while preserving biological diversity. Pollution, in any form, would be curtailed and eventually eliminated by industries designed to discharge no waste. The economy of that world would be calibrated to fit ecological realities. Taxes would be levied on things we do not want such as pollution and removed from things such as income and employment that we do want. These changes signal a revolution in design that draws on fields as diverse as ecology, systems dynamics, energetics, sustainable agriculture, industrial ecology, architecture, and landscape architecture.[2]

The challenge of ecological design is more than simply an engineering problem of improving efficiency—reducing the rates at which we poison ourselves and damage the world. The revolution that van der Ryn and Cowan propose must first reduce the rate at which things get worse (coefficients of change) but eventually change the structure of the larger system. As Bill McDonough and Michael Braungart argue, we will need a "second industrial revolution" that eliminates the very concept of waste (McDonough & Braungart, 1998). This implies, in their words, putting "filters on our minds, not at the end of pipes." In practice, the change McDonough proposes implies, among other things, changing manufacturing systems to eliminate the use of toxic and cancer causing materials and the development of closed loop systems that deliver "products of service" not products that arîFeventually discarded to air, water, and land-fills.

The pioneers in ecological design begin with the observation that nature has been developing successful strategies for living on Earth for 3.8 billion years and is, accordingly, a model for:

- Farms that work like forests and prairies,
- Buildings that accrue natural capital like trees,
- Waste water systems that work like natural wetlands,
- Materials that mimic the ingenuity of plants and animals,
- Industries that work more like ecosystems, and

- Products that become part of cycles resembling natural materials flows.

Wes Jackson, for example, is attempting to redesign agriculture in the Great Plains to mimic the prairie that once existed there (Jackson, 1980). Paul Hawken proposes to remake commerce in the image of natural systems (Hawken, 1993). The new field of industrial ecology is similarly attempting to redesign manufacturing to reflect the way ecosystems work. The new field of "biomimicry" is beginning to transform industrial chemistry, medicine, and communications. Common spiders, for example, make silk that is ounce for ounce 5 times stronger than steel with no waste byproducts. The inner shell of an abalone is far tougher than our best ceramics (Benyus, 1997). By such standards, human industry is remarkably clumsy, inefficient, and destructive. Running through each of these is the belief that the successful design strategies, tested over the course of evolution, provide the standard to inform the design of commerce and the large systems that supply us with food, energy, water, and materials, and remove our wastes (Benyus, 1973).

The greatest impediment to an ecological design revolution is not, however, technological or scientific, but rather human. If intention is the first signal of design, as Bill McDonough puts it, we must reckon with the fact that human intentions have been warped in recent history by violence and the systematic cultivation of greed, self-preoccupation, and mass consumerism. A real design revolution will have to transform human intentions and the larger political, economic, and institutional structure that permitted ecological degradation in the first place. A second impediment to an ecological design revolution is simply the scale of change required in the next few decades. All nations, but starting with the most wealthy, will have to:

- Improve energy efficiency by a factor of 5-10;
- Rapidly develop renewable sources of energy;
- Reduce the amount of materials per unit of output by a factor of 5-10;
- Preserve biological diversity now being lost everywhere;
- Restore degraded ecosystems;
- Redesign transportation systems and urban areas;
- Institute sustainable practices of agriculture and forestry;
- Reduce population growth and eventually total population levels;
- Redistribute resources fairly within and between generations; and
- Develop more accurate indicators of prosperity, wellbeing, health and security.

Exterior and Interior views of the Adam Joesph Lewis Center for Environmental Studies, Oberlin College

We have good reason to think that all of these must be well underway within the next few decades. Given the scale and extent of the changes required, this is a transition for which there is no historical precedent. The century ahead will test, not just our ingenuity, but our foresight, wisdom, and sense of humanity as well.

The success of ecological design will depend on our ability to cultivate a deeper sense of connection and obligation without which few people will be willing to make even obvious and rational changes in time to make much difference. We will have to reckon with the power of denial, both individual and collective, to block change. We must reckon with the fact that we will never be intelligent enough to understand the full consequences of our actions, some of which will be paradoxical and some evil. We must learn how to avoid creating problems for which there is no good solution technological or otherwise (Hunter, 1997; Dobb, 1996) such as the creation of long-lived wastes, the loss of species, or toxic waste flowing from tens of thousands of mines. In short a real design revolution must aim to foster a deeper transformation in human intentions and the political and economic institutions that turn intentions into ecological results. There is no clever shortcut, no end-run around natural constraints, no magic bullet, and no cheap grace.

The Intention to Design

Designing a civilization that can be sustained ecologically and one that sustains the best in the human spirit will require us, then, to confront the wellsprings of intention, which is to say human nature. Our intentions are the product of many things at least four of which have implications for our ecological prospects. First, with the certain awareness of our mortality, we are inescapably religious creatures. The religious impulse in us works like water flowing up from an artesian spring that will come to the surface in one place or another. Our choice is not whether we are religious or not as atheists would have it, but whether the object of our worship is authentic or not. The gravity mass of our nature tugs us to create or discover systems of meaning that places the human condition in some larger framework that explains, consoles, offers grounds for hope, and, sometimes, rationalizes. In our age, nationalism, capitalism, communism, fascism, consumerism, cyberism, and even ecologism have become substitutes for genuine religion. But whatever the ism or the belief, in one way or another we will create or discover systems of thought and behavior which give us a sense of meaning and belonging to some larger scheme of things. Moreover, there is good evidence to support the claim that successful resource management requires, in E. N. Anderson's words, "a direct, emotional religiously 'socialized' tie to the resources in question" (1996). Paradoxically, however, societies with much less scientific information than we have often make better environmental choices. Myth and religious beliefs, which we regard as erroneous, have sometimes worked better to preserve environments than have decisions based on scientific information administered by presumably "rational" bureaucrats (Lansing, 1991). The implication is that solutions to environmental problems must be designed to resonate at deep emotional levels and be ecologically sound.

Second, despite all of our puffed up self-advertising as Homo sapiens, the fact is that we are limited, if clever, creatures. Accordingly, we need a more sober view of our possibilities. Real wisdom is rare and rarer still if measured ecologically. Seldom do we foresee the ecological consequences of our actions. We have great difficulty understanding what Jay Forrester once called the "counterintuitive behavior of social systems" (Forrester, 1971) We are prone to overdo what worked in the past, with the result that many of our current problems stem from past success carried to an extreme. Enjoined to "be fruitful and multiply," we did as commanded. But at six billion and counting, it seems that we lack the gene for enough. We are prone to overestimate our abilities to get out of self-generated messes. We are, as someone put it, continually overrunning our headlights. Human history is in large measure a sorry catalog of war and malfeasance of one kind or another. Stupidity is probably as great a factor in human affairs as intelligence. All of which is to say that a more sober reading of human potentials suggests the need for a fail-safe approach to ecological design that does not over tax our collective intelligence, foresight, and goodness.

Third, quite possibly we have certain dispositions toward the environment that have been hardwired in us over the course of our evolution. E. O. Wilson, for example, suggests that we possess what he calls "biophilia" meaning an innate "urge to affiliate with other forms of life" (Wilson, 1984). Biophilia may be evident in our preference for certain landscapes such as savannas and in the fact that we heal more quickly in the presence of sunlight, trees, and flowers than in biologically sterile, artificially lit, utilitarian settings. Emotionally damaged children, unable to establish close and loving relationships with people, sometimes can be reached by carefully supervised contact with animals. And after several million years of evolution it would be surprising indeed were it otherwise. The affinity for life described by Wilson and others, does not, however, imply nature romanticism, but rather something like a core element in our nature that connects us to the nature in which we evolved and which nurtures and sustains us. Biophilia certainly does not mean that we are all disposed to like nature or that it cannot be corrupted into biophobia. But without intending to do so, we are creating a world in which we do not fit. The growing evidence supporting the biophilia hypothesis suggests that we fit better in environments that have more, not less, nature. We do better with sunlight, contact with animals, and in settings that include trees, flowers, flowing water, birds, and natural processes than in their absence. We are sensuous creatures who develop emotional attachment to particular landscapes. The implication is that we need to create communities and places that resonate with our evolutionary past and for which we have deep affection.

Fourth, for all of our considerable scientific advances, our knowledge of the Earth is still minute relative to what we will need to know. Where are we? The short answer is that despite all of our science, no one knows for certain. We inhabit the third planet out from a fifth-rate star located in a backwater galaxy. We are the center of nothing that is very obvious to the eye of science. We do not know whether the Earth is just dead matter or whether it is, in some respects, alive. Nor do we know how forgiving the ecosphere may be to human insults. Our knowledge of the flora and fauna of the Earth and the ecological processes that link them together is small relative to all that might be known. In some areas, in fact, knowledge is in retreat because it is no longer fashionable or profitable. Our practical knowledge of particular places is often considerably less than that of the native peoples we displaced. As a result, the average college graduate would flunk even a cursory test on their local ecology, and stripped of technology most would quickly founder.

To complicate things further, the advance of human knowledge is inescapably ironic. Since the enlightenment, the goal of our science has been a more rational ordering of human affairs in which cause and effect could be empirically determined and presumably controlled. But after a century of promiscuous chemistry, for example, who can say how the 100,000 chemicals in common use mix in the ecosphere or how they might be implicated in declining sperm counts, or rising cancer rates, or disappearing amphibians, or behavioral disorders? And having disrupted global biogeochemical cycles, no one can say with assurance what the larger climatic and ecological effects will be. Undaunted by our ignorance, we rush ahead to re-engineer the fabric of life on earth! Maybe science will figure it all out. But I think that it is more probable that we are encountering the outer limits of social-ecological complexity in which cause and effect are widely separated in space and time and in a growing number of cases no one can say with certainty what causes what. Like the sorcerer's apprentice, every answer generated by science gives rise to a dozen more questions, and every technological solution gives rise to a dozen more problems. Rapid technological change intended to rationalize human life tends to expand the domain of irrationality. At the end of the bloodiest century in history, the enlightenment faith in human rationality seems overstated at best. But the design implication is, not less rationality, but a more complete, humble, and ecologically solvent rationality that works over the long-term.

Who are we? Conceived in the image of God? Perhaps. But for the time being the most that can be said with assurance is that, in an evolutionary perspective humans are a precocious and unruly newcomer with a highly uncertain future. Where are we? Wherever it is, it is a world full of irony and paradox, veiled in mystery. And for those purporting to reweave the human presence in the world in a manner that is ecologically sustainable and spiritually sustaining, the ancient idea that God (or the gods) mocks human intelligence should never be far from our minds.

Ecological Design Principles

First, ecological design is not so much about how to make things as it is how to make things that fit gracefully over long periods of time in a particular ecological, social, and cultural context. Industrial societies, in contrast, operate in the conviction that "if brute force doesn't work you're not using enough of it." But when humans have designed with ecology in mind there is greater harmony between intentions and the particular places in which those intentions are played out that:

- Preserves diversity both cultural and biological
- Utilizes current solar income
- Creates little or no waste
- Accounts for all costs
- Respects larger cultural and social patterns

Second, ecological design is not just a smarter way to do the same old things or a way to rationalize and sustain a rapacious, demoralizing, and unjust consumer culture. 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 who do not confuse what they have with who they are. The larger design challenge is to transform a society that promotes excess consumption and human incompetence, concentrates power in too few hands, and destroys both people and land. Ecological design ought to foster a revolution in our thinking that changes the kinds of questions we ask from "how can we do the same old things more efficiently" to deeper questions such as:

- Do we need it?
- Is it ethical?
- What impact does it have on the community?
- Is it safe to make and use?
- Is it fair?
- Can it be repaired or reused?
- What is the full cost over its expected lifetime?
- Is there a better way to do it?

The quality of design, in other words, is measured by the elegance with which we join means and worthy ends. In Wendell Berry's felicitous phrase, good design "solves for pattern" thereby preserving the larger patterns of place and culture and sometimes this means doing nothing at all (Berry, 1981). In the words of John Todd, the aim is "elegant solutions predicated on the uniqueness of place"(1996). Ecological design, then, is not simply a more efficient way to accommodate desires as it is the improvement of desire and all of those things that effect what we desire.

Third, ecological design is as much about politics and power as it about ecology. We have good reason to question the large scale plans to remodel the planet that range from genetic engineers to the multinational timber companies. Should a few be permitted to redesign the fabric of life on the earth? Should others be permitted to design machines smarter than we are that might someday find us to be an annoyance and discard us? Who should decide how much of nature should be remodeled, for whose convenience, and by what standards? In an age when everything seems possible, where are the citizens or other members of biotic community who will be effected by the implementation of grandiose plans? The answer is that they are now excluded. At the heart of the issue of design, then, are procedural questions that have to do with politics, representation, and fairness.

Fourth, it follows that ecological design is not so much an individual art practiced by individual "designers" as it is an ongoing negotiation between a community and the ecology of particular places. Good design results in communities 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. In a well designed community, people would know quickly what's happening and if they don't like it, they know who can be held accountable and can change it. Such things are possible only where: livelihood, food, fuel, and recreation are, to a great extent, derived locally; when people have control over their own economies; and when the pathologies of large-scale administration are minimal. 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. Ecological design, then, is a large idea but is most applicable at a relatively modest scale. The reason is not that smallness or locality has any necessary virtue, but that human frailties limit what we are able to comprehend, foresee, as well as the scope and consistency of our affections. No amount of smartness or technology can dissolve any of these limits. The modern dilemma is that we find ourselves trapped between the growing cleverness of our science and technology and our seeming incapacity to act wisely.

Fifth, the standard for ecological design is neither efficiency nor productivity, but health beginning with that of the soil and extending upward through plants, animals, and people. It is impossible to impair health at any level without affecting that at other levels. The etymology of the word health reveals its connection to other words such as healing, wholeness, and holy. Ecological design is an art by which we aim to restore and maintain the wholeness of the entire fabric of life increasingly fragmented by specialization, scientific reductionism, and bureaucratic division. We now have armies of specialists studying bits and pieces of the whole as if these were, in fact, separable. In reality it is impossible to disconnect the threads that bind us into larger wholes up to that one great community of the ecosphere. The environment outside us is also inside us. We are connected to more things in more ways than we can ever count or comprehend. The act of designing ecologically begins with the awareness that we can never entirely fathom those connections and with the intent to faithfully honor what we cannot fully comprehend and control. This means that ecological design must be done cautiously, humbly, and reverently.

Living Machine used to treat wastewater in the Lewis Center, Oberlin College.

Sixth, ecological design is not reducible to a set of technical skills. It is anchored in the faith that the world is not random but purposeful and stitched together from top to bottom by a common set of rules. It is grounded in the belief that we are part of the larger order of things and that we have an ancient obligation to act harmoniously within those larger patterns. It grows from the awareness that we do not live by bread alone and that the effort to build a sustainable world must begin by designing one that first nourishes the human spirit. Design, at its best, is a sacred art reflecting the faith that, in the end, if we live faithfully and well, the world will not break our hearts.

Finally, the goal of ecological design is not a journey to some utopian destiny, but is rather more like a homecoming. Philosopher, Suzanne Langer, once described the problem in these words:

Most people have no home that is a symbol of their child-

hood, not even a definite memory of one place to serve that purpose. Many no longer know the language that was once their mother-tongue. All old symbols are gone . . . the field of our unconscious symbolic orientation is suddenly plowed up by the tremendous changes in the external world and in the social order. (Langer, 1976)

In other words, we are lost and must now find our way home again. For all of the technological accomplishments, the twentieth century was the most brutal and destructive era in our short history. In the century ahead we must chart a different course that leads to restoration, healing, and wholeness. Ecological design is a kind of navigation aid to help us find our bearings again. And getting home means remaking the human presence in the world in a way that honors ecology, evolution, human dignity, spirit, and the human need for roots and connection.

Conclusion

Ecological design, then, involves far more than the application of instrumental reason and advanced technology applied to the problems of shoehorning billions more of us into an earth already bulging at the seams with people. Humankind, as Abraham Heschel once wrote, "will not perish for want of information; but only for want of appreciation . . . what we lack is not a will to believe but a will to wonder." (Heschel, 1990) The ultimate object of ecological design is not the things we make but rather the human mind and specifically its capacity for wonder and appreciation.

The capacity of the mind for wonder, however, has been all but obliterated by the very means by which we are passively provisioned with food, energy, materials, shelter, health-care, entertainment, and by those that remove our voluminous wastes from sight and mind. There is hardly anything in these industrial systems that fosters mindfulness or ecological competence let alone a sense of wonder. To the contrary these systems are designed to generate cash which has itself become an object of wonder and reverence. It is widely supposed that formal education serves as some kind of antidote to this uniquely modern form of barbarism. But conventional education, at its best, merely dilutes the tidal wave of false and distracting information embedded in the infrastructure and processes of technopoly. However well intentioned, it cannot compete with the larger educational effects of highways, shopping malls, supermarkets, urban sprawl, factory farms, agribusiness, huge utilities, multinational corporations, and non-stop advertising that teaches dominance, power, speed, accumulation, and self-indulgent individualism. We may talk about how everything is ecologically connected, but the terrible simplifiers are working overtime to take it all apart.

If it is not to become simply a more efficient way to do the same old things, ecological design must become a kind of public pedagogy built into the structure of daily life. There is little sense in only selling greener products to a consumer whose mind is still pre-ecological. Sooner or later that person will find environmentalism inconvenient, or incomprehensible, or too costly and will opt out. The goal of ecological design is to calibrate human behavior with ecological realities while educating people about ecological possibilities and limits. We must begin to see our houses, buildings, farms, businesses, energy technologies, transportation, landscapes, and communities in much the same way that we regard classrooms. In fact, they instruct in more fundamental ways because they structure what we see, how we move, what we eat, our sense of time and space, how we relate to each other, our sense of security, and how we experience the particular places in which we live. More important, by their scale and power they structure how we think, often limiting our ability to imagine better alternatives.

When we design ecologically we are instructed continually by the fabric of everyday life—pedagogy informs infrastructure which in turn informs us. The growing of food on local farms and gardens, for example, becomes a source of nourishment for the body and instruction in soils, plants, animals, and cycles of growth and decay (Donahue, 1999). Renewable energy technologies become a source of energy as well as insight about the flows of energy in ecosystems. Ecologically designed communities become a way to teach about land use, landscapes, and human connections. Restoration of wildlife corridors and habitats instructs us in the ways of animals. In other words ecological design becomes a way to expand our awareness of nature and our ecological competence.

Most importantly, when we design ecologically we break the addictive quality that permeates modern life. "We have," in the words of Philosopher Bruce Wilshire, "encase(d) ourselves in controlled environments called building and cities. Strapped into machines, we speed from place to place whenever desired, typically knowing any particular place and its regenerative rhythms and prospects only slightly." We have alienated ourselves from "nature that formed our needs over millions of years [which] means alienation within ourselves." (Wilshire, 1998) Given our inability to satisfy "our primal needs as organisms" we suffer what he calls a deprivation of ecstasy that stemmed from the 99% of our life as a species spent fully engaged with nature. Having cut ourselves off from the cycles of nature, we find ourselves strangers in an alien world of our own making. Our response has been to create distractions and addictive behaviors as junk food substitutes for the totality of body-spirit-mind nourishment we've lost and then to vigorously deny what we've done. Ecstasy deprivation, in other words, results in surrogate behaviors, mechanically repeated over and over again, otherwise known as addiction. This is a plausible, even brilliant, argument with the ring of truth to it.[5]

Ecological design, finally, is the art that reconnects us as sensuous creatures evolved over millions of years to a sensuous, living, and beautiful world. That world does not need to be remade but rather revealed. To do that we do not need research as much as the rediscovery of old and forgotten things. We do not need more economic growth as much as we need to re-learn the ancient lesson of generosity, which is to say that the gifts we have must move, that we can possess nothing. We are only trustees standing for only a moment between those who preceded us and those who will follow. Our greatest needs have nothing to do with possession of things but rather with heart, wisdom, thankfulness, and generosity of spirit. And these things are part of larger ecologies that embrace spirit, body, and mind—the beginning of design.

Design in its largest sense joins a variety of disciplines around the issue of how we provision six (soon to be 8-10 billion people) with food, energy, water, shelter, health care, and materials and do so sustainably and fairly on a planet with a biosphere. Design is not just about how we make things, but rather how we make things that fit harmoniously in an ecological, cultural, and moral context. It is therefore about systems, patterns, and connections. It is also a part of a long-term conversation between ecologists and designers of the built environment and technosphere the essence of which is whether design becomes yet one more clever way to make end-runs around natural systems or is disciplined and informed by an understanding of nature. At its best, design is a field of applied ethics that joins perspectives, and disciplines that otherwise remain disparate and often disjointed. Problems of environmental justice, for example, are unsolvable unless a morally robust design intelligence is applied to the design of food systems, energy use, materials flows, waste cycling in ways that do not compromise standards of fairness and human dignity. Justice, in this perspective, is a design problem, but it is also a criterion for design and a result of good design. But design itself requires both robust ethics and mastery of design skills and analytic abilities.

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BROWNFIELD CHALLENGES IN THE COMMONWEALTH:
Papa John's Cardinal Stadium and Kentucky's Future

By
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Drive by the area today and you would never suspect that U of L's new Papa John's Cardinal Stadium, which opened Sept. 5, 1998 was once a major railroad repair yard. The 92 acre site on which the new stadium now stands was once a community eyesore and a highly contaminated site. From 1905 until the early 1990's, the site housed 20 acres of facilities that were continuously operated by a succession of railroads to build and repair all types of cargo, steam and diesel locomotives and passenger cars.

CSX South Louisville Shops at height of operation

During the nearly 90 years that the site was used as a full service repair shop, activities such as motor cleaning, use of solvents, varnishes, hydraulic oil, lead lubricants and plating solutions resulted in at least 47 different constituents being released into the environment. Modern environmental standards of care did not exist for much of this period so it was common industry practice to dispose of unwanted or spent chemicals on facility grounds. Environmental consultants hired by CSX, the last owner, conducted extensive site characterization studies in the mid 90's and reported estimates up to 1.1 million gallons of diesel fuel in the ground with thickness on the groundwater as great as eight feet in places. Lead contamination was higher than 18,000 ppm in one area of the site, and 100 cubic yards of soil that contained PCBs exceeding 100 ppm were found, as were high levels of arsenic and chromium.

Site as it appeared earlier this century (1905)

Further, asbestos was identified in 20 acres of existing structures, which required abatement, prior to demolition. The resulting data from the two year site characterization study stacked vertically is over seven feet tall.

WHY HERE?

With such significant contamination present, why build on such a site? After evaluating nine tracts around the community, the University of Louisville selected the Louisville South

Yards owned by CSX Transportation because it was adjacent to the campus and was the appropriate size for the $68 M Stadium complex, as well as for additional future facilities. Importantly, there was no competition to purchase the land due to the findings of preliminary environmental assessment reports and perceptions of potential buyers that resulted in lost business opportunities on the south end of the site. For the University of Louisville, this was an opportunity to bring football back on campus while enhancing recruiting efforts as well as master planning opportunities. Once the CSX property was selected as the home for the new UofL Papa John's Cardinal Stadium, the first major "brownfield" redevelopment project in Kentucky was underway.

"Brownfields" are abandoned or underutilized sites where expansion or redevelopment is complicated by either real or perceived environmental contamination.

— EPA Definition

The University and stadium fundraisers had hoped to have finances in place, to have the property prior to construction long enough to remediate all environmental concerns and then build normally. That did not happen since the 3 year fundraising campaign concluded in the summer of 1996, only a few months prior to an immoveable construction start date. Stadium backers had promised donors that the new stadium would be ready for the first game of the 1998 season which just happened to be against the University of Kentucky (for the first time UofL would host its state rival in the 5th meeting of an annual series which started in the mid 90's). In fact, the contract execution occurred only hours before a major public groundbreaking ceremony that included the governor, mayor and other dignitaries. Indicative of the condition of the site at the time, soil for the groundbreaking had to be imported to avoid having the ceremonial shovels dig into contaminated earth.

Ceremonial "goundbreaking" with imported soil

The risk management plan, developed specifically with the reuse of the site as a stadium in mind, indicated that the primary constituents of concern were lead, arsenic and diesel fuel in the ground. The planned reuse of the site included construction of a 45,000 seat stadium, a clubhouse, and luxury suites, practice fields, a state-of- the- art training facility and associated parking lots. Collectively, these facilities were ultimately determined by state officials to be a sufficient barrier to "cap" the site contaminants and protect future site users from exposure, a concept known as "risk based closure". While this was good news in terms of time and budget, it also meant that the project would have to be built "in contamination". The opportunity to remediate prior to construction no longer existed due to the firm construction schedule.

Vacuum Trucks removing diesel fuel during construction

Leaving the contaminated soil on site and creating a stadium design that was compatible with the site environmental conditions was now the remediation solution. Not only was this project routinely in the media spotlight with over a dozen articles appearing prior to construction start, there was also no precedent to follow. At the time, the Kentucky Cabinet for Environmental Protection and Natural Resources had little experience or comfort with risk–based closures. The EPA and many states had been using this approach for years, but it has been applied only recently in Kentucky. Risk-based remediation focuses not on removing all the contamination and redepositing it somewhere else, but in removing or managing the ways that people might become exposed to the contamination —e.g., paving over soil so children can't contact it when they are playing, or removing contamination in groundwater that may be flowing offsite. The entire issue of risk based closure was complicated because Kentucky did not have a legislatively-endorsed brownfield program offering liability protection to the owner after the remediation plan was implemented. The absence of standards added significant time to a very tight construction schedule since countless meetings were required with Frankfort officials to review site characterization results, risk assessment calculations, plans to block exposure pathways from site contaminants and remedial action plans during construction.

Additionally, a means of assuring the safety of over 900 construction workers none of whom were specialized environmental remediation contractors was a paramount concern for the University. To address this concern, CSX consultants performed additional risk assessment and site monitoring work and determined that with proper site specific awareness training, protective equipment and some precautions against incidental ingestion of soil, regular construction workers could work safely within the predominant conditions at the site.

However, this alone did not assuage the construction trade contractors as they demanded environmental liability protection. The indemnity protection provided by CSX for the site contamination did not extend beyond UofL. This meant that the University would have to purchase environmental impairment liability insurance in order to assure that they would have bidders on the project. With over 180 pages of environmental technical documents and plans that the University was contractually obligated to carry out, another key concern was the proper interpretation and implementation of these plans since they were developed by CSX and their consultants. Clearly, the indemnification provided by CSX for environmental site conditions would require a high degree of diligence by the University throughout the project.

ATTENTION TO DETAILS RESULTS IN INNOVATIVE SOLUTIONS

Key to the success of meeting the absolute deadline and budget of the stadium project was the time spent to anticipate every potential environmental issue, problem and/or overlap in all aspects of construction. Although considerable work had been done prior to the actual sale and beginning of construction – including a site characterization that encompassed 380 site borings, demolition and asbestos abatement of 34 buildings, some limited hot spot remediation to remove PCB and sewer sediment contamination, development of risk assessment, risk management plan, remedial action plan, environmental health and safety plan, negotiation of risk levels with the Kentucky environmental cabinet —there was still much more to be done. The various plans, all of which affected design and construction decisions, had to be refined. For example, CSX was concerned that the extensive amount of diesel fuel in the ground would degrade over time and possibly produce methane. So, the stadium design team had to incorporate a vapor collection system that could be installed underneath the stadium and other buildings after construction documents had already been produced.

Additionally, contract provisions required protection of the lower clay layer to avoid creating a conduit for migration of contamination. This meant using stump grinders to remove the top portion of old timber pile foundations while leaving the remaining portion in place and using auger cast piles to bedrock to prevent contamination from migrating downward. Moreover, knowledge of the site conditions changed during the construction timeframe, so plans had to be regularly and carefully updated. One of the tools used as a communication mechanism to convey site conditions was a "Stadium Advisory Notice" multi-part form for timely delivery and easy recognition of important environmental findings and/or required actions. The strategy to adequately protect construction workers involved air monitoring during simulated construction activities to check the effectiveness of the personal protective equipment and the development of a site specific hazard awareness training video. Additionally, OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training was given to about 50 workers who handled diesel saturated soils in designated exclusion zones which were identified with snow fencing and site specific signage. Color-coded stickers were placed on both worker and visitor hardhats to immediately identify the individual's training and clearance for site access. The University through its environmental consultant placed a full-time environmental health and safety officer on site to assure training, control of site access, and to address any problems or questions quickly. CSX also kept an environmental professional on site to meet its obligations under the purchase agreement and resolve any disputes.

Construction generated millions of gallons of "contact" water – rainwater in excavation sites and groundwater—which possibly contained some or all of the contaminants identified in the site characterization and required disposal. A specially designed pump collected the wastewater and transported it into a 187,000 gallon cistern that was discovered on site. Floating oil-absorbing booms and pads placed around the suction hose prevented oil from being picked up and discharged. The University, its consultants and the Metropolitan Sewer District (MSD) developed a pump and test scenario which facilitated continuous discharge of the wastewater to the sewer under a general discharge permit. During the two-year construction period, more than 6.5 millions gallons were discharged without violating any MSD regulations and with no adverse effects to the sewer system.

Additionally, the old sewer system that serviced the former CSX buildings on the stadium site was remediated (i.e. sedi-

Underground cistern collecting site wastewater

ments removed by CSX) and either removed or plugged as part of the construction process. The new sewer system included extraordinary measures to prevent contaminant infiltration. These measures consisted of neoprene gaskets for all joints in the areas with high total petroleum hydrocarbon levels, and anti-seepage collars at the down-gradient portions of the site to prevent seepage along the sewer bedding materials.

The reuse of on-site soils and concrete also required innovative engineering designs and construction techniques. Over 40,000 tons of concrete (i.e. building foundations) were crushed for reuse and an extensive pre-loading and settlement monitoring plan was developed so that 50,000 cubic yards of soil was suitable for reuse. Through the successful utilization of all the above innovative solutions and a plan to

40,000 tons of site foundation crushed and reused

sufficiently "cap" the site, the environmental remediation costs were reduced from the seller's original $40 Million estimate to $6.8 Million.

A LASTING IMPACT

This brownfield turned stadium has had an enormous economic and social impact on Louisville. It can also be called a demonstration project on how to bring together a variety of private and public funding sources while maximizing community involvement.

Attendance at home football games – and the revenues associated with them – has risen dramatically, with much of the profit earmarked to enhance women's sports programs and other athletic programs at the University. In addition to providing a state-of-the-art facility for college football, the stadium has become a venue for community events including music concerts and other major sporting events. In its first year of operation, the US Women's National Soccer team played their last World Cup victory tour game at the stadium. It was also the venue for an outdoor music concert that drew 51,000 fans and was the single top grossing concert in the U.S. for the week it was held. The 15,000 square foot Brown and Williamson Clubhouse (which runs the length of the football field and has glass walls that provide a view of Churchill Downs famous twin spires) regularly hosts corporate, business and social gatherings – a mint jubilee formal dance the night before the Kentucky Derby, Breeder's Cup receptions, weddings and more.

Beyond these major economic impacts, there are some other less obvious yet important benefits to the community in the form of opportunities for volunteer groups. Papa John's International, Inc., whose $5 M donation gave the national pizza chain the naming rights of the stadium, has established a concessions-stand program that provides revenue generating opportunities for civic youth groups (such as scouts, church, and athletic booster groups) which receive a percentage of concession sales at each home game.

Stadium used as venue for a major concert

UofL Papa John's Cardinal Stadium has been a catalyst for further improvements in the area and is now a critical link in an east-west entertainment and sports corridor that includes Churchill Downs, the Kentucky Fair and Exposition Center and the Louisville International Airport.

According to a local development authority executive, redevelopment proposals are being considered for a former industrial site immediately adjacent to the new stadium. "No one was interested in making an investment in a new business on this old industrial site until the university, along with the former owner, successfully remediated the site next door and built the stadium", he said.

Given the innovative solutions and positive economic and redevelopment impacts that have resulted from the construction of the stadium, it is no surprise that the University of Louisville won the 1999 Grand Prize Phoenix Award for the nation's best brownfield redevelopment project.

This prestigious award, now presented yearly at the EPA Brownfields conference, promotes the concept of brownfield redevelopment by identifying projects across the country that can serve as models for other communities and publicizing successful solutions.

LESSONS FOR KENTUCKY

This award-winning project is unfortunately still the exception to the rule in Kentucky despite the fact that brownfield sites exist across the commonwealth. The stadium was a highly visible project with extensive community support as well as local government backing. These factors coupled with the 200 year history of the University of Louisville – a public institution — certainly differentiates the stadium project from most other potential brownfield redevelopment opportunities in Kentucky. Moreover, UofL and CSX went into this project with no clear remediation standards or liability protection offered by the state's environmental regulators. The lack of cleanup standards and liability protection that the stadium developers encountered would clearly deter most if not all other developers from taking on similar brownfield projects. That's because Kentucky is one of only five states in the country that has not yet enacted voluntary environmental legislation (often referred to as "brownfield" legislation) to provide relief for parties involved in the cleanup of contaminated property and a set of known, reliable remediation standards.

This year during Kentucky's 2001 session of the General Assembly, two brownfield bills have been introduced. One bill contains key elements of the model voluntary cleanup program in Pennsylvania which is widely considered to be one of the best and most effective brownfield programs in the country. Since Pennsylvania's land recycling program began six years ago, 832 sites have been cleaned up voluntarily and over 20,000 new jobs have been created. The creation of a Science Advisory Board to set cleanup standards that are protective of human health and the environment has been key to the success of the Pennsylvania program according to Tom Fidler, Manager of the Land Recycling and Cleanup Program. Mr. Fidler also says that " the technical support and operational practicality that an advisory group such as the Cleanup Standards Scientific Advisory Board (SAB) has provided to our program cannot be underestimated. I am convinced that without the very useful debate, research, and

Over 1800 sites have been identified - LOJIC map peer review provided by the Pennsylvania SAB, the sound and realistic technical underpinnings of our program would not exist." The other bill that has been introduced takes a different approach on many important elements including what sites are excluded, cleanup standards, selection of remedy, timeline for agency action, liability protection and provisions that would allow the agency to "reopen" a site cleanup for further action. Clearly, the differences in the two bills will require thoughtful debate on what constitutes an effective brownfields program. A recent editorial in the Courier-Journal said that one of the top priorities of 2001 General Assembly should be passing brownfield legislation in Kentucky. "The time has come for Kentucky lawmakers to strike a balance. No one wants urban sprawl; no one wants abandoned lots and decaying buildings. There must be a way to make these areas redevelopable. The methodology that's chosen must include discernable health standards, relief from liability, and specific time frames for the state to review developers' plans".

There are many benefits that Kentucky can derive if effective brownfield legislation is passed. We have brownfield sites in most counties in the Commonwealth, though most are in the larger cities and towns. The sites include old gas stations, commercial dry cleaners, closed manufacturing plants and other industrial sites, as well as active businesses. Re-use of brownfield sites like these offer the opportunity to solve multiple problems concurrently. Recycling contaminated land to promote continued economic growth , curtailing urban sprawl and cleaning up our environment are the opportunities that exist if legislators can craft a compromise brownfield bill without eliminating all of the key elements that make it effective. This spring, we will find out if our legislators have the foresight to create new opportunities that will truly promote brownfield redevelopment or whether more obstacles will continue to exist. Hopefully, the UofL Papa John's Cardinal Stadium will no longer be one of the few brownfield redevelopment projects in Kentucky.

Some brownfield resources for those that want to learn more:

Pennsylvania Department of Environmental Protection's Land Recycling Program
www.dep.state.pa.us (then search for "brownfield)

Northeast Midwest Institute – contains a number of Brownfield reports including "State of States Brownfield program" www.nemw.org

EPA Brownfields Home Page
www.epa.gov/swerosps/bf/index.html

National Brownfield Association – publishes magazine and also provides many links
www.brownfieldassociation.org

Phoenix Award Program – showcasing the best brownfield projects in the country since 1997
www.dep.state.pa.us/hosting/phoenixawards

Center for Environmental Policy and Mangement – publishes research papers on brownfield redevelopment and environmental financing.
www.kiesd.org

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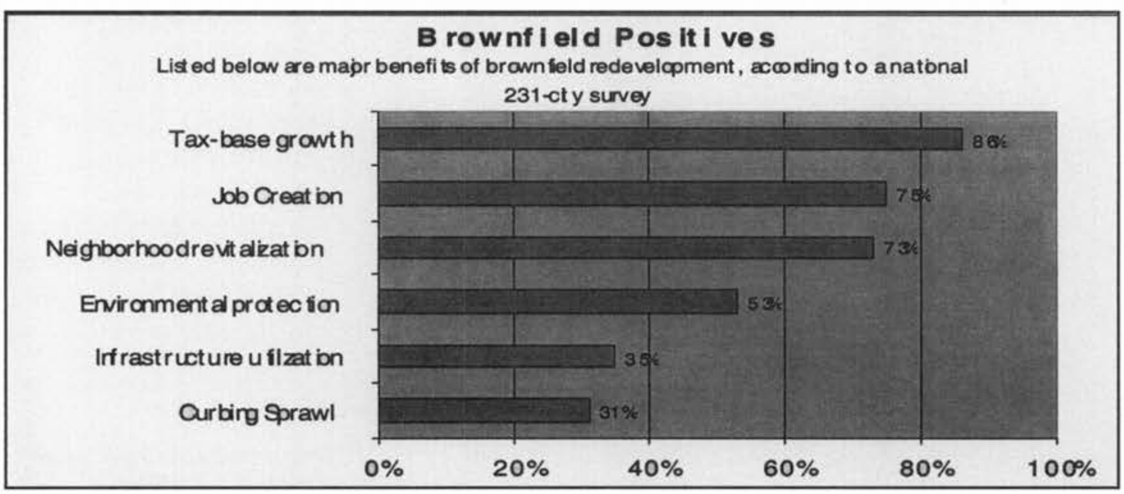

Brownfield Benefits (Source: U.S. Conference of Mayors, 2000)

New Urbanism and Sprawl

By
Russell Barnett
Kentucky Institute for the Environment and Sustainable Development

Urban sprawl, characterized by poorly planned development that threatens our environment, health, and quality of life, is often seen as an inevitable result of population growth, public demand for a quality of life, and increased mobility (physical as well as that facilitated by electronic technology). Since the end of World War II, the population has shifted to the outer rings of our central cities, in part due to the increased reliance on the automobile but also due to governmental policies on highway construction, low interest loans and tax incentives for home owners, public funding of infrastructure (water lines, sewers, schools, etc.) and industrial development incentives. According to the 2000 Census, 80.3 percent of the US population now lives in metropolitan areas, almost 50 percent live in the suburbs.[1] In the late 1980's, in response to urban sprawl, a new approach to creating and revitalizing cities emerged. The approach, New Urbanism, seeks to reintegrate the major components of daily life (home, workplace, shopping and recreation) into neighborhoods and cities that are compact, pedestrian-friendly, mixed-use units. This approach has been used in creating new cities as well as infilling older urban areas including areas classified as brownfields.

Urban sprawl is a widely used term in the literature, but its precise definition is elusive. It is often defined by comparing the average density of a particular area with another, specifically Los Angeles, the "poster child" for a sprawling city, automobile dependent, and congested. This has posed problems for users of the term since more recent research has shown that the population density in Los Angeles is actually fairly low (1,862 residents/sq.mi.) compared to Atlanta (806 residents/sq.mi.) and a number of smaller metropolitan areas. Atlanta has now replaced Los Angeles as the poster child. A more useful working definition of sprawl is a pattern of land use in an urban area that exhibits low levels of some combination of factors: density, continuity, concentration, and centrality.[2]

Urban sprawl, more accurately suburban sprawl, has created a host of environmental, social, and economic problems. The increased reliance on automobiles has resulted in our urban areas being designed around their accommodation, at the expense of social and environmental needs. Cookie-cutter designed subdivisions accessing arterial roads has necessitated the use of automobiles to get to schools, stores, doctors' offices, churches, or even to visit neighbors who may live close by but in another subdivision. Designing our urban and suburban areas around the needs of automobiles has led to an ever-increasing proliferation of automobile travel. The mean travel time to and from work is over 45 minutes daily, equal to over 20 work days a year. Increasing road capacity has led to more traffic and supported additional sprawl. The automobile is the source of 40-50 percent of the air toxics in our urban areas, resulting in public health problems.[3] Water quality is adversely impacted by runoff from impervious street and parking lot surfaces contaminated with hydrocarbons and other pollutants, and by creating surges within the hydrological systems as water is flushed quickly into streams, scouring stream banks and destroying aquatic habitat. Open spaces and agricultural lands are consumed at a frightening rate. An estimated 1 million acres of parks, farms and open spaces are consumed each year. Providing the infrastructure necessary to support poorly planned development is an expensive process, paid for by existing residents and hastening the decline of urban tax bases.

In Kentucky, most of the growth over the past 10 years has been in the Commonwealth's metropolitan areas and within the "Golden Triangle" defined by Louisville, Lexington and Northern Kentucky. The largest numeric increases have been in the counties with larger cities—Lexington, Louisville, Covington, Bowling Green, and Richmond. The growth, however, has occurred outside city boundaries. Louisville, for example, has seen its population steadily decrease from a high of 361,706 in 1970 to 256,231 in 2000. However, the county for the first time since 1970 realized a slight increase in population over the past decade, but the 2000 Census shows the county still down 1,451 residents from its peak in 1970. The metropolitan area has shown dramatic increases in the surrounding counties with increases in Bullitt (28.7%), Oldham (38.8%), Shelby (34.3%) and Spencer (73%) counties. Even though Louisville and Jefferson County's population has declined, the urbanized area has grown in size over the last 30 years.

County	2000 Pop.	Increase since 1990 No.	%
Fayette	260,512	35,146	15.6
Jefferson	693,604	28,667	4.3
Boone	85,991	28,402	49.3
Warren	92,522	15,849	20.7
Bullitt	61,236	13,669	28.7
Madison	70,872	13,364	23.2
Oldham	46,178	12,915	38.8
Laurel	52,715	9,277	21.4
Scott	33,061	9,194	38.5
Jessamine	39,041	8,533	28.0
Shelby	33,337	8,513	34.3
Nelson	37,477	7,767	26.1

Louisville is not unique in this respect. Urban sprawl can occur while populations are actually declining. This is particularly true in the eastern and southern US. In a study of 213 urbanized areas, population grew 47 percent from 95 million in 1960 to 140 million in 1990, while urbanized land increased 107 percent from 25,000 square miles to 51,000 square miles. The population density per square mile decreased 28 percent in this time period.[4] Data from the US Department of Housing and Urban Development show a continuation of this trend, with urban areas increasing at about twice the rate of population growth.[5] In other parts of the nation, sprawl is constrained by physical and geographic barriers, land availability, prohibitive commuting distances, and other factors. These constraints are for the most part not applicable in Kentucky. Many suburbs are being constructed with no attachment to a central city. In effect, suburbs without the urbs are free-floating development located loosely along the state's major highways. With more of the population living in suburbs than in central cities, the definition of "suburb" needs to reexamined. Older suburbs immediately around Louisville have densified making them indistinguishable from the central city. Other developments in surrounding counties have no real link with the city. Louisville is ranked number 9 as the least dense (therefore the most sprawl) among metropolitan areas over 1 million in population. Lexington is ranked 11 among metropolitan areas 250,000 to 1 million in population.[6]

In the later 1980's, in reaction to conventional suburban planning and sprawl, a growing movement of planners, architects, and developers began to explore a new approach to create and revitalize communities. Termed New Urbanism, the approach reintegrates housing, workplace, shopping and recreation into compact, pedestrian-friendly, mixed-use neighborhoods. Initially New Urbanism focused on the environmental costs of development and on the actual design of communities. Environmental concerns are the focus of such planners as Peter Calthorpe, one of the movement's leaders. Calthorpe concentrates on reducing automobile use and intensifying the density of land development to minimize environmental impacts. The second area of concern espoused by architect planners like Andres Duany and Elizabeth Plater-Zybeck focuses on community design. Initially dubbed "neo-traditional planning," community designs tried to recapture the intimacy and ambience of a small town. Town planning principals and architecture characteristic of the beginning of the 20th century are emphasized. Architectural details from the materials used for walls and roofs, the configuration of doors and windows, to front porches are integral to the community design. The combination of these two focus areas is the foundation of New Urbanism.

The goal of New Urbanism is to restore neighborhoods in increments of villages, towns and cities and to do it through design principles that make residents feel part of a community, to make it beautiful architecturally, to use buildings and open green areas to define space, and to make sure that it is a place worth caring about. The guiding principles of New Urbansim are:

Limited Size Neighborhood units are built on a scale that enables residents to walk safely from their front door to a retail establishment and workplace within 5 minutes. Typically the size of the community is no more than one-quarter mile from center to edge.

Mixed Use A diverse mix of activities (residences, shops, schools, workplaces, parks, etc.) should occur in proximity to one another. To increase population density, lot sizes are smaller. Residences may have first floor storefronts or second floor offices. A wide spectrum of housing options (townhouses, apartments, condominiums, duplexes, and single family) should enable people with a broad range of incomes, ages, and family types to live within the neighborhood.

Urban Architecture The houses must provide modern living space and amenities that consumers demand (and that competing suburban houses offer). Houses are designed with garages in the back yard to reinforce the feeling of urban density by bringing houses closer to the street (and accessed by alleys—uniquely urban). A front porch provides public areas for neighbors to meet and congregate. The architectural style should reflect the climate and traditions of the local region, rather than the cookie-cutter design of suburbs that are of indistinguishable origin.

Street Network Streets should be laid out as an interconnected network (usually a grid or modified grid pattern) forming coherent blocks where building entrances face the street rather than parking lots. "T" intersections and street deflections are used to calm traffic and increase visual interest. The network provides a variety of pedestrian and vehicular routes to any destination, which also serves to disperse traffic.

Narrow Streets Narrow streets result in calming affects to slow traffic speeds.

Pedestrian Friendly Streetscape Streets lined with sidewalks and trees encourage pedestrian activity without excluding automobiles altogether. Attention to children is particularly important. Elementary schools and small playgrounds should be close enough to homes to allow children to walk to them.

Transit Linkage Public transit should connect neighborhoods to one another.

Public Space and Community Center A place for residents to gather as well as open spaces, such as parks, playgrounds, squares and greenbelts should be provided in convenient locations throughout the neighborhood. The neighborhood needs a discernible center, often open public space but could as well be a busy street corner. A transit stop should be located at this center.

Diversity of Density and Building Types A variety of buildings for different uses, scale and architecture should be incorporated into the neighborhood. Stores and businesses need to have parking on the street or to the side of the building. Although "big box" mega-retail buildings are difficult to locate in a neighborhood designed under New Urbanism principals, with proper design they, as well as large office and light industrial buildings, can be

Modified grid in Park DuValle, Louisville, redevelopment project

Front porches and rear garages in Park DuValle, Louisville, redevelopment project

accommodated. The shops should be of sufficiently varied types to supply the weekly needs of a household.

Prominent Public Buildings and Symbols Civic buildings, schools, churches, libraries and other public buildings should be sited in prominent locations such as the termination of street vistas or in the neighborhood center. These provide sites for community gatherings, education, religion, or other cultural events.

Self Governing The neighborhood is organized to be self-governing, to empower residents to become involved in their community's future development and activities. [7]

This last characteristic is a reflection of a commitment by most New Urbanists to the concepts of strong citizen participation, affordable housing, and social and economic diversity. Although these values do not fit into community design, most New Urbanists focus on the community's physical design features (e.g. front porches and community center) believing that design can create or influence a community's social patterns.

Developers, planners, local governmental officials and citizens have all shown great interest in New Urbanism design approaches. Many see it as a win-win approach that enables a community's growth to be channeled into inner city areas, on vacant lands, brownfields, and redevelopment areas. Using the design principles listed above makes these projects compatible with the scale of established neighborhoods, discourages automobile use, is less costly to serve, and protects greenfields at the city's edge as well as providing green space within the city. New Urbanism is not widely used as a development model because its physical design standards are not always compatible with land use regulatory standards (e.g. zoning laws typically segregate land use, set back and minimum street width requirements). A fundamental reason, however why new urbanism is not used, its the nature and structure of the real estate industry. Developers are highly segmented by land use categories (housing, retail, office, warehouse) and each category has its own practices, markets, and financial sources. The development principals of New Urbanism require an integrated development strategy of community building. Few developers can conduct the market analysis, financing, construction, and marketing for the diverse land use categories integrated within the New Urbanism concept. In addition, the focus on smaller scale runs counter to current large-scale retailing markets (the "big box") that are dependent on the automobile. The goal of reduced automobile use in infills and communities designed under New Urbanism principles has proven allusive to date. There is no evidence of reduced automobile use rates in these communities.

There are now over 100 small-scale urban infill projects designed to attract people to inner cities. The majority have achieved success in attracting people and increasing property values. In Louisville, the Park DuValle project follows the design principles of New Urbanism. The project was initiated during Mayor Jerry Abramson's administration and is fully supported by the current mayor David Armstrong. (for further details on this project see the article in this journal prepared by Tim Barry, Louisville's Housing Authority director).

The success of New Urbanism is in part a reflection of the discontent with continued urban sprawl and changing public perceptions of suburban life, with ever increasing congestion on arterial roads and longer commutes, a lack of meaningful civic life, loss of open space, the total reliance on automobiles for transportation (and ever increasing fuel prices), a lack of feeling of belonging to a community, a change in the perception of a green lawn from being an asset to a liability, and a general discontent with suburban life. An underlying factor in this shift in public perception is an aging population and change in family structure. As the population ages, individuals value more the diversity and convenience available within the city. Driving long distances for every activity becomes an increasing burden. Taking care of a large lawn is a chore. Family units without children no longer feel the need to have a backyard for children to play or a new school to attend. This shift is reflected in the 2000 Census. Populations in many cities, after three decades of decline are recovering. Jefferson County for the first time in that time period realized an increase in population.

New Urbanism is only one alternative to suburban sprawl. It offers a viable approach to redevelopment in inner cities, but probably fits best in a broader context of tools that may include direct incentives to invest in the inner city, disincentive to build beyond the urban fringe, and new investments in transit systems to lower the dependency on automobiles. Louisville has committed substantial resources in, and established incentive for, reinvestment in the inner city. These include major projects in the Russell and Smoketown neighborhoods, the E-Commerce Building on east Main Street, the Waterfront Development project and others. These have all shown positive benefits to the city. The 2000 Census shows that the population of Russell and Smoketown increased 28 and 29 percent respectively over the last decade. The city is planning a new light rail transit system. There are currently few, if any disincentives to build beyond the urban fringe of Louisville or in Northern Kentucky. Lexington has imposed service areas within Fayette County to control development, but suburban sprawl has leap-frogged, unabated into the surrounding counties. Suburban sprawl will continue to occur until local and state governments work in concert to place meaningful restrictions on development outside urban service areas.

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Revitalizing a Neighborhood

By
Tim Barry
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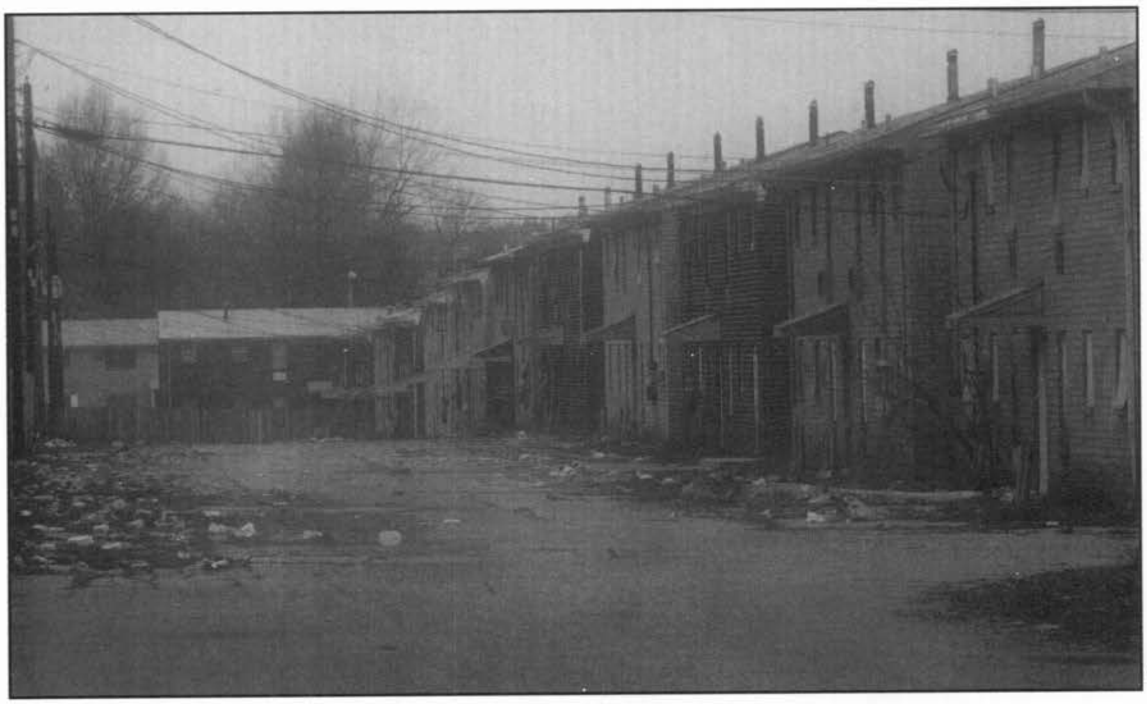
Once a public housing project dominated by 1,100 barrack-like units, Park DuValle is being transformed into a mixed-income neighborhood of 1,055 new houses for sale and for rent. At its worst, Park DuValle experienced high crime rates, and even had its own "murder corner." Now people on public assistance live unobtrusively alongside professionals ranging from business owners to bank executives.

The Park DuValle neighborhood is vastly different than it was just six years ago. Before a revitalization program began in 1995, the neighborhood was known as a haven for drugs, crime and poverty. Subsidized housing nearby had failed and was virtually abandoned, and stable neighborhoods surrounding the development were beginning to falter. But in 1996, a ray of 'hope' descended upon the neighborhood.

The U.S. Department of Housing and Urban Development (HUD) awarded Louisville more than $50 million to tear down and replace the Cotter and Lang housing projects. That HOPE VI grant led to a redevelopment plan that far surpassed the initial goal of replacing one public housing project with another. As the plan evolved, it became known as the Park DuValle revitalization – a plan to transform the neglected community into a more traditional neighborhood. The marketing plan for the new Park DuValle focused on selling the neighborhood, rather than individual lots, by concentrating on the boulevards and neighborhood amenities, such as the clubhouse and surrounding schools and churches. Plans for a rebuilt medical complex and 25,000-square foot retail complex also added to the neighborhood's appeal.

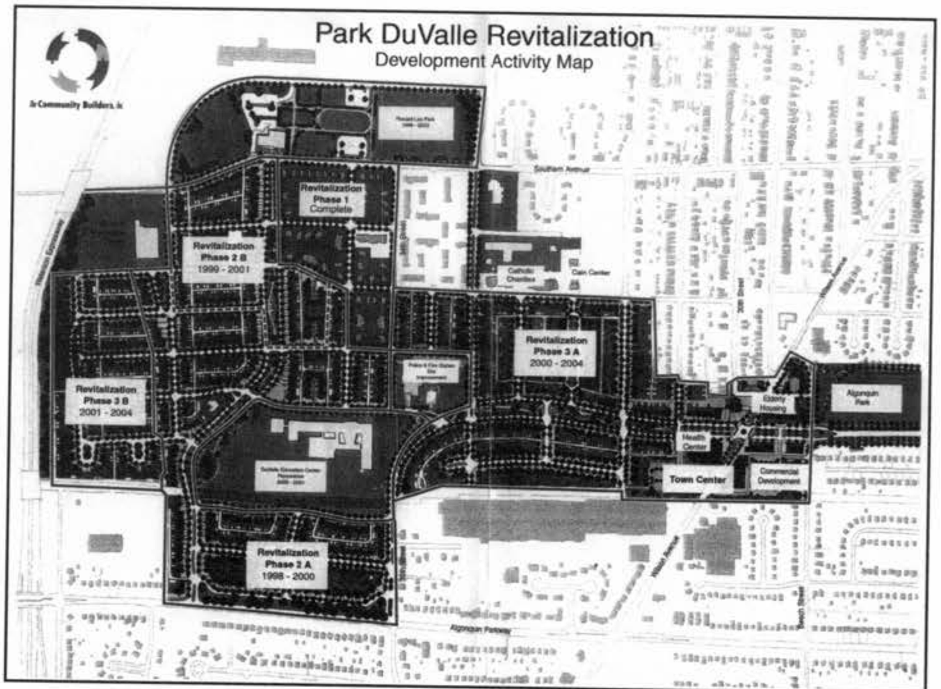
The Park DuValle project includes community programs, new facilities such as a technology center, clubhouse and upgrades to existing structures such as the Southwick Community Center. Jefferson County Public Schools also plans to spend $16 million on improvements to the DuValle Edu-



Cotter-Lang housing project

cation Center. What started with the demolition of a public housing development is helping rejuvenate the adjacent neighborhoods and shows definite signs of spurring a social and economic turnaround in sections of Louisville's West End.

The plan is backed by a remarkable blend of public and private partners: the City of Louisville, the Housing Authority of Louisville, the Louisville Development Authority, the U.S. Department of Housing and Urban Development, the Community Builders, and the Louisville Real Estate Development Co., an affiliate of the Louisville Community Bank. Together, they leveraged HUD's initial $51 million investment into a $190 million fund, half of which is public money. The daring effort extends beyond the land owned by the Housing Authority of Louisville.



Park DuValle redevelopment plan

Cotter and Lang Homes were demolished between 1996 and 1998. To remove remnants of the old neighborhood, the Housing Authority purchased and demolished a liquor store at the corner of 32nd and Young streets that had been a magnet for drug-dealing and other criminal activity. In total, more than 50 additional houses and buildings were razed in preparation for the new development.

The first phase of the rebuilding project, The Oaks, consisted of 100 luxury apartments and rental townhouses and was completed in late 1998. All of those apartments are fully leased, and maintain a significant waiting list. The second phase of the revitalization, known as The Villages, is now nearly complete as well. It contains 213 rental homes and 125 privately-owned homes. The rental units range from 715 to 1,490 square feet. At full price, these units rent for between $425 and $680. The 213 rental units in this phase are also fully leased with a significant waiting list. Each of the final three phases will include about 100 single-family homes and about 100 apartments. A town center, and an additional 150 off-site rentals, which could be existing apartments or houses that are renovated, will be included during the final phases.

When officials were seeking applicants for rentals in The Villages, more than 1,800 showed up. That was "way beyond the level of interest we had anticipated," said Willie Jones, deputy director of The Community Builders. Since then, he said, hundreds of people have come in to apply to live in the apartments. The applications are from a variety of incomes, including many who make $40,000 a year or more, Jones said. "What we're seeing here is the ability to draw from all income sectors very aggressively."

Louisville Mayor Dave Armstrong is one of the most vocal supporters of the rebirth of Park DuValle. Armstrong has made urban development one of the main goals of his administration. The $190 million cost of development was subsidized with City of Louisville community development block grant (CDBG) funds, and City of Louisville homeownership zone/economic development funds, in addition to a variety of financial incentives, low-income housing tax credits, a public-housing comprehensive grant, and HUD HOPE VI funds. The city's money also has paid or will pay for construction and marketing of the rental and for-sale homes, as well as the infrastructure and the town center.

At the Mayor's request, $3 million was added to the most recent city budget to stimulate downtown housing construction. And earlier, the city, in partnership with a private lender, created a $5.6 million low-interest loan pool for investors planning to build privately owned, unsubsidized housing in downtown Louisville. Armstrong said he is hoping that the success at Park DuValle leads to similar projects throughout the city. "You can take Park DuValle where it was 10 years ago," Armstrong said. "It was a notorious part of the city. Now it is a model for the rest of the nation. It's like the phoenix rising from the ashes." With high hopes and large investments riding on the Park DuValle program — it is no wonder that city officials in Louisville and across the country are following the fortunes of this venture with intense interest.

If the Park DuValle Revitalization is successful, it will become the national model for mixed-income communities in the coming decades, said Jones. The Community Builders has construction projects under way in Boston, New Jersey and Pittsburgh, but Jones says none of them have the scope of the Park DuValle project. "Park DuValle is becoming the poster child of urban revitalization," Jones says. "Sometimes, I feel like a tour guide because so many people from out of town are coming to look at it." In fact, Park DuValle was recently honored by the American Institute of Architects for excellence in urban design. The project was one of six international contenders to receive that designation.

All 625 rental units in the revitalization area have been designed as a collection of houses, rather than as conventional blocks of apartments. Rental units are built in duplexes, triplexes, fourplexes, and sixplexes – many look like large, single-family houses – and are interspersed with 450 for-sale houses. An observer could not tell the difference between rental homes and owned homes by looking at them from the street. The relationship between rental and for-sale houses is complex. Although each block has a mixture of both, the rental houses are grouped in more or less contiguous bands for management purposes. There is no distinction between subsidized and market-rate rentals; and the units may change from one to another classification. This unconventional approach was a concern to lenders. The challenge was to convince new home-buyers, who had other options, to buy houses in a neighborhood with lower-income rentals.

The people who are moving in are risk takers in a sense. One of the challenges was to make it new and exciting and to instill a sense of quality. All the people that come here want more out of life than they currently have. "These people are willing to bet their net worth on a neighborhood with decades of bad headlines. We want to make sure that we give them a high-quality product in return," said Armstrong.

To overcome the stigma associated with government-subsidized housing, Park DuValle houses were 5-to-10 percent larger than homes in surrounding neighborhoods and offered more varied designs. In addition, the highest valued lots were reserved for homebuyers. To conform to financing requirements, it was decided that owned homes would face one another and, that rental homes would face other rentals. Given tight budgets, developers found ways to use the same building footprints while varying the facades and adding distinguishing details to the houses.

Before long, the 956-acre site was linked with a continuous network of streets connecting to the street grid of surrounding stable neighborhoods; the parkway was extended through the Park DuValle development; and an intricate property management program was set up by the developers. Once the dilapidated public housing was gone, people saw only the large amount of land ready to be developed, and the market began to respond positively. Led by Boston-based The Community Builders, Inc., the developers persuaded appraisers that they would be able to sell the market-rate homes at more than $100,000 even though nearby neighborhood homes were selling for only about $40,000. To start the homebuying ball rolling, the Phase II developers built an eight-home "model village" that opened in June 1999. That approach was successful.

LREDC offered incentives for people to build homes in Park DuValle. Some of the early homebuyers received as much as $20,000 when their homes were completed. As sales have picked up, the cash incentives have decreased to the point that people buying homes now can expect to receive "around half" as much as the early birds, says Kelly Downard, president and chief operating officer of the Louisville Real Estate Development Company. The demand is being fueled by word of mouth and marketing that has included radio and television advertisements, speaking engagements and translating marketing materials into foreign languages. The design mimics that of successful older neighborhoods, such as the Highlands, and masks any differences between market-rate housing and subsidized apartments. The ownership homes measure 1,100 square feet and up, and will have a market value of $75,000 or more. Planners designed the neighborhood with a range of new homes valued from $80,000 to more than $200,000.

The homes also could be side by side, according to Downard. "A surgeon could be living next door to a bus driver in Park DuValle," he said. "There are no stamps on any resident, building, or area or anything – it's a neighborhood," Downard said. "One of the goals of the neighborhood was the diversification of income. All neighborhoods are that way, and we wanted to ensure that is the case here."

The third phase of the revitalization, focused on the triangle of land near Wilson Avenue and Beech Street, will include the construction of a Town Center, housing 25,000 square feet of commercial space. It also includes the Park DuValle Health Center; an independent-living complex for the elderly; a neighborhood clubhouse and more rental and ownership homes. Armstrong said he could not say which retailers are looking at Park DuValle, "I can tell you we have a number of folks," Armstrong said. "We are talking with some major retailers and have commitments with other smaller operations. This is a quality development, and we are looking for quality vendors." Discussions have taken

Housing in the new Park DuValle project

place with food-service companies and a grocery chain, Armstrong said. Nobody has signed on to take any space, but "we have more prospective tenants than we have space," he added. He said he has heard that some retailers are waiting to see the residential areas built out more before making a commitment.

Jones believes that Park DuValle can have a positive impact on the community surrounding it by providing construction jobs and attracting other employers such as a pharmacy or major grocery. "If this thing is done right, the neighborhood adjacent to Park DuValle will get an immediate benefit," Jones said. "We are already seeing some signs of that. People are renovating their houses and nearby homes are selling. These are all signs of economic success in the neighborhood." The Park DuValle Revitalization also represents a significant opportunity for minority participation in the ongoing construction.

Minorities accounted for 37 percent of the contractors and 30 percent of the work force in the first phase of construction, and 50 percent of the general contract work in the second phase. Some of this has been accomplished by establishing partnerships between minority-owned companies and larger contractors.

The total project has a planned completion date of 2004, but it may be completed before then. Officials are pursuing locations for the 150 off-site rentals, which will likely be scattered throughout the city. The final phases of the redevelopment of Park DuValle in Louisville's west end are under way, and the response so far is more than encouraging. "When all is said and done, we hope to create a neighborhood that's reflective of people from throughout Louisville," Armstrong said. "We hope that's a natural evolution as a result of economic diversity."

Timothy Barry is the Executive Director of the Housing Authority of Louisville, the project manager of the Park DuValle Revitalization Project and a Special Assistant to the Mayor.

Restoration of Urban Waterways and Vacant Areas: The First Steps Toward Sustainability

By
John Cairns, Jr. and Sarah E. Palmer
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Most cities and towns have evolved along the banks and shores of waterways. Historically, the larger waterways functioned as major transportation corridors for humans as well as for other organisms. The numerous smaller waterways weaving through cities also functioned as sources of fresh water that provided food and habitat. Rapid urban expansion has dramatically changed the face of these waterways. Today an estimated 93 million people reside in the coastal counties in the United States.[1] Many watercourses have been channeled, rerouted, paved over, transformed into storm sewers, or, in the case of wetlands, obliterated. Impervious surfaces such as roofs, parking lots, roads, shopping malls, and industrial buildings, dramatically alter the flow of natural systems. Instead of percolating through the soil to groundwater aquifers or being transpired by vegetation, urban runoff shunted in abnormal patterns enter natural systems well beyond the urban areas from which the water originates. Additionally, the components of urban runoff, such as suspended solids, pesticides, nutrients, oil and grease, human and animal refuse, and pathogenic microorganisms, have significant impacts on the aquatic habitats they enter.

The National Research Council[1] estimates that approximately 85% of the 10 billion gallons per day of wastewater effluent discharged along the U.S. coasts enters bays and estuaries rather than open ocean. The ecological impacts of large-volume discharges into these slow-circulating habitats include sedimentation, anoxia, hypoxia resulting in aquatic plant die-back, and nuisance algal blooms, all of which adversely impact benthic populations such as shellfish. The Chesapeake Bay has seen dramatic declines in aquatic plant populations, which coincides with increased turbidity from agricultural and urban runoff. Aquatic plant communities are important nurseries that provide nutrients and shelter for molting crabs, juvenile fish, and shellfish, all of whose declines in the Chesapeake Bay are well documented. Residential, commercial, and industrial sites are all important contributors to urban runoff. Many of the contributing pollutants (such as refuse, oils, and solid materials) could easily be reduced with changes in urban lifestyle. With the water shortages we now face, particularly in the western United States, better management of water resources is mandatory. This can be accomplished while reacquainting urban dwellers with at least some of the attributes of natural processes.

The implementation of the 1972 Clean Water Act and its amendments in 1987 brought dramatic changes in point-source pollution, and society is only beginning to address the problems associated with non-point pollutants stemming from urban areas. Recognizing the importance of reducing nonpoint wastes, a number of creative and common-sense strategies have been developed. Unfortunately, no single "quick fix" or technology exists for reducing urban runoff, and a combination of innovative management policies and grassroots education is essential to improve water quality. Simple approaches, such as street sweeping and warnings posted on storm drains, may reduce urban pollutants, but to what extent is uncertain. In some cases, parking lot and gas station drains may be effectively retrofitted with oil and grit separators to remove hydrocarbons and heavy metals from storm water before its entry into storm sewers.[2] San Francisco developed a combined sewer system in which all city water (including street runoff) is treated before its release.[3]

The construction of wetlands to alleviate storm water pulses as well as to improve water quality is becoming increasingly popular. Wetlands (either engineered or natural), with dense vegetation and wide, shallow basins, slow the entry of storm water by forcing it to flow through a longer course (decreasing water velocity) and remain in the basin for a longer period of time so that trapping sediments is possible. Trapped sediments containing nutrients (such as nitrogen and phosphorus) are then used by plants during growing seasons or are broken down through biological processes such as denitrification. Wetlands have been extremely successful in reducing high pollutant loads in storm water. Samples from constructed wetlands in Auckland, New Zealand, reflect an 80-97% decrease in sediment concentrations of lead, total phosphorus, and hydrocarbons.[4] In addition to improving water quality, wetlands serve as an attractive habitat for waterfowl and provide important ecosystem functions ("ecosystem services") to areas affected by urban development.

A number of cities are going beyond the banks of urban waterways to reduce urban runoff. Tucson, Arizona, is currently conducting a citywide storm water management study. This detailed analysis of the 59 watersheds in the city of Tucson is an effort to provide a long-range management plan for storm water quality and quantity. The plan promotes harvesting rain and grey water for landscape irrigation by private property owners and improved street and alley maintenance through increased street cleaning and waste removal. Tucson has a strict wash ordinance to protect washes from channeling and developing floodplains. Revegetation of disturbed floodplains and wash areas with native plant species is also encouraged. In other areas, Tucson has created an extensive set of linear parks along its two major waterways, the Santa Cruz and Rillito rivers. Areas that were once graded and devoid of other vegetation are now lush with native mesquite (Prosopis sp.), palo verde (Cercidium sp.), ocotillo (Fouquiera splendens), and numerous small herbaceous plants. As a result of this endeavor, the linear parks are not only heavily used by humans (hiking and biking) but by native fauna as well. It is not uncommon to see horned lizards (Phrynosoma modestum), road runners (Geococcyx californianus), coyotes, and numerous species of birds and rodents foraging among the plants adjacent to the walkways. In addition to reducing urban runoff, the restoration of such disturbed riparian areas increases the opportunity for public environmental education. Surrounding businesses and residential areas also tend to benefit economically from similarly restored areas. The recent restoration of a downtown creek in San Luis Obispo, California, raised property values and enlivened business activity.[5]

Concrete channelized urban stream, Louisville, KY

Strategies to reduce urban runoff have wide-reaching effects on community lifestyles and result in subtle improvements in the ecological condition of native plant and animal communities residing within the city. Integrated with strategies to decrease urban runoff are opportunities for urban ecological restoration. Urban ecological restoration need not be limited to riparian areas or wetlands. Although traditionally perceived as a linear process, urban development can be quite circular. Clothes, newspapers, and milk cartons are recycled; why not abandoned stores and empty lots? What would happen if abandoned or perpetually vacant commercial areas and empty lots were restored to natural habitat parks? As suburban malls, shopping strips, and housing developments continue to expand away from the city center, the remaining abandoned and vacant areas are ripe with restoration opportunities. The restoration of abandoned or vacant urban areas with native plant species may provide similar societal, as well as ecological, benefits as the community gardens and parks of the 1960s and 1970s. Urban restoration has the added benefit of reducing the impact of urban runoff, which is both a major ecological and societal problem.[6]

The restoration of abandoned or vacant urban landscapes with native flora provides one means of replenishing ecological capacity (e.g., fossil water and biodiversity). Additionally, revegetating graded areas and removing deteriorating buildings reduces suspended solids entering urban storm sewers. A number of valuable ecosystems already exist in heavily urbanized areas (e.g., Central Park, New York, and Amsterdam Bos, Holland) which further legitimizes the practice of environmental restoration in urban settings. Holland has pioneered the ecological restoration concept of landscape planning on a significant scale.[7] Amsterdam Bos is a large, manmade forest. Bijlmereer is a 1960s housing project located on the flat polders southeast of Amsterdam. In England, volunteers from youth organizations and the Conservation Corps created the Ecological Parks Trust on two acres of abandoned warehouses and docks along the south bank of the Thames.[8] Restored areas in close proximity (e.g., multiple lots on a city residential block) may function as habitat for small mammals, reptiles, and birds. Agencies such as state Game and Fish Departments and the federal Fish and Wildlife Service are establishing urban wildlife branches to determine the number and diversity of animal species residing in urban areas. The agencies also identify potential urban landscapes that may provide ecologically valuable habitat to nonhuman residents. On a subtle scale, all of these steps in ecological restoration represent steps toward sustainable use at the level of the individual.

To continue the trend toward sustainable resource use, society must pay attention to its influence at the level of the individual; its control of the rate of loss of ecological capital; overharvesting of renewable resources and exhaustion on non-renewable resources; deterioration of environmental quality; and extinction of species. First, the environmental literacy of most societies must be dramatically improved.[9] The presence of restored floodplains, riparian zones, created wetlands, and grey water harvesting expose citizens to the environment at an approachable level. Second, society must understand what sustainability means. In its simplest form, sustainable resource use meets present needs without compromising the ability of future generations to meet their own needs. In fulfilling these needs, society must focus on both technological development and ecosystem services.[10] Ecosystem services are those functions of natural systems perceived to be of value to human society, such as maintenance of water quality. Third, as identified by the National Research Council,[1] integrated management strategies that identify the cost and consequences of resource use must be implemented. To achieve this goal, society must form a clear vision of the future of its communities and develop strategies toward that vision. It is essential that ecosystem protection and restoration measures be incorporated into the daily lives of individuals to maintain natural resources. In doing so, sustainable use practices may be realized.

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Watershed Planning and Site Design
August 1-2, 2001
Louisville, Kentucky

The Kentucky Institute for the Environment and Sustainable Development will host a workshop on watershed planning and site design principles. The two-day workshop is open to individuals and organizations interested in learning more about watershed planning and then conducting similar workshops in your geographic area, to your organization or association. Attendees willing to present subsequent workshops will have their $350 workshop fee waived and be provided a stipend of $1,500. The workshop will be conducted by the Center for Watershed Protection and will include the following topics:

- Why plan at a watershed level;
- Impacts of impervious surfaces;
- Eight tools for watershed protection;
- Building an effective watershed plan;
- Model land development principles;
- Review of design case studies;
- Codes and ordinances; and,
- Site planning roundtable exercise.

For more information contact:

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