Wali, A., G. Darlow, C. Fialkowski, M. Tudor, H. del Campo, and D. Stotz. 2003. New methodologies for interdisciplinary research and action in an urban ecosystem in Chicago. Conservation Ecology **7**(3): 2. [online] URL: http://www.consecol.org/vol7/iss3/art2

CONSERVATION ECOLOGY

Synthesis

New Methodologies for Interdisciplinary Research and Action in an Urban Ecosystem in Chicago

Alaka Wali, *Gillian Darlow*, *Carol Fialkowski*, *Madeleine Tudor*, *Hilary del Campo*, and *Douglas Stotz*

ABSTRACT. This article synthesizes recent work carried out at The Field Museum that applies an ecosystems approach to ecological and anthropological research, conservation planning, and environmental action. This work is part of an effort to protect biological diversity in the Lake Calumet region of metropolitan Chicago. The need for an ecosystems approach to urban areas, particularly in relation to conservation efforts, is discussed. Reviewing the problems of alternative, non-systemic perspectives in both research and policy toward urban problems, the article describes how the efforts of Field Museum scientists and educators integrate interdisciplinary research into a conservation and information design process.

INTRODUCTION

Almost half the world's population, some 3 billion people, live in metropolitan regions (United Nations Environment Program 1999) and occupy an estimated 4% of the world's land area (World Resources Institute 2000). Furthermore, urban regions use or extract resources from all other regions, and thus exert tremendous pressure on ecosystems throughout the world. Therefore, the creation of healthy urban regions is one of the most critical tasks of the 21st century. Success will depend on active citizen participation in local, national, and global efforts to manage natural resources, protect fragile ecosystems and biological diversity, and improve social conditions. Understanding urban regions as ecosystems will be critical to our ability to manage human–environment interaction because such an approach compels us to look broadly and holistically at a range of concerns. The task is increasingly imperative because of the global reach of urban landscapes.

Scientists and planners have only recently begun to conceptualize urban areas as ecosystems and definitions of what constitutes an urban ecosystem are difficult to come by. A general definition that seems useful is provided by the World Resources Institute (2000, pp. 141): "a biological community where humans represent the dominant or keystone species and the built environment is the dominant element controlling the physical structure of the ecosystem." The advantage of this definition is that it enables researchers and planners to transcend the limits of political boundaries and examine eco-social relationships. Furthermore, it allows for the integration of distinct disciplinary approaches. Recent work done on the Long-term Ecological Research (LTER) projects has also clarified how we can conceptualize urban ecosystems and has developed sound methodologies for investigating their complexities (Pickett and Cadenasso 2002, Pickett et al. 2001, Grove and Burch 1997).

A third advantage to the above definition is that it enables us to treat human populations as integral to the rest of the environment. This is in contrast to previous approaches. From the late 19th century, when industrialization and urbanization began to dominate social processes and become subjects of sociological concern, to the present, we have tended to characterize urban life as "unnatural," "alienating," and "chaotic" (e.g., Durkheim 1964, Wirth 1938). We have separated the city from nature and drawn them as polar opposites (Cronon 1991, pp. 6–8).

Consequently, although there is extensive literature on urban ecology and design, there is a gap in our understanding of the processes by which social variables (i.e., economic and political conditions) and ecological variables (accounted for in both the natural and built environments) are integrated in urban areas.

The disaggregation of social and ecological processes has also affected urban policies, which have assumed

[1]Center for Cultural Understanding and Change, The Field Museum

that improvements in physical infrastructures and the "natural" environment can be separated from attention to social milieu—such things as poverty rates, labor force participation, and social service quality. Conversely, policy aimed at alleviating poverty or social inequality has operated on the assumption that social behavior occurs independent of the broader "environmental" and ecological context of resource use and distribution (Halpern 1995). The most recent attempts to address poverty (for example, the Empowerment Zones Initiative and the 1996 Welfare Reform Legislation) continue to be predicated on a "Culture of Poverty" approach that contends poor people are operating with cultural "deficits" that prevent them from improving their economic and social condition, regardless of the structural and systemic factors that cause poverty.

This is not to say that ecological concepts have been altogether absent from social science or urban research. The Chicago School of Urban Sociology, for example, one of the earliest systematic attempts to characterize urban life, relied on ecological analogies (Park and Burgess 1974, Wirth 1938). The Chicago School's delineation of the city as a series of concentric zones, each inhabited by a distinctive subculture characterized as "econiches," led successive researchers to identify distinct bounded areas of residential and commercial activity and to describe these in isolation from one another (e.g., Gans 1962, Glazer and Moynihan 1963, Whyte 1955, and more recently Wilson 1980, 1987). The impact of this approach can be seen in such concepts as "the inner city," "community studies," and "ethnic groups" and in characterizations that presume the isolation of one group from another (e.g., Goldsmith and Blakely 1992, Hacker 1992, Massey and Denton 1993).

The attempt to place social patterns within a spatial concept was laudable, but there were significant problems with the Chicago School's approach. First, although the sociologists used ecological concepts, they were not studying actual ecological relationships. The impact of the built urban environment on the natural landscape was ignored, as was the actual pattern of resource distribution. Second, the simplistic drawing of boundaries around communities could not account for processes that connected people across "ecological niches," nor for the structural impact of city-wide social institutions (Hannerz 1980, Persons 1987; but see Drake and Cayton's 1945 masterpiece, *Black Metropolis*, for a notable exception). This approach then "reduced" the complexity of urban interactions and was unable to account for social and cultural change or the dynamics of urban systems.

Ecological analysis, meanwhile, which had concentrated on issues of sustainability in fragile and eroded non-urban ecosystems (Gore 1992, Haas et al. 1992, Turner et al. 1990, United Nations 1992, Wilson 1988), has again turned its attention to questions about building sustainable urban environments (Platt et al. 1994, pp. 9–12). Of necessity, sustainability in this urban context will entail the development of criteria for ensuring a viable quality of life for all species, human and nonhuman, that can be maintained over succeeding generations (Berkes and Folke 1998). Recent efforts to promote cleanup of toxic waste sites, rehabilitate brownfields, improve water quality, and search for environmental justice, as well as recoup and restore wildlife areas within metropolitan regions, have re-energized urban ecology (Beatley and Manning 1997, Haughton and Hunter 1994, Hough 1989, OECD 1991, Platt et al. 1994, White 1994). Urban ecology focuses on how systemic understandings of the impact of the built environment on the natural environment can shed light on global processes of climate change, resource erosion, and threats to biodiversity. Still missing here, however, is careful attention to the details of social life, such as can be provided by anthropological research that concentrates on understanding the workings of social institutions and knowledge construction at a localized level.

Alternative formulations based on more nuanced applications of ecology and political economy can be found in the inter-disciplinary literature of urban studies (e.g., Castells 1977, Hannerz 1980, Harvey 1973, Platt et al. 1994). Additionally, anthroplogists are using more sophisticated ecological approaches to understand social dynamics in non-urban systems. For example, a recent special issue of American Anthropologist (March 1999) titled "Ecologies for Tomorrow: Reading Rappaport Today" contains articles that demonstrate the continued vitality and significance of Roy A. Rappaport's pioneering ecosystem model for explaining cultural phenomena. A. Biersak (1999), in her introduction to this volume, highlights the new directions in symbolic, historic, and political ecology. These new ecological approaches take more account of vectors of power relations, are less functional, and more concerned with the dynamics between ecosystems to explain local–global interactions (e.g., Kottak 1999, Wolf 1999). But, by and large, social scientists have failed to synthesize the

large body of empirical data they have gathered on urban life to formulate a comprehensive approach that can replace previous approaches. As a result, relying on flawed assumptions, programs continue to be implemented that address infrastructural problems (i.e., housing, environmental pollution) without full citizen participation and that attempt to change people's individual behavior (i.e., dependence on public assistance) without fully understanding the dynamics of institutional constraints and structural forces. Consequently, significant problems remain unresolved, one of the most pressing of which is the need to recoup degraded sites in urban areas (including significant wilderness areas) and improve environmental quality, and yet provide avenues for economic development.

As demonstrated by the LTER work cited above, any model that can address these issues will have to draw on new concepts and data from the fields of cultural geography, ecology, and the new paradigms about urbanism in anthropology and sociology. It will have to integrate processes occurring at the macro levels (regional, as well as national and global) and at the micro level of community or neighborhood. In this paper, we discuss the application of one such approach: an urban ecosystems framework for research and conservation work being conducted in the Lake Calumet region at the southern end of the Chicago metropolitan region. In the next section, we describe the ecosystem of Lake Calumet in terms of human–environment interactions. In the final section, we delineate how our approach, framed under the rubric of "Conservation Design," guides research, conservation action, and environmental education efforts.

RESEARCH SYSTEM: THE LAKE CALUMET ECOSYSTEM

The Calumet region, which extends from southeast Chicago to northwest Indiana, is an industrial and natural landscape, a montage of culture, industry, and natural resources that is liminally perched between deindustrialization, on the one hand, and economic and ecological revitalization, on the other (see Fig. 1).

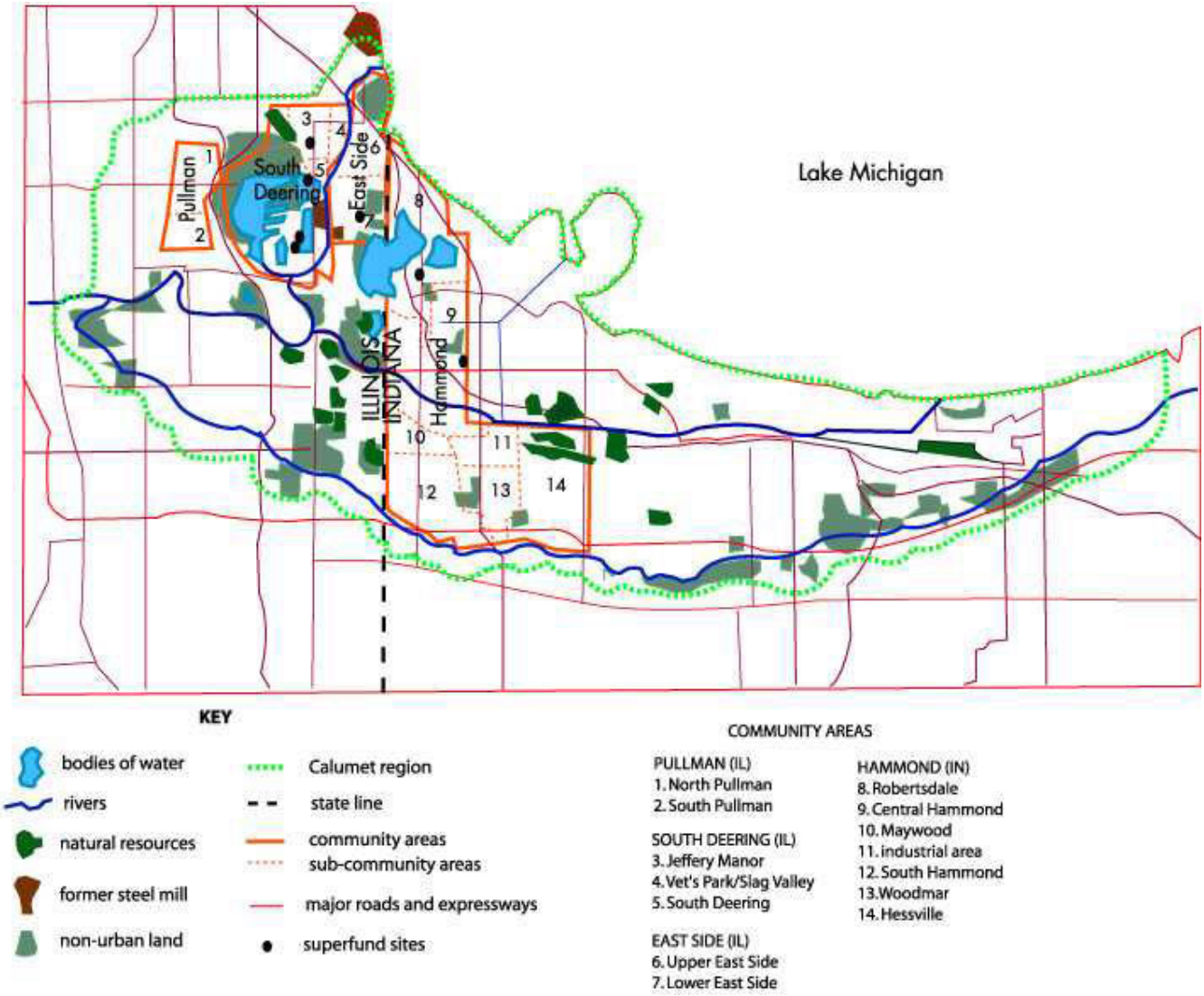
The following description of a recent visit by ornithologist Douglas Stotz perfectly captures the juxtaposition of wildlife and human-shaped landscapes that create the ecosystem:

> *Field Museum volunteer Peter Cruikshank and I are finishing a trip to the Lake Calumet region. For our final stop, we turn to follow two big semis heading west on 122nd Avenue from Torrence, but we get stopped by a train hauling cars from the Ford plant just down the road. After crossing the tracks, all of us drive south on Stony Island. The trucks turn into one of the businesses along the southeast side of Lake Calumet, while Peter and I continue south to where Stony Island dead-ends on the north bank of the Calumet River, just east of where it drains into Lake Calumet. A barge is passing on the Calumet River, and I can see the sewage settling ponds off to the east. Peter parks, trying to ignore the sweet, chemical odor. Scope in hand, I jump out of the car and crash through dense brush to reach a chain link fence; Peter follows. We look out over a small pond, where dozens of old, broken trunks of drowned trees poke out of the water—the aptly named Dead Stick Pond. I don't notice the big smokestacks off to the east, the remnants of abandoned steel mills. I am too interested in the scene unfolding in front of me. There are hundreds of shorebirds of 15 species, ranging from in size from the tiny Least Sandpiper on the mudflats to the dowitchers and yellowlegs feeding in a few inches of water. Along the far shore, a Common Moorhen (one of the 11 state-threatened species that breed in the Calumet area) drifts with her two chicks among the reed behind a motionless juvenile Black-crowned Night-Heron. There are many other herons here, including Great Egrets, Snowy Egrets, Little Blue Herons and one Yellow-crowned Night-Heron. A Virginia Rail calls from the cattails, startling a female Blue-winged Teal and her brood of six tiny chicks that have been swimming with all their might to keep up. Five species of swallows swoop over the pond, scooping up insects."*

Dead Stick Pond is just one of dozens of little patches of habitat tucked away amid the factories, neighborhoods, and transportation corridors of the Lake Calumet area. As is evident in the above description, in the Lake Calumet region, globally imperiled prairies, woodlands, and wetlands intermingle with complex human communities and industrial remnants. The region contains small jewels of prairie wetlands, oak savannas, and oak woodlands, in which there remains an amazing amount of biological diversity.

Once the best region for waterbirds in all of Illinois (in 1876, E.W. Nelson remarked on the overall region as "an unusually fertile field for the ornithologist." Nelson himself noted flocks of Smith's Longspur, a Nelson's Sharp-tailed Sparrow, a Blue-winged Teal, and even a rare record of a female Ruddy Duck near the shores of Lake Calumet during breeding season—one of only three such sightings then recorded in the United States), Calumet is still famous for its birds. Today, despite extensive habitat degradation and pollution, Calumet still features among the best spots in the state for migratory shorebirds. Scientists from The Field Museum have inventoried birds throughout the Calumet region and have determined that there are sizeable breeding populations of at least seven endangered or threatened bird species.

Fig. 1. Significant natural resources, Superfund sites, and community areas of study in the Lake Calumet region. Map modified from the Calumet Ecological Park Feasibility Study (1998).



Detailed studies of fungi, mosses, beetles, reptiles and amphibians, and vegetation have been conducted at Powderhorn Prairie, a Cook County Forest Preserve at the far southeast corner of Chicago. Here, significant findings have been reported, including many first records for the region and/or the state, including a population of Blanding's turtle, a threatened species, and unique set of fungi. The fungi included several species in the genus Hydrocybe (a group typically found in North American forests but, in Europe, found only in grasslands such as Calumet).

Much of this research has been conducted through coordinated research efforts as part of the Illinois Rapid Assessment Program (IRAP), intensive yet time-effective inventories of the biological riches of Illinois ecosystems initiated in 1997 by The Field Museum's Environmental and Conservation Programs and the Illinois Department of Natural Resources. IRAP found that Calumet's significant oak savanna, tallgrass prairie, and ridge-and-swale habitats are prime candidates for further protection, restoration, and management. Additional research into the historical and social elements of the human role within the ecosystem is being conducted by anthropologists and social scientists working in a complementary fashion with the ecologists and biologists.

The work of the IRAP scientists focused attention on the unique characteristics of the Lake Calumet region and moved it higher up the set of priorities for wilderness conservation undertaken by Chicago Wilderness, a coalition of over 140 organizations (including area zoos, botanic gardens, museums, environmental organizations, and state, county, and city agencies) dedicated to preserving wild habitats and biological diversity in the Chicago metropolitan region.

Their efforts then sparked city-wide and national efforts for ecosystem restoration and urban development. Chicago Mayor Richard M. Daley and Illinois Governor George H. Ryan, for example, have announced a groundbreaking collaboration for conservation in Calumet: the creation of an Open Space Reserve; the revitalization of abandoned industrial sites in Calumet, and a new environmental center to concentrate on habitat restoration of the region.

The vision for the Lake Calumet region enshrined in this effort integrates the work to preserve and enhance biological diversity with the work of providing sustainable economic alternatives to the region's residents. It recognizes the enormous impact that human activity over the past several thousands of years, intensified in the last 150 years through the process of industrialization, has had on the Lake Calumet region.

The history of the Calumet region has been extensively documented, starting with reports from the earliest French settlements that described the subsistence patterns, ecological adaptations, and trade networks of the indigenous, non-European inhabitants. These indigenous inhabitants quickly became involved in exchange and trade relationships with European settlers. As the pace of European settlement intensified, the natural environment was radically altered in a manner and degree not experienced before. Chicago was established in 1830 and rapidly grew to become a center for regional commerce (Andreas 1994, Cronon 1991, Miller 1996).

The Calumet ecosystem was changed even more drastically 122 years ago. In 1880, engineers supervised the draining and infilling of the west shore of Lake Calumet for construction of the Pullman Luxury Car Works factory and the "model" city of Pullman, Illinois. The North Chicago Rolling Mill Company was moved to the head of the Calumet River that same year. By 1890, Chicago was the second-largest manufacturing center in the United States. The rich wetlands of the Lake Calumet region had been transformed into one of the largest steel manufacturing areas of the world. Illinois Steel (created by mergers of smaller corporations) was the largest, covering 260 acres by 1889, merging again with another corporation in 1901, to become United States Steel. Railroads brought new workers from Mexico and the African American regions of the southern United States, and from Poland, Ireland, Lithuania, and Slovakia (Miller 1996, pp. 243). These immigrants' rich contributions are still evident in the area today, a century later. They helped build the numerous residential enclaves around the Lake Calumet industrial region where many of their descendents still reside—a living testimony to the long-entrenched patterns of global labor flows that continue to play a significant role in the economic life of the United States.

Steelworkers not only helped make Chicago an industrial giant of the early 20th century, they were also leaders in the fight for unions, safer working conditions, and living wages. It was in the course of these struggles that strong social relationships were created, and institutions and practices were developed that enabled people to stay in the region despite hard living conditions. Residents' sense of identity was derived in part from their attachment to the place they had helped to build.

However, by the mid-1970s, the open hearth and electric furnaces of the Chicago area were losing their competitive profit margins to newer furnaces and mills in the non-unionized southern United States and foreign countries, such as Japan, enabled by advances in the technology of steel production and electronic communication. By the mid-1980s, most of the steel mills were closed. Residents of the Lake Calumet region were faced with massive unemployment, devastated neighborhoods centered around empty factories, millions of tons of toxic wastes, industrial landfills, and the ever-

growing sludge mountains of the Metropolitan Water Reclamation District.

Between 1930 and 1970, most communities surrounding the steel mills in the Lake Calumet region had doubled or nearly doubled in population (Census 1930–1970). Between 1980 and 1990, however, the Lake Calumet region of southeast Chicago experienced a dramatic decrease in population. The Census reported a 4 to 20% decrease in population in the region, with an average population decrease of 11% in southeast Chicago alone (Census 1990). Yet, today, more than 100,000 people still live in the Lake Calumet region of southeast Chicago (including new residents who have moved here since the industrial collapse). Recent census data reveal that new resident populations are beginning to settle in the region, with some communities boasting a 10 to 15% increase (Census 2000). Their neighborhoods have been designated as areas of "severe environmental contamination." A recent report by the National Park Service stated that "sixty square miles of...[the study area] has been filled with steel slag and other waste generated by the steel industry, bordering and sometimes surrounding many of the area's important natural resources....Construction debris, municipal solid waste, and biological sludge disposal areas, some deposits thicker than 80 feet, are located near or adjacent to Lake Calumet....The Grand Calumet River received 90 percent of its discharge from industrial and municipal sources and has extremely high levels of bacteria, nutrients, cyanides, heavy metals, PCBs, phenols, hydrocarbons, chlorides, and other contaminants in the water column and bottom sediments" (U.S. Department of the Interior 1998, pp. 9–10). The region is dotted with Superfund Sites and the Agency for Toxic Substances and Disease Registry (ATSDR) has been petitioned numerous times since the 1980s by community groups in southeast Chicago concerned about environmental pollution and public health impacts (see Illinois Environmental and Protection Agency 1986, U.S. Department of Health and Human Services 1995, 1998 for further information).

Yet, current residents of the region, some of whose ancestors' labor fueled the region's massive industrial growth, continue to hold on to a positive vision of the region and to maintain their stake in it. They are seeking now to reinvest and reinvent this region as a more salubrious locale, able to sustain livelihoods and natural diversity. Citizens' concerns about malodorous fumes, pollution, and health problems as a result of heavy industry have resulted in the formation of numerous environmental organizations and committees. Groups such as the People for Community Recovery, the Centro Comunitario Juan Diego, the Southeast Environmental Task Force, the Jeffrey Manor Community Revitalization Committee, and the Grand Calumet Task Force address environmental contamination, its impact on the ecosystem and the public health in community areas. Through these and other organizations, citizens are undertaking a range of activities associated with improving the "environment," including activism against toxic contamination, organizing for better access to health care, and working to preserve the wilderness areas (Babcock 1998, unpublished report; Gillogly and Pinsker 2001, unpublished report). Similarly, nonhuman species continue to exist and even flourish despite the severe degradation. However, if community efforts cannot be maintained, some species are in peril.

It is striking that many of the systemic threats facing the remnant biological communities in the Calumet region also have strong direct negative impacts on the human residents there. The complete disruption of the natural hydrological cycle has substantially degraded the wetlands of the area and has also led to increased flooding and subsidence, which affect the human residents; the severe negative effects of non-native species on the native biological diversity is mirrored in the damage done in households and commercial enterprises by non-native pests, such as rats, mice, and many noxious insects. Environmental toxins are, perhaps, the most insidious example of a threat facing both nature and human residents in the Calumet area. Industrial contaminants are found throughout the waters, soil, and air of the Calumet ecosystem. These contaminants directly poison animals and disrupt their reproduction, and also pose a serious long-term health hazard for the area's human residents.

For these reasons, research that examines the interplay between natural and social factors, the nature and structure of the changing resource base, and the distribution of resources, is necessary to inform policy for restoring damaged elements of the environment and maintaining a healthy ecosystem. The Field Museum's research scientists have initiated such a research program, using the conservation design framework described in the next section.

THE CONSERVATION DESIGN FRAMEWORK

The processes of conservation design and information design emerged in the early 1990s as part of an effort to meet the need of several Mexican protected areas to tie ecological management and monitoring directly to

conservation goals. Conservation design was developed in parallel with The Nature Conservancy's approach to Conservation Area Planning (formerly known as Site Conservation Planning) and shares many characteristics with that approach. However, conservation design specifically includes cultural values (The Nature Conservancy 2001) as conservation targets, whereas Conservation Area Planning considers the human context but excludes protection for cultural values. Both conservation design and information design evolved quickly as they were put into practice through the Biodiversity Recovery Plan for Chicago Wilderness (Shopland 1999).

Conservation design and information design are complementary processes in adaptive management, which implements and adjusts conservation action within an experimental framework (in the following section, bolded words refer directly to steps in the conservation design and information design processes shown in Fig. 2). Conservation design derives goals and strategies from biological and cultural values and the threats to those values. The process transforms scientific information about values and threats into on-the-ground protection, restoration, and management.

Emphasizing broad participation from stakeholders, the conservation design process begins by determining the **geographic scope** and the **ecological context** of a site, by identifying human and nonhuman **conservation targets** and by setting **visions** for them. It requires that attention be paid to the structure of relationships between all of the conservation targets. In fact, targets are defined in relation to one another and within the overall environmental context.

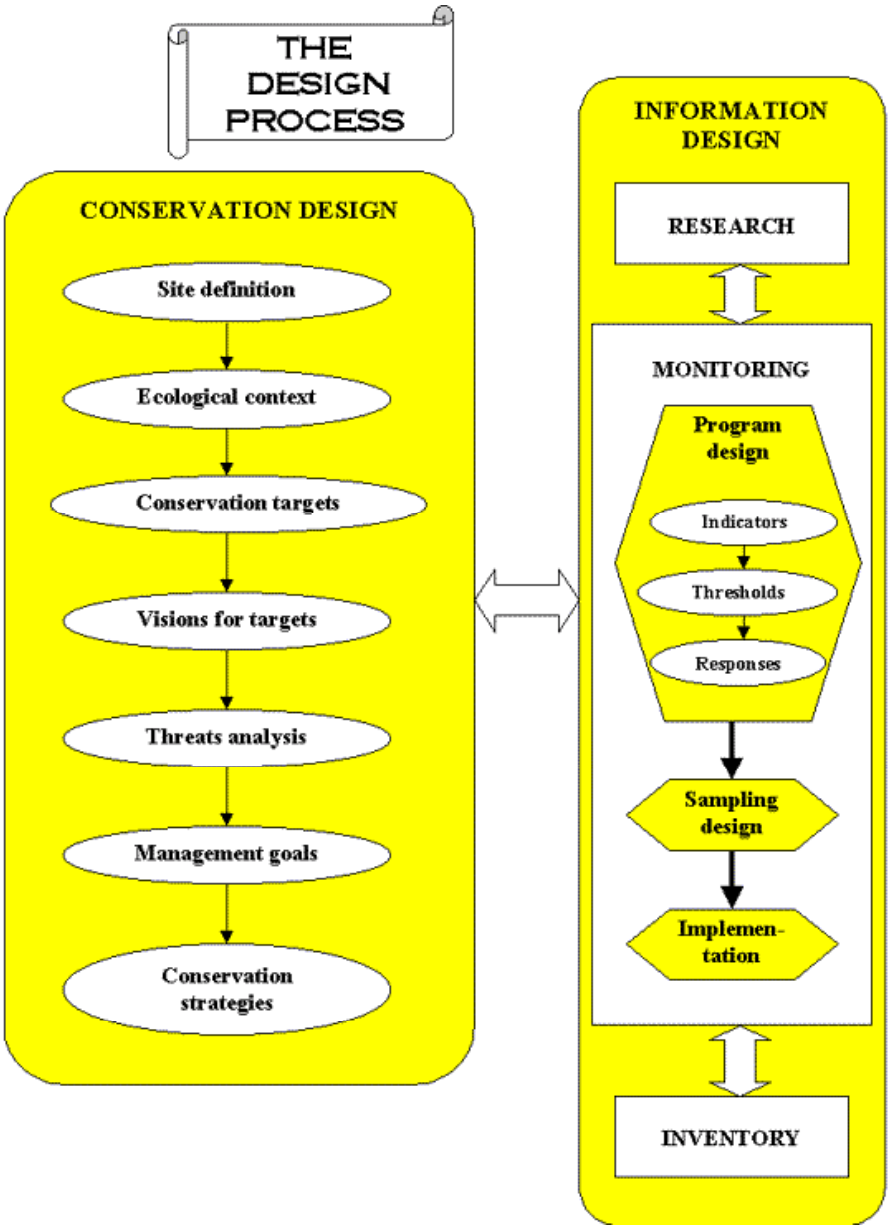
Importantly, targets for conservation include both biological values (usually the species and communities of greatest conservation concern) and cultural values (biodiversity values in a human ecological context, when humans are part of the ecosystem). Among the criteria for identifying a site's biological values are global or regional rarity, influence on community dynamics, and significance for ecosystem function. To identify conservation targets, we conduct site surveys to identify important cultural and biological components. These are then evaluated according to a set of criteria to identify conservation targets, elements that are either crucial to the long-term conservation of the site or for whose conservation the site is crucial. Criteria for identifying cultural values include ability to inform conservation practice, social organization potential, and significance for healthy ecosystems function.

Visions for conservation targets must address quantity, quality, and time: for example, for a given species, a viable population size, reproductive potential, and age structure over a specific number of years; and for a given human community, a viable mode of livelihood, potential for community stability over a long term, and a sense of stakeholder satisfaction with the quality of life. The next step in conservation design involves articulating the **threats** to these conservation targets. A threat is any obstacle to achieving the vision for the future security of a conservation target. Threats often are ranked on the basis of severity (quality) and scope (quantity or extent). Threat analysis should identify direct, proximate stresses, as well as sources (the ultimate causes of threats), and should differentiate between the two. Amelioration of proximate threats may have the most immediate payoff, but reducing or eliminating the ultimate causes is the key to long-term success.

Once visions and threats to those visions are identified, conservation design lays out concrete conservation **goals** and **strategies**, also with quantity, quality, and time measures. Strategies are the experimental treatments of adaptive management. Actions specify the schedule, people, and funds necessary to accomplish each strategy.

Information design then builds on these emerging goals and strategies to identify the most urgent needs for ecological research, inventory, and monitoring to support conservation strategies over the long term. Targeted ecological research identifies causal relationships. **Inventories** take a snapshot of baseline conditions against which changes over time are measured. **Monitoring**, which is a sustainable, adaptive process, measures progress toward conservation goals. An effective monitoring program sets (1) **indicators** (variables that measure change toward a goal or strategy, such as the area of intact vegetation), (2) **thresholds** (values of an indicator that, when crossed, send up a "red flag" calling for a management response), and (3) planned options for **management responses**, which may include policy, education, and biological approaches, among others. **Design** and **implementation** of simple, cost-effective, scientifically sound sampling protocols should be participatory. Every cycle of monitoring provides information for modifying the processes of monitoring and management.

Fig. 2. Conservation design process.



THE DESIGN PROCESS

CONSERVATION DESIGN:

Basing conservation goals and strategies on biological values and the threats to those values

INFORMATION DESIGN:

Basing ecological research, inventory, and monitoring on these goals and strategies

In fact, ecological monitoring serves as the mechanism regulating the loop between management goals and the outcome of the strategies that we use to reach them. The information provided by targeted research, inventory, and monitoring enables iterative refinement of the visions for conservation targets and the strategies that address the threats.

In Calumet, The Field Museum is providing scientific underpinnings for understanding this complex ecological system and for integrating local efforts for public involvement with restoration management and conservation design. Both biological and cultural values that should be targeted for conservation are being identified. Because the Lake Calumet region was a major wetland area before its industrial development, the major biological components that have been identified as conservation targets are mainly associated with its wetlands and aquatic systems. In particular, wetland plant communities and the birds that nest and forage in them include a number of threatened or endangered taxa. Each of the threatened species has its own particular management needs, but it is clear that the wetland systems need to be targeted as a unit. Much less well-surveyed taxa (insects and other invertebrate groups) are not sufficiently understood to be identified as specific targets for conservation, but will be maintained as a part of the overall system. The remnant patches of sand savanna on the dunes between swales in less disturbed parts of the region are also important conservation targets that extend the wetland system into the natural uplands of the region. The Lake Calumet region is considered globally important for the conservation of elements of both of these biological communities. The overarching vision for Calumet is a suite of healthy communities thriving under ecological management by a coalition of diverse and dedicated actors. In this instance, anthropological research is being integrated to better ensure that all aspects of the ecosystem are understood as conservation targets are being determined. At the same time, the design of the anthropological research being undertaken is informed by an ecosystems approach.

INTEGRATING RESEARCH AND ACTION

This research, undertaken by The Field Museum's Center for Cultural Understanding and Change (CCUC), is designed to compare communities in the Lake Calumet region in order to understand variation in levels of civic activism, concepts of the environment, and degree and type of place attachment. The intent is to understand those aspects of the local social system and cultural practices that are worth "conserving," in order to restore the ecosystem to health, as well as to identify the threats to those values.

In the summer of 1998, as part of a grant to CCUC from the John D. and Catherine T. MacArthur Foundation, Elizabeth Babcock, a doctoral candidate in anthropology at Indiana University, worked in the Lake Calumet community areas of Hegewisch, East Side, and South Deering, to investigate ways to collaborate with Calumet-area residents on environmental conservation, restoration, and education projects. Babcock conducted ethnographic research in these communities using the anthropological techniques of participant observation and semi-structured interviewing to construct "asset maps" to illuminate ways to involve the local residents in revitalization efforts underway in the area. Assets are created as people construct social relationships and social institutions, and engage in different events or activities (such as public rituals). The construction of an asset map involves overlaying information about such constructs onto the geographical terrain of the region. Use of asset maps thus assumes that a spatial configuration of social constructs is identifiable and informative. By mapping the communities' assets, Babcock was able to illuminate which sites in the region are especially significant for environmental activism, which sites are imbued with meaning for local residents, and how these sites are related.

Babcock's research (Babcock 1998, unpublished report) revealed that current residents maintain an intricate local knowledge system regarding environmental quality and can relate detailed impressions and histories of usage patterns for many different areas of the region. Older residents can narrate detailed histories of the wildlife areas and land-use practices, dating back to early in the century.

Babcock's research was immediately useful in determining targets for environmental education efforts that are critical to the success of conservation and information design implementation. The conservation education goal of The Field Museum's Environmental and Conservation Programs is to provide participants with skills and knowledge to make informed decisions and move beyond awareness to responsible action on behalf of biodiversity conservation. Founded on rigorous science content, research, and proven educational models, programs focus on building community and participant capacity

and involve partnership in design, development, and execution.

Mapping communities' assets identifies which sites in a region are especially significant for public involvement. Additionally, working with a community to identify and capitalize on its assets and strengths conveys a proactive message and sets a positive tone. This approach differs significantly from previous approaches that tended to treat human communities in isolation or apart from nature, as previously mentioned. Using the asset map for the Hegewisch community, The Field Museum's environmental educators started building partnerships with local voluntary organizations and key activists. Programs were designed that engaged the community on their terms in conservation design work. What has evolved over the 2 years of concentrated program development are five programs now embraced and being implemented by the Hegewisch community.

Mighty Acorns introduces youth, ages 8–11, to nature and stewardship through content-based activities and natural area restoration work at an adopted site. Students from local schools pull garlic mustard (an invasive plant species) at Powderhorn Lake Prairie, cut buckthorn at Beaubien Woods, and collect and plant seeds at Sandridge Nature Center, helping to restore the biological health of their community.

For 12- to 15-year-olds, there is *Earth Force*, a national program being brought to the Calumet area under a Field Museum partnership. Through a sequenced skill-building process, *Windy City Earth Force* enables youth to assess environmental issues in their local communities and take the lead in bringing about positive change. From students at Thornton-Fractional North School assessing the water quality of the Calumet River and helping in streambank restoration, to Girl Scouts in Hegewisch working on the Wolf Lake clean-up, to students at Our Lady of the Gardens investigating the quality of the river during their summer school session, hundreds of Earth Force students are making a difference.

High school students, teachers, and adults can participate in *UrbanWatch*, a ground-breaking program being developed in partnership with the Illinois Department of Natural Resources. UrbanWatchers monitor the biological quality of urban green space: backyards, school yards, golf courses, parks, corporate properties, campuses, cemeteries, etc. and report their findings to Field Museum and IDNR scientists over the Internet. Biological Urban Surveys and taxa-specific investigations on fungus, birds, beetles, tree health, slugs and snails, and butterflies have been conducted at Calumet Park, Olive-Harvey Community College Campus, the park areas of Powderhorn Lake, and the Washington High School grounds. The Washington students have decided to take action to enhance biological quality. Beetles are being reared and released by students and adults to control the spread of invasive purple loosestrife in the wetlands surrounding the community.

Resident volunteer stewards are restoring globally significant sand prairie and savanna at the community's southern edge on scheduled workdays under the direction of trained local volunteer leaders.

All five projects are carefully crafted to further the goals of the management plan that will emerge from the conservation design process. Currently, a management plan is being developed for the Hegewisch Marsh in the Lake Calumet region based on both biological and anthropological research. Regular monitoring should indicate if the goals have been reached. If not, the plan will be adjusted.

To build on Babcock's research, in June 2001, CCUC embarked on a 19-month ethnographic research project, supported by the U.S.D.A. Forest Service's North Central Research Station, to illuminate the vital connection between the environmental and economic concerns held by residents of the region. A team of four students conducted research in the communities of East Side and South Deering, adjacent to wilderness areas designated high priority for protection. Rapid assessments were subsequently conducted in the Pullman community of Chicago and Hammond, Indiana. Preliminary findings of this research are as follows.

Social communities in the Lake Calumet are intimately tied to each other through economic, political, and kinship relationships. The fabric of social organization spreads across the entire ecosystem and creates the social assets that underlie different forms of civic activism. Thus, residents in the Chicago neighborhoods have kin relations in Indiana towns across the state line; voluntary organizations draw members from the region, not just from the local neighborhoods, as increasingly do churches and other civic institutions. We also found that length of residence affected the way in which people became attached to place. The region's long-term residents

recalled the days of the steel mills when discussing the regional landscape, but newcomers were becoming attached through investments in residences and businesses (see also Altman and Low 1992, Low 1999). Additionally, power relationships tie in forces and actors from outside the ecosystem, such as Chicago political institutions and transnational corporations that continue to operate in the region. Much of the current change occurring in the region is shaped in part by the global shift from an industrial to an information economy and the particular expression of this shift in the Chicago metropolitan region. All these elements inform the creation of asset maps for the region.

Attention to heterogeneity within communities is a prerequisite for determining what assets residents bring to the sustainable development of the region, as well as what constraints may prevent them from participating in initiatives currently under way. Internal borders and boundaries are socio-culturally enforced by residents (see Fig. 1, "sub-community areas," designated by number and demarcated by broken lines). City boundaries are not always aligned with local perceptions of where communities begin and end.

Variation in ethnicity, length of residency, and age affect the ways in which residents both perceive and interact with the natural and the built environment. For example, older residents (from a variety of ethnic backgrounds) who had worked in the steel mills continue to regard the mills and the work they created as a primary factor of the landscape. Although they are aware of the pollution and environmental damage caused by the steel industry, they also value the way in which the work they did there shaped their collective identity. Meanwhile, newer immigrants (many of them Mexicans from the city's southwest side) have invested in small businesses, such as retail stores or restaurants, and are attempting to establish a sense of place through participation in existing civic institutions (such as churches and voluntary organizations).

Although residents and staff of city-wide environmental organizations expressed a sense of frustration about different perspectives on environmental issues and persistent lack of local participation, our research revealed many similarities among southeast Chicago's diverse residents, as well as points of intersection between internal and external actors interested in the revitalization of the region. Such similarities could be used to pull people together in spite of divergent perspectives. One such similarity concerns the "pride of place" that all actors feel toward the Lake Calumet region despite the degraded appearance of the landscape. Conservationists and scientists are attached to it for the richness of its wild habitats, and local residents are attached to it because it remains their home (see Edelstein and Wandersman 1987, Edelstein 1982 and Gibbs 1982 for further examples). It is important, however, to understand the nuanced differences in the concepts of the environment. Residents tend to define the "environment" broadly enough to encompass their concerns about securing a livelihood, protecting their health, and nurturing an aesthetically pleasing landscape of parks, gardens, and wild areas. Local discourse on the environment emphasizes beautification of community areas through gardening, tree planting, and maintenance of personal property; increased economic opportunities through "greener" industry, business, and educational opportunities; and decreased health problems as a result of social networks and community–government linkages so that environmental justice is served. Scientists and conservationists have yet to understand how the different parts of such a broad vision can be linked together to create a viable strategy to engage local people in ecological conservation work (del Campo et al. 2002).

CONCLUSION

These preliminary findings, together with subsequent research, will be integrated into the conservation design process as it unfolds. Subsequent environmental education programs and conservation efforts will be able to take advantage of this comparative data to determine the most effective strategies for integrating conservation of wildlife habitats with the overall plan for sustainable economic development in the region. In turn, collaborating with local residents on these programs should provide additional data on the quality of the landscape and the impact of economic change or resource distribution on wildlife and natural and constructed habitat.

We believe that the integrative, holistic approach of conservation design, as described here, reflects a new way to incorporate an ecosystems approach into research, action, and educational strategies that can shape human–environment interactions within an urban context. It accounts for complexities of social practice, and for social and cultural change by locating

responsible vectors both within and from outside the system. Finally, it seamlessly integrates research findings into a flexible and changing management and information dissemination strategy. In this vision, anthropologists, biologists, conservationists, and local residents can collaborate to conserve what all value: a viable and dynamic ecosystem that offers benefits to all its inhabitants.

Responses to this article can be read online at:
http://www.consecol.org/vol7/iss3/art2/responses/index.html

Acknowledgments:

The authors would like to thank Jennifer Shopland, Office of Environmental and Conservation Programs at The Field Museum, for her thoughtful comments on this article and her continued work on Conservation Design. We also would like to thank Carolyn Johnson, Ph.D., Research Associate in Anthropology at The Field Museum, who contributed to the historical research on the Lake Calumet Region. We are also indebted to Debra Moskovits, Director of the The Field Museum's Environmental and Conservation Programs office for leadership on the Lake Calumet project and to Lynne Westphal, Ph.D., Research Social Scientist at the U.S.D.A. Forest Service for thoughtful advice on the project design. Thanks also to Rosa Cabrera of the Center for Cultural Understanding and Change for help with the map, and Meganne Lube, also of CCUC, for editorial work. The research and educational programs reported here were funded in part by the Illinois Department of Natural Resources, the Grand Victoria Foundation, Chicago Wilderness, the John D. and Catherine T. MacArthur Foundation, and the U.S.D.A. Forest Service, North Central Research Station.

LITERATURE CITED

Altman, I., and S. M. Low, editors. 1992. *Place attachment.* Plenum Press, New York, New York, USA.

Andreas, A. T. 1994. *History of Cook County, Illinois. From the earliest period to the present time.*A. T. Andreas, publisher, Chicago, Illinois, USA.

Beatley, T., and K. Manning. 1997. *The ecology of place: planning for environment, economy, and community.* Island Press, Washington, D.C., USA.

Berkes, F., and C. Folke, editors. 1998. *Linking social and ecological systems: management practices and social mechanisms for building resilience.* Cambridge University Press, Cambridge, UK and New York, New York, USA.

Biersack, A. 1999. Introduction: from the "new ecology" to the new ecologies. *American Anthropologist* **101**:5–18.

Castells, M. 1977. *The urban question.* Translated by A. Sheridan. MIT Press, Cambridge, Massachusetts, USA.

Cronon, W. 1991. *Nature's metropolis: Chicago and the great West.* Norton, New York, New York, USA.

del Campo, H., V. Abrams, I. Lagos, and S. Salomon. 2002. *Interim report: mapping social assets in the Lake Calumet region.* Unpublished report submitted to the U.S.D.A. Forest Service, North Central Research Station.

Drake, S. C., and H. R. Cayton. 1945. *Black metropolis: a study of negro life in a northern city.* Harper and Row, New York, New York, USA.

Durkheim, E. 1964. *The division of labor in society.* Ed. G. Simpson. Free Press, New York, New York, USA. (First published in 1893.)

Edelstein, M. R. 1982. *The social and psychological impacts of groundwater contamination in the Legler section of Jackson, New Jersey.* Report to the law firm Kreindler & Kreindler.

Edelstein, M. R., and A. Wandersman. 1987. *Coping with toxic contaminants in neighborhood and community environments.* Plenum Press, New York, New York, USA.

Gans, H. J. 1962. *The urban villagers: group and class in the life of Italian-Americans.* Free Press, New York, New York, USA.

Gibbs, L. M. 1982. *Love Canal: my story.* State University of New York Press, Albany, New York, USA.

Glazer, N., and D. P. Moynihan. 1963. *Beyond the melting pot: the Negros, Puerto Ricans, Jews, Italians, and Irish of New York City.* MIT Press, Cambridge, Massachusetts, USA.

Goldsmith, W. W., and E. J. Blakely. 1992. *Separate societies: poverty and inequality in U.S. cities.* Temple University Press, Philadelphia, Pennsylvania, USA.

Gore, A. 1992. *Earth in the balance: ecology and the human spirit.* Houghton Mifflin, Boston, Massachussetts, USA.

Grove, J. M., and W. R. Burch. 1997. A social ecology approach and applications of urban ecosystem and landscape analyses: a case study of Baltimore, Maryland. *Urban Ecosystems* **1**:259–275.

Haas, P. M., M. A. Levy, and E. A. Parson. 1992. Appraising the Earth Summit: how should we judge UNCED's success? *Environment* **34**(8):6–11; 26–34.

Hacker, A. 1992. *Two nations: black and white, separate, hostile, unequal.* Ballentine Books, New York, New York,

USA.

Halpern, R. 1995. *Rebuilding the inner city: a history of neighborhood initiatives to address poverty in the United States.* Columbia University Press, New York, New York, USA.

Hannerz, U. 1980. *Exploring the city: inquiries toward an urban anthropology*. Columbia University Press, New York, New York, USA.

Harvey, D. 1973. *Social justice and the city.* Edward Arnold, London, UK.

Haughton, G., and C. Hunter. 1994. Sustainable cities. Cromwell Press Ltd., Melksham, Wiltshire, UK.

Hough, M. 1989. *City, form and natural process: towards a new urban vernacular.* Routledge, London, UK.

Illinois Environmental Protection Agency. 1986. *The southeast Chicago study: an assessment of environmental pollution and public health impacts.* IEPA/ENV/86-008. Environmental Programs, Springfield, Illinois, USA.

Kottak, C. P. 1999. The new ecological anthropology. *American Anthropologist* **101**:23–35.

Low, S. M. 1999. *Theorizing the city: the new urban anthropology reader*. Rutgers University Press, New Brunswick, New Jersey, USA.

Massey, D., and N. Denton. 1993. *American apartheid: segregation and the making of the underclass.* Harvard University Press, Cambridge, Massachusetts, USA.

Miller, D. L. 1996. *City of the century: the epic of Chicago and the making of America.* Touchstone Press, New York, New York, USA.

Nelson, E. W. 1876. Birds of northeastern Illinois. *Bulletin of the Essex Institute* **9**:89–155.

OECD. 1989. *State of the environment.* OECD, Paris, France.

Park, R., and E. Burgess. 1974. *The city.* The University of Chicago Press, Chicago, Illinois. (First published in 1925.]

Persons, S. 1987. *Ethnic studies at Chicago,1905–1945.* University of Illinois Press, Urbana, Illinois, USA.

Pickett, S. T. A., and M. L. Cadenasso. 2002. The ecosystem as a multidimensional concept: meaning, model, and metaphor. *Ecosystems* **5**:1–10.

Pickett, S. T. A., M. L. Cadenasso, J. M. Grove, C. H. Nilon, R. V. Pouyat, W. C. Zipperer, and R. Costanza. 2001. Urban ecological systems: linking terrestrial ecological, physical, and socioeconomic components of metropolitan areas. *Annual Review of Ecology and Systematics* **32**: 127–157.

Platt, R. H., R. A. Rowntree, and P. C. Muick. 1994. *The ecological city: preserving and restoring urban biodiversity.* University of Massachusetts, Amherst, Massachusetts, USA.

Shopland, J. M. 1999. Working with change in a metropolitan ecosystem: a framework for ecological monitoring, research, and inventory in Chicago wilderness. Report to the Chicago Region Biodiversity Council. Chicago, Illiinois, USA.

The Nature Conservancy. 2001. *Planificación para la conservación de sitios: metodología.* Compact Disk.

Turner, B. L. II, W. C. Clark, R. W. Kates, J. F. Richards, J. T. Mathews, and W. B. Meyer, editors. 1990. *The Earth as transformed by human action: global and regional changes in the biosphere over the past 300 years.* Cambridge University Press, Cambridge, UK and New York, New York, USA.

United Nations. 1992. *Drafts: Agenda 21, Rio Declaration, Forest Principles.* United Nations, New York, New York, USA.

United Nations Environment Program (UNEP). 1995. *Global biodiversity assessment.* Cambridge University Press, Cambridge, UK.

U.S. Department of Health and Human Services. 1995. *Proteinuria and lead screen in Altgeld-Murray Homes.* Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Atlanta, Georgia, USA.

U.S. Department of Health and Human Services. 1998. *Petitioned health consultation, health outcome data evaluation, southeast Chicago study, Chicago, Cook County, Illinois.* Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation, Atlanta, Georgia, USA.

U.S. Department of the Interior. 1998. *Calumet Ecological Park feasibility study: a special resource study conducted in the Calumet Region of Northeast Illinois and Northwest Indiana*. National Park Service, Midwest Region.

White, R. R. 1994. *Urban environmental management: environmental change and urban design.* John Wiley, Chichester, UK.

Whyte, W. F. 1955. *Street corner society.* The University of Chicago Press, Chicago, Illinois, USA.

Wilson, E. O., editor. 1988. *Biodiversity.* National Academy Press, Washington, D. C., USA.

Wilson, W. J. 1980. *The declining significance of race: blacks and changing American institutions.* 2nd ed. The University of Chicago Press, Chicago, Illinois, USA.

Wilson, W. J. 1987. *The truly disadvantaged.* The University of Chicago Press, Chicago, Illinois, USA.

Wirth, L. 1938. Urbanism as a way of life. *American Journal of Sociology* **44**:3–24.

Wolf, E. R. 1999. Cognizining "cognized models." *American Anthropologist* **101**:5–18.

World Resources Institute. 2000. *World resources 2000–2001. People and ecosystem: the fraying web of life.* World Resources Institute, Washington, D. C., USA.