MODELS FOR URBAN FOREST RESTORATION: HUMAN AND ENVIRONMENTAL VALUES

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Introduction

Urban forest restoration programs have been increasing worldwide in recent decades. A mail survey by Borneman and Hostetler (2004) gathered basic information on 33 urban natural areas programs in the United States and Canada and found the programs differed considerably along key variables such as budget, hectares under jurisdiction, and staffing. In terms of their commonalities, most programs were engaged in some form of restoration activity such as invasive plant removal and all relied at least in part on volunteer stewardship efforts. Along with such survey data, more detailed information about the implementation of urban restoration is also needed to assist in the development of successful programs that satisfy a range of human and environmental goals.

In this paper I look in depth at two such programs—in Chicago, Illinois and San Francisco, California—to better understand some of the key issues faced by practitioners and public stakeholder groups when restoration programs are instituted within metropolitan areas. From an analysis of key issues and constraints I suggest that the "classical" model of restoration, where historical authenticity is emphasized in restoring ecological structure and function, may not always provide the best guidance for urban forest restoration programs. My analysis shows such programs may be better conceived along a spectrum of different model types, with different principles and practices emphasized to accommodate human and ecological values in nature.

Case Study: Key Issues and Constraints

I examined restoration activity in Chicago, Illinois and San Francisco, California to better understand some of the key issues faced by practitioners and public stakeholder groups when restoration programs are instituted within metropolitan areas. Both locations have significant amounts of protected open space within their metropolitan boundaries, and while extensive restorative management is happening in urban fringe areas, I focused my case studies on sites within the two cities and their surrounding county because of the diverse range of issues that are being dealt with (Gobster 2001, 2004, 2006). In Chicago there are 49 restoration sites in City of Chicago parks and another 70 sites in the Forest Preserve District of Cook County. These sites range in size from a fraction of a hectare in size to 1500 hectares and include prairie, savanna, woodland, and wetland communities. In San Francisco there are 30 restoration sites in City of San Francisco parks and another 12 sites in Golden Gate National Recreation Area within the County of San Francisco. These sites range in size from less than 1 ha to more than 160 ha in size and include coastal dune, scrub, grassland, wetland, and non-native forest communities.

The fragmented character of these urban natural areas imposes significant restrictions on what ecological conditions *can* be restored through management programs. For example, a prairie restoration at the scale of even the largest of urban sites is unlikely to become home to a bison. Instead, most restorations focus on recovering or reintroducing the key flora of a target community and hope to attract smaller fauna such as butterflies and reptiles. By the same token, a dune restoration cannot be given the freedom to shift across a park road or into a neighbor's backyard. Instead, communities are artificially fixed in space and any movement of elements in the community must take place within site boundaries. And while prescribed burning may be used to manage the understory of an open oak woodland or savanna restoration, setting back succession with a stand-consuming crown fire is not in the urban restorationist's playbook. Thus temporal dynamics are also fixed and give the impression that such communities are stable and climax in character.

Along with these structural constraints there is a host of social and political issues that further define what conditions *should* be restored in urban forest settings. Demand for open space by a diverse range of user and interest groups not only limits the number and size of restoration projects within a program but also what other uses might take place there, how they are managed, and by whom. In San Francisco, restrictions on the use of natural areas for off-leash dog access has led to a major conflict between natural area restorationists and dog owners and threatened progress toward adoption of the city's Significant Natural Resources Area Management Plan. Removal of exotic trees from these restoration sites, especially Australian

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blue gum eucalyptus, has also been a point of conflict in plan adoption, and along with tight air quality restrictions and strong attitudes against the use of prescribed burning has forced restoration managers to consider alternative ways for managing natural area sites. In Chicago, while volunteer-based restoration has long been a hallmark of the metropolitan region's restoration movement, many of the Chicago Park District's larger restoration efforts have been done under contract with professional firms, with volunteers entering the scene to assist with maintenance only after the restoration design has been implemented. The magnitude and complexity of the transformation is a major reason for this, but desire for professionalism, accountability, warranty on plant materials, and time frame for implementation are also important considerations.

Urban Restoration Models

Constraints can often spark creativity, and in the case of natural areas management, practitioners and scholars are beginning to advocate for a broader conception of restoration and document a diversity of restoration models that are more in tune with the human and environmental goals they seek to achieve (e.g., Choi 2004, Gross 2003, Low 2000, Rosenzweig 2003). The following models observed in San Francisco and Chicago illustrate the range of possibilities that may be suited to urban restoration sites:

"Classical" model: Steep topography in San Francisco and broad floodplains in Chicago have been good deterrents to prior development of many of the now-designated natural areas in these two cities, and while most sites have been damaged by overgrazing in the past they retain significant populations of indigenous flora. Restoration of these sites conforms most closely to a "classical" model of ecological restoration, where native plant diversity is maintained and enhanced through invasive species control and other management practices, though these activities are sometimes accomplished in uncommon ways to deal with structural and social constraints. Natural Areas Program gardeners in San Francisco, aided by a substantial force of volunteers, often resort to "boutique," labor intensive methods that would be impractical in larger restorations. For invasive species control this includes hand-pulling to avoid herbicide application and the proposed use of goats to maintain grassland areas in lieu of prescribed burning. In the Cook County forest preserves, restorationists use hand-pollination to revive dwindling populations of the prairie white fringed orchid and keep locations of individual plants secret to avoid theft of this beautiful flower.

Sensitive species model: Some sites in San Francisco harbor plant or animal species that have been identified as rare, threatened, and/or endemic to the Franciscan floristic region that the city nearly completely covers. In contrast to the plant community focus of the classical model, restoration of these sites focuses in significant part on protection and enhancement of the populations of these sensitive individual species, such as the San Francisco lessingia, Western Pond turtle, and California red-legged frog. The weight these species are given in restorative management invokes a kind of "ecological primacy" that makes the existence of incompatible exotics such as eucalyptus or bullfrogs and access by uses such as off-leash dogs much less negotiable. This primacy is particularly controversial when sensitive species are re-introduced into a restoration area where they have been extirpated, and is seen by some critics as a move by restorationists to close off public open space to a special interest. Incompatibilities do not always happen, and in other cases sensitive species might be maintained under novel conditions, such as the anise swallowtail butterfly in San Francisco that relies upon the invasive exotic Italian fennel plant as a major food source.

Habitat model: More broadly conceived than the sensitive species model, the habitat model of restoration aims at providing the appropriate set of conditions for a range of species of interest. Birding is a favored recreational activity in urban natural areas, and while Chicago birders have been vocal proponents of enhancing city parks for bird habitat, their concern has focused more on what provides good food, cover, and nesting rather than on what is native or how authentic a restoration project is. A key part of the Chicago Park District's Nature Areas program focuses on providing habitat for migratory birds in the parks that line the city's 67 km-long Lake Michigan shoreline. The lake is an important flyway and based on recent research the city has installed a system of bird sanctuaries at strategic intervals along the lakefront, characterized as "fast food" stopovers where birds can rest and feed on berries or insects before heading back out on the flyway. Grassland, woodland, wetland and shore habitats provide variety, and sites are managed to restrict some uses to help reduce birds' stress from human disturbance.

Naturalistic model: In most of the larger parks in San Francisco and Chicago, the indigenous landscape has been so thoroughly modified that few vestiges of indigenous nature remain. Yet in their quest to create a human habitat for aesthetic pleasure and recreational use, the original designers of these parks developed naturalistic landscapes that often have considerable ecological potential. Restoration efforts in these parks thus must often work to integrate two (or more) periods of significance—one focusing on ecological restoration and another on restoration of the historic landscape design. Successful projects of

this type respect the goals and intent underlying both ideas of restoration yet can produce a hybrid landscape that is its own unique expression of human and ecological values. Examples of this "third way" restoration model in Chicago include the Lily Pool and Montrose Point, two naturalistic oases in Lincoln Park designed in the 1930s by Prairie School landscape architect Alfred Caldwell, where a primarily native plant palette is used to create symbolic renditions of the Illinois landscape as it existed prior to European settlement. An example in San Francisco is the restoration of the historic forests of the U.S. Army Presidio, originally planted in the 1880s by Major William Jones and now part of Golden Gate National Recreation Area, where native grasses and shrubs are being planted under a dominant canopy of exotic trees.

Nature garden model: Contemporary urban garden design is increasingly sympathetic to restoration goals such as the use of native plants and sustainable landscape practices, but often incorporates these considerations in highly artistic and "unnatural" ways. One such example in Chicago is the 3-acre Lurie Garden in the city's new Millennium Park, where designers used plant materials to create a highly symbolic landscape. "Dark" and "light" sections of plantings represent the Chicago region's marshy past and prairie-farmland present landscapes, and are embraced by a hedge of trees symbolic of the northern boreal forest shaped to invoke poet Carl Sandburg's image of Chicago as the "City of Big Shoulders." Native and introduced plants are used in combination to accentuate these themes and provide variety within and across the seasons, and native species such as purple coneflower juxtaposed with their horticultural variants reinforce the idea of the garden as a nexus of nature and culture. While the Lurie Garden may be an uncommon example, designed and vernacular nature gardens can provide key ways of bringing the functional, educational, and symbolic values of restoration into small urban spaces.

Designer ecosystems: A final model I observed looks at the creation of entirely new ecosystems, ones that result from human designs on the land yet also support non-human needs and in some cases allow valued species to flourish that may never have done so with native ecosystems. At Alcatraz Island in San Francisco, exotic vegetation and the foundations of old prison buildings provide a habitat for rare black-crowned night herons that was absent in the island's original landscape. While many designer ecosystems are created accidentally, there are also cases where vegetation such as the Bill Jarvis Migratory Bird Sanctuary in Chicago's Lincoln Park where tree snags and artificial nesting boxes are purposefully created to provide designer habitat.

Discussion and Conclusions

As these models and their examples suggest, the restoration of urban forests can be a highly interpretive endeavor. While the classical model assumes there is an "original nature" out there to be restored as authentically as possible, the goals and constraints inherent in urban restoration often requires the restorationist to improvise upon the theme of original nature. If a comparison could be made to music, much of urban restoration would fall into the realm of jazz improvisation rather than classical composition.

Given the examples identified in these case studies of Chicago and San Francisco, further investigation of alternative models of restoration is warranted. Indeed, evidence from other cities in the U.S. and other countries shows that models focusing on rehabilitation, utilization, and the provision of environmental services such as moderation of urban heat island effects are increasing in use. By examining the human and environmental goals of restoration projects as well as the social and structural constraints, it may be possible to develop guidelines to advise practitioners and policymakers on which model might be most appropriately applied to a given site. Such a "restoration opportunity spectrum" could help to maximize sought-after values and minimize potential conflicts.

Should all of these different models be referred to as restoration? Some have argued that the term restoration should be reserved only for uses that most closely parallel what I have referred to here as classical restoration. But in their own unique ways each of these models contributes to the ideals of restoring nature and culture that have been expressed in the growing literature on the philosophy of restoration (e.g., Higgs 2004, Jordan 2003, Light 2000). My aim here is to clarify rather than confuse, and together these examples suggest that there are many models of nature that provide promising foundations for urban forest restoration efforts (Hull 2006).

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