Designing For Ecology:
The Ecological Park
by

Andres M. Power

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Brown University

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Author _____
Department of Urban Studies and Planning
June 1, 2006

Certified by _____
Professor Eran Ben-Joseph
Associate Professor
Department of Urban Studies and Planning
Thesis Supervisor

Accepted by _____
Professor Langley Keyes
Chair, MCP Committee
Department of Urban Studies and Planning

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This thesis aims to define a) what an ecological park is, and b) whether it is a new model in park design. Reference to the literature on landscape ecology is used to analyze the natural ecological merit of these parks, while reference to the literature on communicative elements of the landscape is used to analyze the pedagogic, or socio-cultural merit of these parks. Two case studies of recently built ecological parks – Xochimilco in Mexico City and Crissy Field in San Francisco, are analyzed and compared to two older picturesque parks – Golden Gate Park in San Francisco and the Back Bay Fens in Boston. The analysis shows that the ecological park is indeed a new phenomenon and model of park design. This new model redefines the relationship between park and city by connecting the cultural and natural ecological aspects of the park's site with a larger context. The ecological park model moves beyond the experientially isolated urban parks of years past, providing society instead with a sustainable, ecologically viable, self-replicating vehicle to improve the links between the built environment and the landscape.

Thesis Supervisor:
Eran Ben-Joseph
Associate Professor
Department of Urban Studies and Planning

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Designing for Ecology: The Ecological Park

Chapter 1. Introduction

Introduction

The affinity of *park* to *city* is so innate that most of us cannot imagine (nor would want to imagine) a city without one. Even cities of the most modest proportions have parks of their own. But it was not too long ago that this was not the case, as the park beyond the downtown square existed only in memories and tales of great European cities. In fact, it was not until the middle part of the 19th century with the emergence of the municipal park movement that this most basic element of cities began to spread across the United States, leaving in its wake such an indelible impression on our notion of civic space that images of New York City without Central Park or Boston without the Emerald Necklace seem beyond conception. The adapting role of park has emerged as one of the most important public spaces in cities around the world, and after a downswing in the early 1980s – at least in the United States – municipal parks are again at the forefront of planning thought and practice. Cities have returned to building new open spaces, doing so increasingly on a reconsidered element of the urban fabric – reclaimed land.[1]

Much has been written on the municipal and national park movements in the United States and a rehashing of a known story is unnecessary. Instead, this study concerns itself with a most recent stage in park development, referred to by some in the field as the *ecological park*. This type of urban open space, proponents argue, embodies the current societal predication towards ecological consciousness, much like previous park models embodied the societal predication of their time. But is this really the case? Is the ecological park explicitly *ecological*? If so, what does *ecological* mean? And then finally, is the *ecological park* something new?

In order to address these questions and to begin the story of the *ecological park*, **Chapter 2** will begin by presenting a brief synopsis of past trends in urban park development in the United States. While drawing from the general literature on municipal parks, this synopsis will focus on the evolution of the American municipal park through a similar conceptual framework as that published by Galen Cranz in her 1982 seminal work entitled *The Politics of Park Design: A History of Urban Parks in America,* considered generally as *the* source of reference for contemporary park historians. These historical trends in park development will be presented from a perspective focusing on the natural and cultural ecologies at play in their design conception and implementation. The intent of this exploration is to establish the evolving relationship between park, city, the landscape, and ecology and to root this evolution temporally. Exploring these past park types will allow for a basis against which to compare the *ecological park.*

In order to bring the analysis of past park models into the framework of contemporary dialogue, Chapter 2 will continue by presenting an analysis of this dialogue as it is found in the literature and will focus on exploring the evolving relationship between urban landscape and ecology as expressed professionally and considered academically. The relationship between natural systems of a site and the greater urban environment, and the role of design and designer, will be considered as they come together to provide a phenomenological and pedagogical experience to the city

1. Examples include Millennium Park in Chicago, Fresh Kills in New York, Southeast Coastal Park in Barcelona, and Downsview in Toronto, among many others.

denizen and the urban parkgoer. This exploration will also consider elements of contemporary park planning and how the profession considers the evolving notion of the role of park vis-à-vis the city.

Perhaps the most elementary, and important, aspect of this dialogue relates to the interrelationship between a cultural ecology – people, places, design – and the natural ecology of a site and its region. This interrelationship as it is expressed through design defines the different park models generally, and the *ecological park* specifically in its attempts to reform, or re-weight the significance of natural systems within the cultural landscape of cities. From this, the ecological landscape – and the *ecological park* by extension – becomes a venue through which natural ecology is communicated pedagogically, explicitly and implicitly, to the parkgoer. This communication is considered in the "natures" of landscapes. Urban parks are defined by what John Dixon Hunt has called a "third nature," or the synergy of the primeval landscape predating human experience as the "first nature" and the landscape utilized by humans for their benefit as the "second nature." This "third nature" is a fundamental characteristic of urban parks, and the argument that has been proposed by some in the literature is that the *ecological park* has redefined the structure of this "third nature" first expressed in the picturesque parks, establishing an entirely new construct: a "fourth nature."

Chapter 3 will provide an explanation of the methodologies used in the course of the study to figure out what an *ecological park* might be. The review of the literature has suggested that two elements are important considerations of the *ecological park* – cultural ecology and natural ecology – and therefore both components will be considered in deconstructing the otherwise umbrella term of *ecology* as it is used in this context. This deconstruction will be facilitated by reference to a diverse literature on these two ecologies, using a matrix to disaggregate and to categorize the different elements of four studied parks. Applying this matrix to two heralded *ecological parks*, in chapters 4 and 5 respectively, and to two prototypical parks, chapters 5 and 6 respectively, will help to identify the dissimilarities of the *ecological park* and will hopefully allow for a greater fundamental understanding of what defines this purported landscape or park "movement."

Considered very simply, does the *ecological park* reflect greater *natural* ecological merit? And how does its *cultural* ecological merit differ, if so at all?

In this light, the deconstruction of Xochimilco Ecological Park and the exploration of the history of its landscape in **Chapter 4** will show the significance of this intervention to be its use of park program to successfully link, and ultimately preserve, not only an endangered cultural landscape, but an endangered ecological landscape as well. Deconstructing Crissy Field, the second ecological park examined in this study and discussed in **Chapter 5**, will demonstrate a stronger emphasis on the restoration of an endemic environmental condition, but as with Xochimilco, will show a fundamental design and programmatic intent to communicate pedagogically the newly revealed natural systems to the parkgoer.

Having analyzed the two most widely cited examples of the *ecological park*, and in doing so emerging with a greater understanding of what in fact an *ecological park* might be, this analysis will then be compared to two prototypical parks. Based on the literature of municipal park history in the

United States, the picturesque park, or the pleasure ground as others sometimes call it, is the logical comparator in that it was the first, and arguably only, park model in a historical sense to explicitly consider cultural ecology and natural systems in the formulation of design. Therefore, the two picturesque parks used in this analysis will be considered controls against which postulations of a new park model, the *ecological park*, might be made.

Chapter 6 will present the first deconstruction of the picturesque park – Golden Gate Park in San Francisco. It was selected because of its ability to reflect the issues, ideas, and philosophies of the larger picturesque movement in its adolescent years. **Chapter 7** will present the second analysis of the picturesque park – the Back Bay Fens portion of the Emerald Necklace in Boston and Brookline, Massachusetts. The Back Bay Fens reflects the issues, ideas, and philosophies of the same picturesque movement, yet in its more developed and matured later years.

In exploring the four case studies, a guiding consideration will be a focus on ecology – both natural and cultural – in that it is the reconsidered synergies between the two that the literature suggests might be of significance in the *ecological park*. The intent of the ecological deconstruction is to then identify differences between the picturesque and *ecological* park. As a side note, an important qualifier to make is that this study does not conduct a true, scientifically based, ecological assessment in considering the *natural* ecology of the studied parks. Such an approach would be highly time consuming and impractical (and perhaps impossible) in the context of an urbanized area and would not necessarily promote the investigation at hand. Instead, this study uses generalizable, but subjective, indicators of natural ecology in considering and exploring the significance of *ecological parks*, as defined in part by ecological merit.

Chapter 8 will summarize the findings of the ecological deconstruction of each park while **Chapter 9** will present discussion on, and the possible implications of, these findings. What does it mean to the city and the environment when landscapes incorporate natural ecological function into their design? Could this fundamentally alter the functioning relationship, as we know it today, between a park and its city? Is the new park not only a place for leisure and relaxation but also a place to learn and understand the dynamics of a living and evolving landscape?

These questions, among many others, will be considered as this study attempts to answer the fundamental quandary guiding this work:

Does the ecological park reflect a sea-change in the design and function of an urban park or is it merely a contemporary aesthetic expression of the picturesque?

Chapter 2. Past & Present Trends in Park Development

"Park planning cannot possibly stop at the edges of parks. The park system is thus the spearhead of comprehensive urban planning."

-Louis Mumford, 1938

City parks of the Western world owe their existence to the desire to counter the externalities of 19th century industrialization. There is, however, a much older heritage of civic space that dates back to Classic Athens in the Western world, and perhaps much further in the great civilizations of Eurasia and the Americas. While this storied history of design and purpose is of itself a fascinating study, this thesis will begin its exploration with a period only 150 years ago, as the full realization of the municipal park in the United States began to emerge. The intent is not to minimize the importance of older manifestations of civic space, but to instead present the context of a new design ideology where *public* space, as a place for recreation and relaxation, functions as an entity distinct from, yet intricately connected to, the city in which it is housed.

A. The Pleasure Ground and the Emergence of the Municipal Park Movement

The park developed out of a worldview that set nature and culture in opposition to each other. Cities were seen as "too big, too built up, too crowded, diseased, polluted, artificial, overly commercial, corrupting, and stressful" (Cranz, 1982, p.3), while the antidote to this moral corruption was believed to come from allowing one's soul to reconnect with nature *outside* of the city. The popularization of this view is easily accredited to Andrew Jackson Downing, who, in the middle part of the 19th century, spoke on the deeply held belief that interaction with nature had a healing effect on mankind, and that all people, regardless of class, must have the ability to experience nature. Unable to see his philosophy put into action before his tragic death, his ideas were quickly catapulted to the forefront of both architecture and landscape design, with the commission for Central Park being taken over by his contemporaries Frederick Law Olmsted and Calvert Vaux.

As American cities matured and began to look eastward at their more 'civilized' European counterparts, many began to see the relative lack of green space as a defining distinction between the two counterparts. Landscape architecture beyond the public square was virtually non-existent in the U.S. at this time, while Europe had over a century of experience in designing the pastoral landscapes of Lancelot 'Capability' Brown and others by the second-half of the 18th century.

With the commissioning of Central Park in New York, the municipal park movement exploded in the United States. But the parks that America would build developed not from "European urban models but from an anti-urban ideal that dwelt on the traditional prescription for relief from the city – to escape to the country" (Cranz, 1982, p.4). These parks would move far beyond the Beaux Arts town square, instead aiming to capture a snapshot of *rural* 'nature' and placing that snapshot within the boundaries of the city. These new American parks were conceived as "great pleasure grounds meant to be pieces of the country, with fresh air, meadows, lakes, and sunshine right in the city" (Cranz, 1982, p.5).

In bringing nature into the city, these municipal parks, first represented by Central Park, referenced a middle ground between nature and culture. This middle ground was a pastoral or picturesque

ideal of the natural landscape that was intended to provide the 'antidote' to the urban condition. The desire was to define an experience in opposition to the 'miasma-infused' urban environments of the time while acknowledging the significance of a humanistic or cultural interaction with the landscape (French, p. 20). Yet in doing so, the picturesque park turned inward, defining an experience predicated entirely on the landscape within the boundaries of the park, failing to create physical and experiential linkages to the city. The picturesque park as a pleasure ground worked by "heighten[ing] the idea of naturalness with forms suggested by nature...[without relying] on what nature actually provided" (Cranz, 1982, p.26).

The picturesque park reacted to the formality of the Renaissance garden or plaza, where the use of nature's materials – water, gravel, trees, shrubs, and stone – in an "unnatural, geometric way...clearly demonstrated man's assault of, and eventual dominion over, nature" (French, p. 13). In the picturesque park, it was difficult to find any rectilinearity, replaced instead by a dominance of curvilinearity – in roads and paths, land formations and water bodies – designs, it was suggested, that could imply natural form. Although this 'nature' was a completely engineered nature, the picturesque park presented a pivotal change in the relationship between city-dweller and the naturalized environment.

The picturesque park was the embodiment of a new conception of landscape, defined by what John Dixon Hunt has called a "third nature." The picturesque park, in promoting a completely designable conception of nature, synergized the "first nature" of the primeval landscape with the "second nature" of the pastoral landscape utilized by humans for their benefit. This was in departure from the concurrent Conservation Movement, 1850s-1920, in that it created a middle-ground between what was 'nature' and what was 'culture' which was seen otherwise as being an oppositional relationship (Hunt, p. 126).

Olmsted's work was predicated on designing this third nature and wrote extensively on the subject: "That scenery which would afford the most marked contrast with the streets of a town, would be of a kind characterized in nature by the absence, or, at last, the marked subordination of human influences. Yet, in a park, the largest provision is required for the human experience."[1]

While 'ecology' as a studied field would not emerge for many decades, only being coined as a word in 1866, some argue that Olmsted, and other picturesque park designers of his time, represented the emergence of a respect for ecological function in their design of this 'third nature.'[2] Although Olmsted's parks reflected a preconceived notion of what nature should be and look like, he used site conditions and existing natural systems as defining drivers of his designs:

"...[The creation of park] must be largely the work of nature; but that the result may be altogether suitable, as well as pleasing and interesting, obstacles to the necessities of use must be removed, the desired work of nature must be started and assisted, and the natural development of plantations be studied, guided, and encouraged in various ways. Beyond this...nothing else is necessary but the provision of ways by which the results of nature's work may be enjoyed by the public without injuring and wearing them out."[3]

1. Olmsted, quoted in Beveridge & Rocheleau, 1998.
2. Coined as Ökologie in 1866 by German zoologist, Ernst Haeckel.
3. Olmsted, 1886.

A decade before making this statement in prose, Olmsted worked in practice with engineers to solve what was considered at the time to be primarily a sanitation problem, not necessarily a park intervention, at the Back Bay Fens in a way that would restore the area to its original salt marsh condition. Olmsted commented on the idea of having a marsh in the city by saying that:

"there may be a momentary question of its dignity and appropriateness...but [it] is a direct development of the original conditions of the locality in adaptation to the needs of a dense community."[4]

The planning and citing of these parks, although rooted in Downing's egalitarian teachings, was nothing but paternalistic, believing that there was a correct and proper definition of what a picturesque park was and what its role with the city and its people should be (Cranz, 1982). The basic ideology guiding the picturesque park was preconceived elsewhere while the actual citing of a new park required only an adaptation, in some cases more so than in others, to existing site conditions.[5] This of course is in contrast with allowing for site conditions, in an organic sense, to drive the formation of design.

B. The Reform Park

At the around the turn of the 20th century, a new, more rationalistic ideology was sweeping across American society. The importance of deliberate intervention by learned professionals to affect improvement on the quality of life for the ordinary citizen quickly emerged as a guiding principal in almost every policy decision. While the picturesque model relied upon the city dweller's 'innate desire' to seek nature, the reformers of the Progressive Era believed that nature, or more specifically open space and recreation, needed to be brought to the city dweller. This marked the emergence of a much more controlling relationship between municipality and citizen.

Where philosophers of the picturesque believed that mere exposure to nature would alleviate the ills of urban society, reformers believed that structured activity through active recreational pursuits would provide the most effective 'sanitary' results. It was this drive for sanitation, both of the mind and of the environment, that guided the design of the landscape in the reform park. As Boyer (1983) argues, "*...the environmental chaos of the American city became linked in the minds of the improvers to the social pathologies of urban life. Long before poverty, poor housing, and slums were thought of as economic and political symptoms, improvers saw a link between environmental conditions and the social order, between physical and moral contagion.*"

With a broader scientific understanding of bacteriology, contagion, and respiratory ill health and the perceived association of these maladies to the urban environment, progressive reformers completely reconceived the concept of park. Where space was once free and enjoyers were encouraged to stroll, parkgoers were now expected to play softball and basketball. Supervised recreational activity, it was believed, was the best ameliorator of the deleterious health effects of the slums and tenements that characterized urban form (Melosi, *unk.*).

4. Zaitzevsky, p.57
5. As will be discussed in the chapter on the development of the Back Bay Fens, Olmsted held more enlightened views, especially in his later career, on the role of pre-existing or endemic site conditions as drivers of the design process.

Progressives interested in reforming the urban neighborhood believed that recreational needs, perhaps the most fundamental civic activity, should be met daily at nearby sties, rather than on occasional outings to the city's outskirts. The typical neighborhood reform park that emerged from this philosophy (most prolifically demonstrated in Chicago) was a square block or two surrounded by housing. Within the park, pathways were straight and at right angle to one another, and the siting was straightforward and utilitarian. The design of the park was intended, above all else, to organize activity, since the increasingly patronizing urban park planner now "considered the masses incapable of undertaking their own recreation" (Cranz, 1982, p.86).

To promote this rationalization of use through design, surfaces for active recreation, such as playgrounds and playing fields, were organized rectilinearly and in sequential and rational order, while grass and landscaped features where more passive recreation could occur were limited. Nevertheless the underlying motivation of restorative release in the reform park parallels the soul-repairing fresh air and exposure to nature that pleasure grounds were designed to provide (Cranz, 1982, p.6).

Within the rapidly urbanizing context of turn-of-the-century urban America, nature and environmentalism were promulgated primarily by professionals and quasi-professionals who were concerned with public health and sanitation. Yet their attempt to ameliorate deleterious environmental conditions was not secured through the restoration of ecological systems or decontamination of polluted landscapes. Instead, the idea was that by rationalizing the otherwise chaotic natural world with the use of widespread engineering intervention, the urban environment could be made better for it. This marked the beginning of a highly altered, culturally-defined, urban landscape. The natural-looking cultural landscapes of the picturesque no longer registered as being of primary concern (Melosi, 1982).

According to Cranz (2000), it was with the progressivism of the reform park that today's dichotomy between active and passive recreation emerged. This dichotomy has powerful influences in the design and use of today's parks, including both ecological parks included in this study.

C. The Recreation Facility

A new type of park design, the recreational facility, emerging between the 1930s-1960s, was influenced heavily by the rapidly suburbanizing context of America's metropolitan regions. The assumption at this time, Cranz argues, was that everybody had their backyard for intimate settings and relatively easy access to larger pieces of un-developed tracts of open space. These un-developed pieces in the puzzle would serve the need for access to 'nature' that the picturesque philosopher argued was so important to provide. Instead, what was needed in public parks was a place to site 'large-scale facilities,' including areas for "field sports [such] as baseball, football, and basketball...and swimming pools," the later, Cranz describes, characterizing this movement more so than any other single element (Cranz, 2000).

These parks were mass-produced, often from a single plan, and placed rather indiscriminately in regards to local site conditions across the new suburban landscape (Cranz, 1984). These monotonous places had little room for ecological function of any kind.

D. The Open-Space System

Cranz describes parks developed post 1965 as representing three distinct typologies – the tot lot, the adventure playground, and the urban plaza – which she collectively refers to as the open space movement. In the context of open space, Cranz argues that an increasing contextual understanding, spurred perhaps by the concurrent environmental movement, between the smaller landscape parcels and a larger regional network, first emerged (Cranz, 2000).

At the urban scale, these open space parks represented small plazas and 'pocket parks.' Although not mentioned by Cranz, the linear riverway and other waterfronts would fall into this category of park development as well.

The term 'open space' represents a variety of different ideas and visions being applied to parks during the 1960s and after. First, "open spaces were wide open areas with the connotation that this was where anything goes, and where the new permissiveness about the range of possible park activities was appropriate." Secondly, open spaces were the odds-and-ends of urban development – vestiges of one sort or another that stood apart from the urbanized landscape around them. Thirdly, open spaces were "fluid...[in] their parameters, so that park flowed into city and city into park" (Cranz, 1982, p. 138).

Open spaces allowed for the expression of increasingly liberalizing social norms, and were themselves liberal in their physical characteristics. Yet the nascent environmental movement had not yet defined a positive connection between ecology, natural systems, the designed landscape, and the urban environment, and therefore these new open spaces continued to lack any expression of ecological intention or merit.

E. Considering a New Park Model

It has been argued that a new park model that considers natural ecology and ecological sustainability as primary and distinguishable motivating drivers of design is in the process of emerging (Cranz & Boland, 2004; Rothman, 2003; Boland, 2001). But there is considerable debate as to what exactly integration of ecological systems means in landscape design generally and urban park design specifically. How should a park designed on ecological principles function and what should it look like? This is a question of early debate in the field and no one argument has gained necessary favor over another. Yet the nexus between environmentalism, environmental ethics and landscape architecture has been well discussed in the last many decades. In order to postulate on the considerations of an ecological park, as is the intent of this thesis, it is necessary to possess an understanding of this changing relationship between design, ecology, and the environment in a temporal sense. This next section will present a synopsis of the literature as it relates to landscape intervention and ecological principles.

F. Ecology and Design: 1960s

The 1960s marked a sea change in the popular perception of human action and environmental consequence. In 1949, Aldo Leopold's essays on the natural environment in *A Sand County Almanac* set the stage for Rachel Carson's apocalyptic denouncement of pesticides in her 1962 work, *Silent Spring*, which in turn kicked off the modern environmental movement in the 1960s (Nadenicek, 2000).

As environmentalism became increasingly popularized in mainstream culture, the profession of landscape architecture "seized the opportunity to promote their work" as the link between environmental health and landscape design. During this time, the profession positioned itself as part of an "environmental solution" given its perennial engagement with nature" (Nadenicek, 2000).

Ian McHarg's *Design with Nature* (1969) codified this professional adoption of an increasingly popular environmental ethic. Nadenicek (2000) argues that this work functioned as the "guidebook for a new generation of landscape architects dedicated to cleaning up the American landscape and planning development that fell lightly on the land." In his book, McHarg wrote, "the purpose of this exploration is to show that natural process, unitary in character, must be so considered in the planning process" (McHarg, p. 65).

G. Ecology and Design: 1970s – 1980s

Environmentalism's evolution from a special interest to a broad-base concern among the general population paralleled a re-centering within the practice of landscape architecture during this period (Meyer, 2000).

Meyer (2000) argues that with the increasingly pluralistic view towards the environment came an increasingly pluralistic view on what environmentally responsive landscape architecture might reflect. Meyer (2000) goes on to argue: *"Some sought to emphasize nature's forms, others to make nature's subtle and transitory processes palpable and visible, and still others to reveal a site's entire history of cultural and ecological agents. These varied goals placed the landscape architect in a position of being site perceiver, reader, and interpreter. Straddling the line between conception and reception, controlling and initiating, the landscape architectural design process anticipated the audience's reactions, perceptions, and experiences of place."*

The 1970s marked the codification of an "Ecological Approach" to landscape design, characterized by British interpretation of Dutch designs of the Heem Parks of the 1930s and 1940s (Thompson, pp. 151-2). Alan Ruff (1979) set out the principles behind this approach:

1. Planting ceases to be a decorative feature and becomes a functional structural element in the external environment.
2. The planting is not designed for visual effect but to achieve the status of woodland in the shortest possible time.

(more)

3. The landscape is a low-cost/high-return landscape. Maintenance costs decrease as social benefits rise.
4. The landscape's users determine its form. It is a place for using rather than looking at.
5. The scheme moves towards greater ecological stability, therefore requires less and less human intervention.

Thompson (2000, p. 152) argues that the ecological approach "was an undoubted success... In many ways the precursor of today's interest in sustainability." The approach intended to design landscapes that would, over time, become self-sufficient, working with "natural processes rather than against them." Yet in contending this positivistic view, Goode and Smart (1983) explain that the ecological approach was not guided by principles of nature conservation or creation of functioning habitat. Instead, they argue, the ecological approach was nothing more than "a green veneer, which gave people the impression that there was nature in their town."

In 1984, Alan Ruff challenged the landscape profession to move beyond a purely symbolic treatment of the environment. "If we accept that the current level of ecological consciousness is part of the beginning of a long-lasting, fundamental change in attitudes and environmental values... then landscape architecture must bear a large measure of responsibility for making aesthetic sense out of this attitudinal metamorphosis" (Ruff, 1984; in Conan, 2000). Ruff goes on to say that the landscape architect's failure to respond to the growing environmental ethic in design terms "abdicates [their] responsibility for aesthetic form of the urban environment."

With the continuing maturation of the philosophies behind ecology and design, the perceived relationship between humans and the natural world as seen within the context of created places continued to change. Specifically, the argument that the designer's role was to facilitate communication between the natural and cultural worlds through established cultural mechanisms gained prominence during this time. Howett (1987) emphasized the role experience played in connecting humans to their cultural and ecological environment, acknowledging "that those bonds of concern were the prerequisite for transforming feelings into values, then into knowledge, and finally into principles for action." As Meyer (2000) illuminates, fundamental to Howett's argument "was her assertion that ecology should not be applied without mediation and that principles of ecology must be combined with the two other powerful 'critical and theoretical currents' already influencing the practice of landscape architecture (1980s) – semiotics and environmental psychology."

Complimenting Howett's (1987) assertion of the importance of an interrelationship between man and nature in an ecologically designed landscape, Lyle (1985) posits "the intentionally designed and managed ecosystem represents a symbiosis of urban and natural processes."

Yet some professionals were disinterested in, even antagonistic towards, the ecological approach. According to Thompson (2000, pp. 173-4), criticisms were of three main types:

1. Much so-called ecological design is 'superficial or tokenistic.'
2. Ecology has an important place, but should be integrated where appropriate.
3. Other social values are more important than ecology to express in designed landscapes.

For many of these disinterested professionals, the history of the ecological approach in practice has led them to conclude that "ecology is anti-design, and as such a great threat to other values which they hold dearly" (Thompson, 2000).

H. Ecology and Design: 1990s

In the 1990s, the idea of revelation through design gained prominence. Subscribers to this line of thought believed that it was inherent in the role of the designer to bring into the realm of the obvious the natural systems at play in the landscape. Proponents of eco-revelatory design believed that both a strong aesthetic and ecological repair could be achieved by bringing to the surface natural systems that would otherwise have gone unnoticed. This includes the daylighting of culverted streams and an allowance for successional change in the planted landscape, for example. Eisenstein (2001) adds that the ecological processes revealed may be natural, "in the sense that they could continue to exist without the management of humans, or they may be highly artificial...systems that need constant supervision if they are to persist in an urbanized context." Thayer (1994) captures this general philosophy most positively: "The first step towards building a sustainable world...is to open up our landscapes to view, such that we may learn from them where we are, how we are doing, and what we need to do to make the world better."

The dialogue first begun by Howett on the necessity of integrating cultural function, understandings, desires, and norms into the design of an ecological landscape was continued by John Lyle (1991) in *Can Floating Seeds Make Deep Forms?* In that article, Lyle (1991) argues that: "Ecological order is as much [in a designed landscape] as in a natural landscape, but it meets and merges with human activity and with aesthetic order as perceived by the human mind. We can know nature only through perception and intellect. Where the merging is harmonious, where ecological and aesthetic order are congruent, we have a human ecosystem...This is Deep Form." He goes on to critique contemporary efforts in designing natural landscapes: "Too often...they have responded to nature by shaping pale limitations of her forms in the picturesque tradition and in so doing have produced Shallow Form."

This leads to a wide body of literature on environmental / ecological perception. As it is applied to landscape design, this literature is best represented by Joan Iverson Nassauer. In *Cultural Sustainability: Aligning Aesthetics and Ecology*, Nassauer (1995a) argues that the key to sound ecological design is the effective communication that ecological value is the intended landscape intervention. She argues that ecologically sensitive designs often fail in the court of public opinion because they look "messy" and do not reflect the popular culture's "conventions for the way scenic landscapes should look" (Nassuer 1995a). She goes on to argue that picturesque parks are successful because they represent what popular culture believes to be an ecologically healthy environment, leading to a "contrived and frequently misleading" perception of what nature is and should be.

In her aptly titled 'Messy Ecosystems, Orderly Frames,' Nassauer (1995b) observes that many endemic ecosystems violate cultural norms of order and organization when established or re-established in an urban context. In addition, research suggests a significant negative public reaction to ecologically valuable landscapes (Gobster 1994, p. 66; Nassauer 1995, p. 162; Littlewood 1996, p. 3). Therefore, ecological spaces, especially in close proximity to urbanized areas where most people live, should be appealing aesthetic experiences (Mozingo, 1997).

Nassauer offers that the role of a designer is to provide the 'cues to care' which tell the public that an apparently unordered landscape is part of an intended intervention. "Orderly Frames," she says, "can be used to construct a widely recognized cultural framework for ecological quality." These 'orderly frames' provide a "recognizable aesthetic" to cue the public that the ecological intervention is one worth caring for. In completing her argument, Nassauer (1995a, p. 69) offers: "Landscapes that are ecologically sound, and that also evoke enjoyment and approval, are more likely to be sustained by appropriate human care over the long term. In short, the health of the landscape requires that humans enjoy and take care of it."

I. Ecology and Design Today: Sustainable Landscapes / Sustainable Cities

Polls indicate that fifty-eight to seventy-three percent of Americans consider themselves environmentalists.[6] This is a remarkable statistic. But what does this mean to the ecological sustainability of cities? Does it mean anything?

John Lyle in *Regenerative Design for Sustainable Development* (1994), foresees that "if we can manifest the inherent elegance of ecological processes in visible forms, those forms will become symbols for the times" and will be "meaningful, even beautiful, in terms of process and context." (Lyle, 1994, p. 45) Yet Mozingo (1997) adds that current practice of ecological design falls short of both meaning and beauty. For ecologically based design to move past its "rather bland condition" and "coalesce as an environmental vision," "ecological landscapes must become iconic." But how this iconography is defined is a question of open debate. Eisenstein (2001) begins a consideration on this need for memorable icons to define a unique and identifiable sense of place. "As ecological processes are made visible through design..., designers should think about how the unique building and landscape forms that arise from each local ecological context can form the basis for place values to flourish." "As these values emerge," Eisenstein (2001) continues, "people will develop more intimate cultural associations with the features of the landscape that make their place special – in other words, the same features that manifest and make meaningful their particular tangible relationship to the larger natural world."

Ecologically designed landscapes, in their ability to teach or impart knowledge of local ecological processes, generate a new literacy that is relevant and specific to the urban condition. Eisenstein (2001) argues that urban landscapes have "extraordinary potential to reveal the tangible relationships between urban residents and the natural environment." In referencing Nassauer's 'cues-to-care,' Eisenstein (2001) adds that "...ecologically designed urban landscapes should communicate cultural 'cues' for sustainable behavior; these landscapes should be implemented in partnership with ecological education efforts; and the cultural meanings and ecological place values created over time will be fundamentally local." With this newly imparted, locally specific literacy, the sustainable future of the city becomes more readily attainable, he argues.

Combining natural ecology with cultural ecology is an important turn in the philosophy of ecological design. Dolores Hayden in *Power of Place:*

6. Gallup poll, 1989 and 1999.

"Urban landscape history shows that simply trying to protect nature has very limited possibility of success against the constant production of urbanized space. Understanding this interplay suggests that common cause with other groups concerned with the presence of the past may be a very useful strategy for environmentalists...Cultural landscape history could become a part of all such ventures to connect efforts to nurture green spaces with a broader understanding of the urban past" (Hayden 1995, pp. 62-63, as cited in Mozingo (1997)).

Recent consideration has been paid on the ability of urban parks to provide culturally and socially engaging program, which the ecological park purports to do by framing it within a construct of designed ecological value (Boland, 2000). Walker (2004), in describing what he calls the "New Park," argues that these landscapes are vital to both the ecological and social health of the urban environment and should be reconsidered in that light. Their program should help youth "choose rewarding paths to adulthood," assist in helping "new entrants to the workforce find productive jobs," help community residents "improve their health" through exercise and mental challenge, and encourage civic participation and neighborhood improvement by encouraging participation in park planning and management.

Paul Bray (2004) believes that "new" parks form the basis for defining the character of the city. He argues that in a world where urban places look increasingly alike, where 'sameness' muddles the vibrancy of city, an "enlarged notion of park that highlights overall cultural and natural themes, fosters linkages and manages...integration of conservation, education, recreation and sustainable development" stands to redefine and create quality of place.

Louis Mumford perhaps most eloquently presages this idea in a 1938 report:"Park planning cannot possibly stop at the edges of the parks. The park system is thus the spearhead of comprehensive urban planning."

J. Synopsis of Contemporary Work:

Nadenicek (2000, pp. 150-1) disaggregates the contemporary philosophy of ecologically designed landscapes into two categories:

1) *Separation through restoration.* The emphasis of this work is on restoration guided by the separation of humans and nature. This work tends to "spark a sense of guilt and confession for the destruction wrought on the landscape by human interaction."
2) *Integration.* This work tends to focus on the interconnectivity between human and natural communities.

The language used to describe a design charrette for a site in Surrey, British Columbia, illustrates these two philosophies:"There are two ways to approach the question of landscape sustainability. You can use the design language of 'mitigation' and create some sort of benevolent buffer between nature and the city; or you can use the design language of 'integration' and try to fuse nature and the city. We chose to use the latter" (Condon, 1996).

Three parks - one in the United States, one in Canada, and one in Europe - represent the spectrum of this philosophical divide.

***Schöneberg Südgelände Park**, Berlin.* An abandoned rail yard in Berlin, Südgelände Park represents a post-modern programmatic insertion - namely, none at all. Here, no design was deemed acceptable or necessary, instead the programming of the landscape relied upon the interplay between abandoned remnants of cultural practices and reintroduced natural ecologies to define a truly unique park aesthetic. Trains that had for decades used the rail yard deposited seeds from their travels all over Europe, creating an ecological museum, of the natural fauna of the continent. The park itself was divided into two sections. A nature reserve that disallows any human presence, while a landscape reserve that is open to a limited public.

***Roxhill Bog Park**, Seattle.* In September of 2000, accumulations of fill and nonnative turf were removed from a portion of the park to reveal an endemic peat bog buried since the late 1960's. With the help of a significant volunteer effort, 20,000 native plants were replanted in the bog and surrounding uplands. The community-initiated planting of this area was designed to help restore natural habitat and create a new educational resource. Recreational amenities tied to the unique character of the park are also programmed, including trails and open areas. The restoration of the wetland was designed to improve water quality and steady water flow to a creek that flows well beyond the site boundaries.

***Parc Downsview**, Toronto.* A new park recently designed for the city of Toronto, the 235 hectare Downsview park is guided by five principles: sustainability, stewardship recreation, legacy, and beauty. Downsview embraces the idea of landscape as process, where no necessary preconceived idea of a final solution – a final ecology in this context – is promoted. Instead, by creating a self-sustaining environmental, social, and economic ecosystem where the natural ecology is allowed to mature and community input and stewardship is fundamental, the park is designed to evolve as social and biological needs change. While this design concept has been chosen by the city of Toronto, funding for its construction is in the process of being secured.

K. On the "Ecological Park"

A recent buzzword has emerged in the field of park planning that some say reflects a changing cultural ethos towards the relationship between cities and the land. Others dismiss this call saying it is nothing more than fancy word to describe the status quo. Here, we concern ourselves with Ecological Parks. Are they truly ecological? Or, are they more ecological than their picturesque counterparts? To answer these questions, it is necessary to understand what *ecological* means in a designed landscape set within a highly urbanized context. Is it natural ecology that is implied, or is it a cultural ecology – perhaps even a combination of the two. Or is it the implication that a sustainable use of resources makes an Ecological Park ecological? In answering these questions, yet another emerges. Is the Ecological Park a new model in park design, as some would argue, or is the commonality between *Ecological* Parks nothing more than the use of this increasingly ubiquitous word?

Using the methods described in the next chapter, Xochimilco Ecological Park and Crissy Field, examples of ecological parks, will be examined in an attempt to answer the preceding questions. Two non-ecological parks, Golden Gate Park in San Francisco and the Back Bay Fens in Boston, will also be considered in order to draw comparative insights.

Chapter 3. Case Study Methodology

A. Introduction

Q: Does the ecological park reflect a sea-change in the design and function of an urban park or is it merely a contemporary aesthetic expression of the picturesque?

This study assembles a matrix of ecological indicators from the literature, both of natural and cultural ecologies, relevant to urban landscapes. Using a case-study approach, this matrix is then applied to two ecological parks, Xochimilco Ecological Park in Mexico City and Crissy Field in San Francisco, California as well as to two picturesque parks, Golden Gate Park in San Francisco and the Boston Fens / Muddy River portion of the Emerald Necklace in Boston, Massachusetts.

B. Measurement of natural and cultural ecology using supported indicators:

What is an ecological park? To answer this, the "ecologies" of the landscape will be deconstructed and analyzed. In order to deconstruct the parks studies in this thesis research, two levels of analysis will be conducted. The first will use the literature on landscape ecology to formulate a running list of indicators of **natural** ecologic viability against which each park will be measured. Would 'nature' consider the ecological park ecological? This analysis will be referred to as the *positive* analysis. The second level of analysis, or what will be called the *contextual* analysis, will look at the role of the park in terms of the broader landscape of the city, drawing from a more socially-oriented body of literature. Is the relationship of the ecological park to the city any different?

i. Natural – *Positive* Analysis

In reviewing the vast literature on ecological measures of the landscape, a series of indicators have been identified that in a general sense suggest the capacity of a landscape to support a sustaining ecological system. In order to identify these indicators, it was first necessary to define the meaning of an ecological system. Given the urban nature of these parks, grater emphasis was placed on systems, repair of degradation, flora, and habitat for smaller fauna. It is important to note that these indicators are in themselves only indicators, demonstrating likelihood, but not necessarily fact, of ecological merit.

While there is a wide body of literature supporting the use of indicators, (Botequilha, 2002; Forman, 1999, 1995; Jongman, 1999; Ludwig, 1999; Collinge 1996; Schumaker, 1996; O'Neil, et al, 1988; Forman & Godron, 1984), there is a limited, yet increasing, body of literature that questions the ability of landscape measures to predict ecologic viability in a consistent manner (Corry and Nassauer, 2005; Tischendorf, 2001). This dialogue arises specifically in the context of alternate land use scenario modeling and the impact on ecological prediction. Because this study is not intended to predict the ecology of ecological parks but to instead identify whether these parks are designed in such a way as to promote certain ecological principles, the importance of this emerging debate to this thesis.

An underlying principle in the compilation of these indicators was that they not be ecosystem or landscape specific. Clearly, the ecological condition of a coastal Mediterranean climate, as that found in the second case study, differs greatly from that found in the Mexican altiplano, as both the

literature and empirical data would suggest. Yet the same literature supports generalizable, non place-specific indicators that can be applied to most landscapes. While it is agreed that much more detailed and analytical measurement could be conducted to measure the ecological viability of each park, such detailing is not necessary when the purpose of this study is only to detect relative ecological merit vis-à-vis the picturesque.

ii. Cultural – *Contextual* Analysis

Explorations on the relationship of cultural values to ecological processes are well documented (Gross, 2003; Nadenicek and Hastings, 2000; Meyer, 2000; Nassauer, 1997). According to Gross (2003), "the traditional picture of a rigid distinction between the sphere of a natural science of 'hard facts' and a citizen science of so called soft knowledge does not fit into the concept of ecological restoration." Ecological restoration, in a comprehensive sense, Gross (2003) would argue, is premised on the active involvement of human actors who bring with them cultural histories and constructions. Further, ecological restoration is a process through which cultural aspirations, academic knowledge, and 'natural' powers interact and synergize to produce an outcome. Through this paradigm, the level of participation in an immediate sense, and social integration in larger sense, in the ecological restoration and subsequent park program are indicators of a strong and sustainable cultural dynamic. Measures were selected to represent this powerful concept.

iii. Presentation of Measurement

The design and programming of each park was measured against a subjective 4-tiered scale for each indicator. Although subjective, this measurement was guided by personal visits and interviews with individuals actively engaged in the planning and operation of each park. In order to ease comparison of these measurements across parks, indicators that were graded as 'high' were given four points, those that were graded as 'medium' were given two points, those that were graded as 'low' were given one point, and those that were graded 'none' were given zero points. A sum total was then calculated for each park. Although a weighting of each indicator might have been an improved methodology, providing a more useful comparative value, it was not feasible, given the limitations of this research, to design and defend such a methodology. Instead, an absolute value was used and is useful as a first order analysis. Further discussion on a second order analysis will be presented in Chapter 9.

With this said, the following consideration was given in measuring each park's attention to each indicator:

Habitat: The level at which endemic or self-regulating habitat was created.

Complexity: The level at which increased complexity in patch dynamics was created.

P.A.R.: The level at which the perimiter-to-area ratio matched endemic site conditions.

Segregated Use: The level at which active recreation and habitat were separated.

Regional Connections: The level at which regional habitat connections were created or preserved.

Native Vegetation: The level at which native vegetation was used in the landscaping program.

Hydrology (surface): The level at which surface water was integrated into the design so as to be replicating of endemic conditions and/or self-regulating.

Hydrology (loop): The level at which the hydrological cycle was addressed.

Fitness: The level at which the park program fits to the site – culturally and ecologically.

O&M: The level at which sustainable management practices are used.

To Stasis: The ability of the park to move towards a state of decreasing maintenance/ intervention requirements.

Pedagogy: The level of didactic experience provided through the park program.

Stewardship: The level of involvement and participation promoted.

History: The level at which historic elements of the site are explored.

Finance: The level of financial sustainability.

iv. Qualifier on Methodology

An important qualifier to make is that this study does not conduct a true, scientifically based, ecological assessment of the natural landscape nor does it conduct an exhaustive analysis of human or cultural ecology. Instead, in drawing from the literature, personal site visits and observations, and interviews with informed professionals, this study applies generalizable indicators of both the natural and cultural ecologies in considering and exploring the significance of *ecological parks*.

D. Selection of Case Studies

The selection of so-called ecological parks was guided by a simple methodology. Xochimilco Ecological Park is considered within the circuit of landscape and urban design awards as a truly revolutionary and emblematic notion of park. Secondly, both Galen Cranz and Michael Boland, early proponents of the ecological park model, cite Crissy Field as an excellent example in practice of this new park ideology.

In considering the case studies against which this study might compare the ecological park, Cranz's (1984) illumination is useful. Of the four major municipal park typologies that have existed since the municipal park movement began in the latter half of the 19th century, Cranz argues, only one, the picturesque, referenced nature and natural systems in any significant way. How this referencing was done and what the implications of that referencing are on ecological merit are the subject of this study. For this reason, it was necessary to select case study sites that captured the array of ideologies vis-à-vis natural systems within the picturesque movement.

Two parks were selected to capture this reflection. Golden Gate Park in San Francisco, designed by William Hammond Hall, is a physical representation of early picturesque philosophy. The ideas, methods, and outcomes of this park are similar to those of Central Park in New York, Prospect Park in Brooklyn, Franklin Park in Boston, and Jackson Park in Chicago. All referenced nature in a visual way and used natural site conditions to varying degrees to influence and guide the superimposition of a pre-established visual and philosophical ideal.

The original condition of Boston Fens and associated Muddy River Improvement, as elements of Frederick Law Olmsted's Emerald Necklace, represented a latter stage of picturesque philosophy. As one of Olmsted's last municipal commissions, it reflected a greater understanding of regional connection and the function of natural systems.[1]

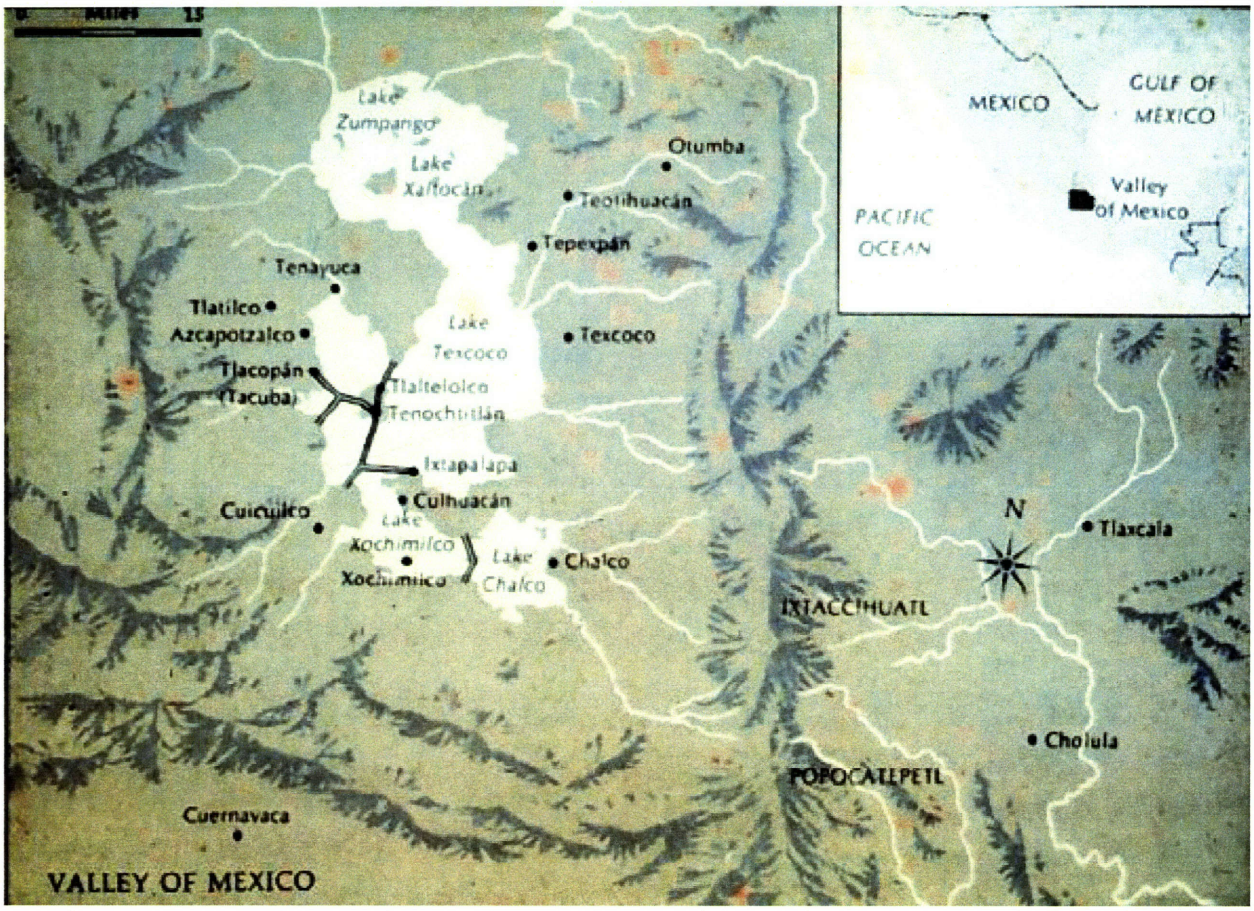
1. It is important to note that today's Fens is drastically different than that designed by Olmsted. To account for this, analysis will be conducted on both historical and contemporary conditions.

Chapter 4. Xochimilco: Ecological Repair and Cultural Preservation

"...this park of 270 hectares is only a small part of what is surely one of the largest and most ambitious efforts to restore a physical and cultural setting undertaken by humankind."

–Alex Krieger, Veronica Green Prize Jury Report

The following chapter on Xochimilco provides this study's first detailed exploration of an ecological park. In analyzing the contemporary literature in a previous chapter, we are left with an emerging understanding of the importance of a designed conjunction between the natural and cultural landscapes. Xochimilco presents a rather dramatic example of this type of design intervention, where the end result was the preservation of a historical landscape artifact and the restoration of a hydrological system – both through the provision of a park program. This chapter will begin with a tracing of the ecological history of the landscape upon which the park was later sited, and will end with a discussion of the motivations behind the design of the park and its planning ramifications. This exploration is intended to begin the construction in the mind of the reader as to what an ecological park might be and what possible implications on cities it might have. This story will be continued in the subsequent chapter, where a second ecological park is considered. For now, let us begin with Xochimilco.



Pre-hispanic lake condition in the Valley of Mexico. Note Xochimilco Lake to the South. Tenochtitlan, in Lake Texcoco, was the Aztec capital city. (Lopez, 2004).

A. Introduction

Xochimilco Ecological Park is in many ways considered the 'poster-child' of the ecological park 'movement.' It is cited by ecological park proponents (Cranz & Boland, 2004, Boland, 2001) as a demonstrable example from which to learn, wining numerous urban design and park planning awards, including the 1994 ASLA Merit Award, the Veronica Green Prize in Urban Design, and the Waterfront Center Design Award, among others. That is not to say that all are in agreement on the natural ecological value of the park (Wirth, 1997) while others would suggest that the actual state of the natural ecology is less important than the designed intent (Eisenstein, 2002). In the course of this next section, the presentation of this case study will focus on both the natural and cultural ecologies of the site, considering how these elements influenced both the design intent and outcome of the park.

Use of words: Natural ecology encompasses the biotic and abiotic systems, including flora and fauna and energy and water flows. Cultural ecology encompasses the human-based systems with respect to the landscape, including perception, interaction, education, and history. The cultural landscape, tied to cultural ecology, reflects the human-induced interactions with the land.

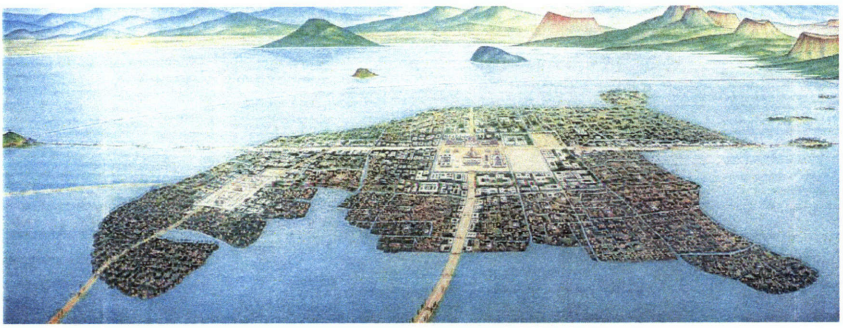
B. Context

When the Spanish conquistadors arrived in 1519, they encountered what must at first seemed like a fabulous mirage: the Aztec capital floating in a vast lake—actually a collection of five lakes—supporting a regional population approaching 200,000, more than twice that of Rome.

Accounts relayed back to Europe described this capital city as being more splendid than Venice with its interlaced system of canals and lakes and floating gardens many hundreds of kilometers long. Within these canals and lakes, the Aztecs had engineered a maze of 'floating' islands, or *chinampas,* upon which fertile soil dredged from the water's bottom allowed for up to three crop rotations each year. Over the centuries, as the ecology of the landscape matured, these floating islands grew to be fixed in place by the roots of trees and shrubs, producing, over time, an ecosystem intricately tied to water, and inexorably tied to culture, in this, the altiplano of the Mexican desert.

As one might imagine, this complex and intricately woven relationship between land and water systems is not endemic to the Valley of Mexico, at least not in its agricultural manifestation created by the Aztecs. Lake Xochimilco was one of a series of ancient endorheic lakes located in the valley, where no outflow of water occurred either superficially or subterraneously. These lakes included the brackish Lake Texcoco, Lake Zumpango, and Lake Xaltocan and the fresh water Lake Chalco. Early Mesoamerican cultures, including the Teotihuacanos, the Toltecs, and the Aztecs, engineered a series of canals that interlaced these lakes, providing potable water for both irrigation and drinking. Yet on the meso scale, the hydrological system was not significantly altered from its pre-human condition (Cassio, 2006).

This mature, stable, and self-sustaining engineered landscape grew to support an incredible richness in biota, becoming arguably, a complete ecological landscape in its own right. It is in fact this inter-relationship between cultural and ecological landscapes that formed the basis for a collective and definable identity for the city. While the relationship between nature and culture will be explored in greater detail in a section to follow, the inexorability of the human condition from the physical landscape of the city is important to keep in mind. As Mario Schjetnan, the chief designer of the ecological restoration in Xochimilco philosophizes, "the mystery and fascination of Xochimilco" is that it is at once "a place created by man in the 10th century" and "a living archaeology" for



Rendring of Aztec capital city in Lake Texcoco.

City meets *chinampa*.

us today of "a perfect manmade ecological system," that has become "deeply embedded in our collective consciousness."[1]

The environment described by those rather romantic depictions first relayed to Europe comparing the Aztec capital to Venice in the 16th century would come under threat in subsequent years during colonization. As the realities of an urbanizing community increasingly found themselves in conflict with historic cultural mores, the ecologies of the landscapes suffered. The vast lacustrine[2] environment, which by the 1950s had been reduced to a small vestige around Xochimilco, was for the first time seriously threatened with extinction. The damning, siphoning, and filling of lakes

1. P.C., January 2006.
2. Lacustrine. Habitat within, or somehow associated with, a lake environment.

created new lands for urban development while the associated demands for increased water supply lowered the valley's water table precipitously. In a dramatic series of events, the rapidly urbanizing areas around the periphery of Xochimilco produced such great amounts of untreated sewage, storm runoff, salts and heavy metals, that the productive capacity and ecological value of the remaining lake system failed. By the early 1980s, what had for two millennia been a self-sustaining social, agricultural, and ecological landscape, seemed destined for complete destruction.

Xochimilco lies in the southeastern rim of the Valley of Mexico. It is here that the most abundant water resource, both historically and presently, in a highly arid land is located, producing almost 10% of the city's drinking water (Menéndez, 1995). Present day Xochimilco is some 127 square kilometers; 79 square kilometers of which are agricultural and forest land; 12 square kilometers are occupied by canals and lagoons; and 36 square kilometers are urbanized.

Lake Xochimilco along southern edge of the Valley of Mexico.

C. The Ecological Problem:

The most serious environmental problems for Xochimilco were related to the simultaneous exploitation of the aquiferous water resources that have nourished the canal system for millennia and the contamination of surface water. This exploitation began in 1913, when the historically abundant springs were first capped to provide the downtown area (D.F.), some 18 kilometers to the north, with inexpensive potable water (Moreno Mejía, 1987). In the 1950s, the D.F. accelerated the extraction of water to meet the needs of an ever-densifying city by drilling wells deep into the groundwater table. This drilling and subsequent pull of water dried the springs, depriving the canals of their primary source of perennial replenishment.

In addition to the extraction of water for municipal water supply, two related factors further enhanced the degradation of the aquifer feeding the *chinampas*. With the increasing urbanization within the Valley of Mexico and the associated deforestation this urbanization had created, the Xochimilco region now receives 30 percent less precipitation and slightly higher average temperatures than it did at the beginning of the 20th century (Wirth, 1997). Just by looking at the population explosion in Mexico City - from 345,000 in 1900, 3.2 million in 1930, 16 million in 1970 and a projected 24 million by 2010[3] - the impacts on the natural landscape are clearly imaginable. In addition to this microclimatic shift and drop in rainfall, the increase in impervious surface has exacerbated the inability of the aquifer to replenish itself.

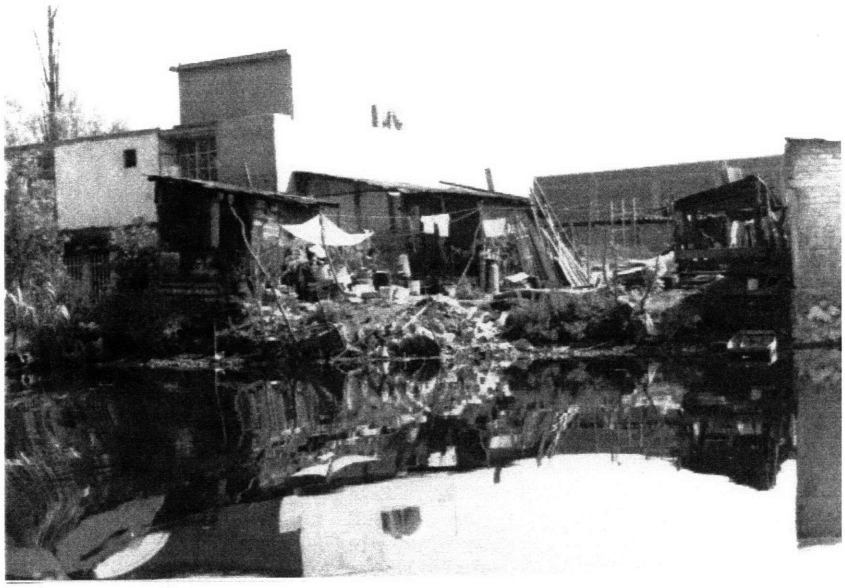
In a well-intentioned but ultimately catastrophic effort to replace the water lost from the springs, the D.F. government began channeling raw sewage *(aguas negras)* into the canals. The residents of as many as 20,000 informal dwellings added to this sewage input with their use of the canals as drainage for all household discharges (Wirth, 1997).

What had prior to 1950 been a somewhat invisible, though progressive, trend towards declination, became strikingly apparent by the 1970s with the widespread collapses of canal walls, evaporation of entire sections of lakes, algal blooms and the drifting of noxious smells for many kilometers downwind of the *chinampas*. In addition, on a geomorphologic scale, land subsidence became a serious problem as the hills surrounding Xochimilco began sinking at a rate of 40 centimeters per year (López Escalente, 1995).

These factors – pollution, deceasing water supply, rapid urbanization, and the collapse of the topographical features of the ecosystem – along with the economic hardship incurred by families whose only source of income was farming in the *chinampas*— (and catalyzed by an impending presidential election) provided the final impetus for both municipal and national authorities to get involved.[4]

3. Population trends from Demos. 1991; (4)23-4.
4. Conversation with the administrator at Xochimilco stressed the political connection to the restoration (and hence minimizing the importance of an emerging environmental ethic). Large-scale infrastructure interventions are often a 'sure way to get elected' into the Mexico City political system.

Dessicated *chinampa*. ca. 1980s. (Lopez, 2004).



Informal settlement along canal. ca. 1980s. (Lopez, 2004).

D. Call to Action

Because of mounting internal and external political pressure to halt the deterioration of Xochimilco, the D.F. government began the undertaking in the late 1980s of a project aimed at rehabilitating the region in a "holistic" manner.

In 1990, the *Movimiento Ecologista Mexicano* (MEM) held a press conference with other environmental organizations, groups of ecologists based in Xochimilco, owners of the *chinampas (los chinamperos)*, and faculty from the Universidad Nacional Autonoma de Mexico (Wirth, 1997) announcing a campaign to save the hydroagriculture and ecology of Xochimilco from the "greed of the developers and those selling land illegally" as they called on the public to support their effort (UnoMasUno, 2/22/90:11).[5]

5. While this study will not delve into the political dynamics at play during this period, it is important to note that there were growing calls for land reform by residents and traditional farmers threatened by encroaching development.

This coalition of environmental groups and local residents had been spurred to action by a series of announcements by the D.F. government in 1989 that called for the "ecological rescue of Xochimilco."

The first of these public announcements, the Xochimilco Holistic Recovery Agreement in early 1989, largely a conceptual exploration, identified the following four strategic areas that any effort should address:

- Hydrological restoration and overall sanitation
- Agricultural recovery
- Archaeological and historical restoration
- Tourism and commercial planning consistent with the region's historical and cultural characteristics.

From this, the master plan outlining the following project goals was released on November 21, 1989. It called for:

- Restoration of the lake area ecosystem
- The maintaining and increase of the valley's natural water supply through major hydraulic works including the construction of wastewater treatment plants and a coordinated effort to collect stormwater for aquifer recharge
- Reactivation of the traditional hydroagricultural system of *chinampas* and the assistance in the marketing of produce
- Redefinition and enforcement of zoning bylaws
- The enlargement of green/open space
- Providing for architecture in keeping with the area's physical beauty and predominant landscape

The municipal plan, designated as the Plan to Rescue the Ecology of Xochimilco, was formally announced by President Carlos Salinas de Gortari on November 21, 1989 and called for major hydraulic works for water treatment, expansion in the agricultural sector, historical and archeological studies of the *chinampa* system, improvement in the sanitary conditions of residences, and the introduction of separated sewers to conserve storm water for diversion to aquifers.

A year later on December 4, 1990 the government signed the "Accord of Democratic Cooperation for the Ecological Rescue of Xochimilco" which included specific plans for protection of the agricultural land by expropriating three *ejidos* (communal farms) to restrict urban development, the construction of two lagoons to reduce flooding and limit the sinking of land, and provide for advanced treatment of sewage water pumped into the canals.

E. Xochimilco Ecological Park

The Xochimilco rescue project in totality encompasses 3,000 hectares, 300 of which are the Ecological Park.

Mario Schjetnan, the landscape architect commissioned for the design of the park, describes the created landscape in philosophical terms:

"...the Xochimilco park is not a sentimental evocation of the past. It is a space geared to the present and future, because it deals with the present problems and aspirations of the community of Xochimilco, of its surroundings, and of the city at large. It also looks into the future as a created natural space that will grow, evolve, mature, and be a permanent open space that aspires to both form and conform with the city."[6]

The ecological park was an attempt to provide for a place through which access to the larger Xochimilco district was possible in both a physical sense but also in a more experiential or metaphysical sense as well. It was about providing the visitor with a recreational experience defined by a pedagogical interaction with the space around them. It was about creating a living, breathing, ecologically functioning outdoor museum that provides for leisure but in a way that connects the visitor to the land beyond the traditional sense of recreation.

While the physical, or demonstrative incorporation of natural ecology played an important aspect in the design of the park, the reflection of cultural ecologies was perhaps equally prevalent. These cultural ecologies, defined most prominently by the human history and archaeology of the landscape, were integrated into the programmatic aspects of the park and physical characteristics of its layout.

"When we started to design the park, we began at the largest scale. We started to see the cosmography of the major mountains, which were, we found out, important religious places in the pre-Hispanic culture. We began by relating the main axes to the major mountain Cerro de la Estrella, to the north. Another important axis connects the park with the historical district of chinampas. With the establishment of the lake system, our objective was to recover the main perspectives that must have existed until the 18th century, with views of lakes, mountains, and trees related to this enormous landscape."[7]

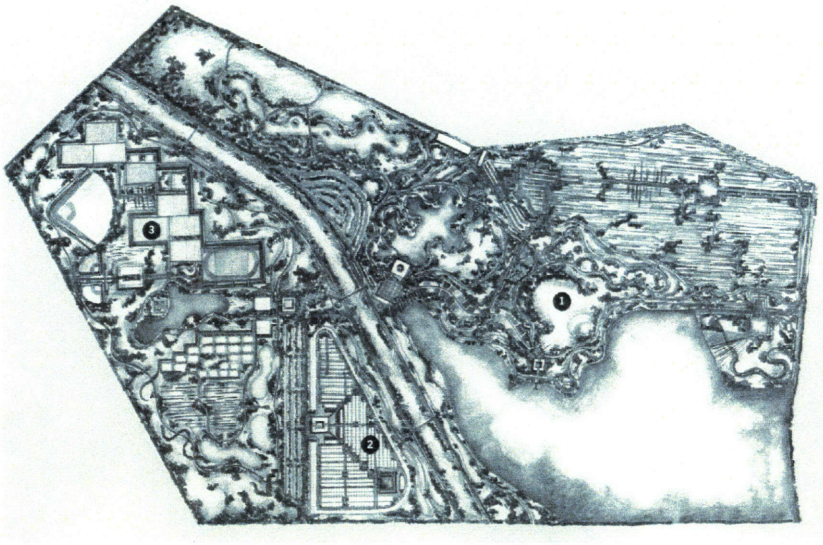
The ecological park consists of what are called its natural area, a didactic area, a botanical garden, a recreational area, the *Paseo de las Flores* (Flower Walk)[8], and the lagoons and embarcaderos, which establish a connection to the extended lake system.

As mentioned earlier, the introduced *chinampa* landscape has very little 'natural' about it, yet historically, it was able to support quite a richness of different biotic elements. The repaired version of this system within the Ecological Park reflects certain elements of this richness, both designed and organic.

F. Study Setting

The purpose of this study, beyond exploring the specifics of the park in terms of design intent and demonstrated outcome, is to postulate whether this park, in a larger aspect, demonstrates a new ecological ethic in the creation of public space. Is there some element in the qualities of the park

6. Schjetnan (1996a).
7. Mario Schjetnan in Veronica Green Prize.
8. Flower Walk is culturally significant because it has become the primary agricultural crop in the chinampa system.

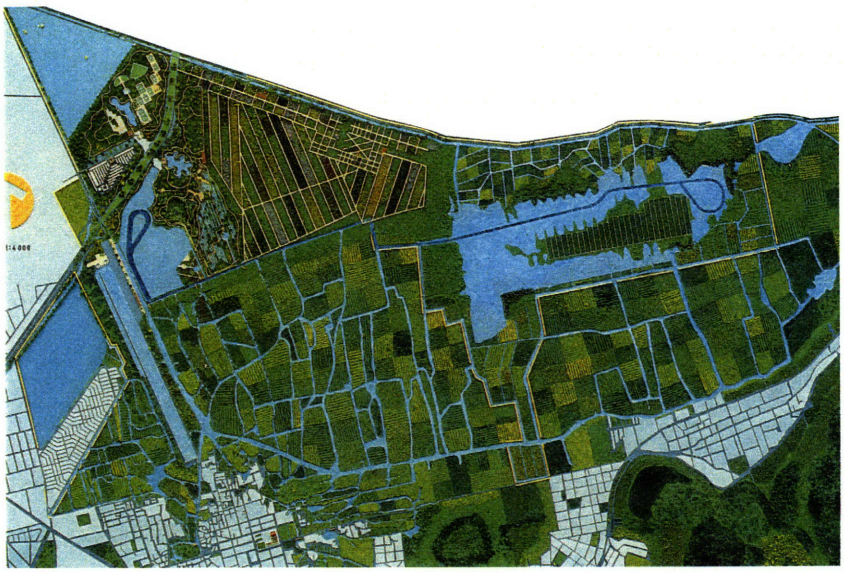


Schematic plan for Xochimilco ecological park. Zone 1 highlights ecology, Zone 2 allows for active recreation, Zone 3 is the flower mart. (Schjetnan)

Culture and ecology center. Note constructed lake in foreground. (Mex 4 You)

that identifies, or reflects a notion of an *ecological* landscape? But what is an ecological landscape and how can one identify it?

In looking at the dialogue used in talking about Xochimilco, there seems to be specific, repeated reference to both a natural ecology – water, plants, birds—and a cultural ecology – people, history, custom. While the use of the word *ecology* to encapsulate these elements of the landscape is not contended, the relevance of this study is to determine whether the representation of these ecologies, or perhaps the concerted intent in using these elements as the principles defining the landscape, is any different from accepted practice in the world of park design. If in fact we suppose that the traditional, or picturesque urban park is not necessarily designed to promote ecology, can we say that ecological parks, as demonstrated by Xochimilco, are then a departure because they do attempt to promote certain ecological functions?



Ecological park (upper left quadrant) and connecting portion of chinampa zone (Schjetnan).

In order to address these questions, two levels of analysis will be conducted. The first will use the landscape ecology literature to formulate a running list of indicators of natural ecologic viability against which Xochimilco will be measured. This analysis will be referred to as the *positive* analysis. The second, or what will be called the *contextual* analysis, will look at the role of the park in terms of the broader landscape of the city.

While this study so far has presented the Xochimilco Ecological Park within the context of a grander landscape project, the indicators will be measured against the conditions within the park boundaries, unless noted otherwise.

G. Application of Ecological Analysis

[A summary chart is provided at the end of this chapter.]

1. Positive Analysis: Natural Ecology

Indicators

i. HABITAT DIVERSITY

Water: The primary creation of habitat was for migratory water foul. Specific plantings in and around the lagoons known to attract birds were used, including a variety of grasses and reeds. Migrating birds have appeared and have been returning each year in greater numbers for more than a decade.

No attempt was made to support below-surface habitat other than specific mitigations to ensure water quality.

Land: Because of the arid quality of the landscape, larger assemblages of bushes and medium-grade groundcover, which are both associated with birds, smaller mammals, and reptiles, are not likely to survive without irrigation and were therefore not included in the design.

Because of the lack of connection to larger patches, the park and the overall *chinampa* system have little capacity to support larger mammals. As a result, no design intent for medium to larger mammals was identified within the boundaries of the park.

ii. LAND MOSAICS

Complexity. Heterogeneity in patch dynamics is better than homogeneity (Selman, 1993; Forman, 1995). Xochimilco has made attempts to provide distinct yet connected patches of moderate internal complexity and irregular edge condition.

Perimeter-to-Area Ratio of patches: Increased fragmentation of habitat patches correlates in a physical sense with an increased perimeter-to-area ratio (PAR). In other words, an increasing ratio of this sort leads to a decrease in the core of the habitat, which the literature suggests correlates with decreased ecological viability (Dramstad et al, 1996). Patches within the park are small and therefore contain higher PARs, suggesting a decrease in ecological richness of animals. Yet it is also possible to consider the park as a patch relative to the entire Xochimilco restoration area, in which case the PAR is much lower. For this reason, comparability to other ecological parks lacking the same regional dynamic is questionable.

Disaggregation of human and natural use. Attempt was made to disaggregate and physically separate parts of the landscape used for active recreation from passive uses. On the north side of the peripherical highway, which is closer to more densely settled areas and isolated from the larger *chinampa* system, active recreational uses were concentrated. Here, elements of the reform park – playing fields, field houses – as well as the more characteristically urban elements of the park – the flower market and running trails—are also located. Across the highway, and contiguous to the greater lake system, is the botanic garden, the ecological center, the nature reserve, and the portion of the restored *chinampas* and canals within the site. This area, the literature would

Along a *chinampa*. (Power)

suggest, contains greater possibility for ecological richness because of the softer and more diffuse interaction it has parkgoers. It is in this portion of the park that the greatest concentration of wintering migratory birds can be found.

Regional Relationship: Connectivity between spatial elements and habitat patches to surrounding environments enhances the biological richness of a site. The design of the park was done in such a way as to promote, to as great an extent as possible, the seamless integration of the surrounding naturalized landscape (the *chinampas*) and the surrounding hills, leading to a grater possibility for an ecologically rich environment. (Forman, 1995)

iii. USE OF NATIVE VEGETATION

A portion of the site was planted with native vegetation, including a variety of succulents and bushes. Most trees, with the exception of the Ahuejote *(Salix bonplandiana)* tree, endemic only to the Xochimilco area, were planted as specimens and therefore offer only limited habitat value. Continued maintenance and successional plantings, to a majority extent, will be required as the planting program is not self-replicating. Overall, the planting characterization is poor.

iv. HYDROLOGICAL SYSTEM

Surface Water: As discussed previously, attention to the water cycle was a primary concern in both the design of the park and of the restoration of Xochimilco. Within the boundaries of the park itself, both surface and subsurface water are addressed. The created lakes were designed and have acted to collect and percolate seasonal rainfall into the underlying aquifer while providing for recreational amenity, habitat, and visual pleasure. The only input of water into these lakes is rainfall, but surface outputs channel this water throughout the park and ultimately into the *chinampas*.

Water Loop: In order to address the depleting aquifer, attention was paid to repairing the water-cycle loop between pulls for drinking water and groundwater recharge. The intent was a no-net-loss policy for the aquifer. Both the collection of rainwater that would have otherwise flooded surrounding communities and the return of tertiary treated wastewater from two new treatment plants into the *chinampas* are important elements of the design. The return of this water flows somewhat ceremoniously through three architectural fountains that discharge into the lagoons. The effects on water quality, specifically bioaccumulation of substances not treated for by the wastewater plants, is unknown.

Irrigation: While not specifically delineated in any of the park master plans, widespread irrigation of the park landscape is minimal if not nonexistent.[9] As a result, the landscape of the park changes seasonally in concert with the landscape of the surrounding hills.

Impervious Coverage: Impervious surface coverage is minimal.

9. Attempts to secure a copy of the state-sanctioned program and maintenance plan have been unsuccessful.

Using trees to stabilize canal edges (Power).

v. SITE FITNESS

Physical aspects of the site, such as size, topography, aspect, climate, soil, hydrology, vegetation and wildlife, together with cultural and social influences, and current uses combine to give a site its distinct character. An ecological approach takes prevailing site conditions at its lead. Careful attention to integrate both the hydrological system and cultural elements of the landscape add to the fitness of the program at Xochimilco.

vi. OPERATION & MAINTENANCE

Maintenance. Increased maintenance of the landscape to suit aesthetic desires often correlates with decreased biodiversity. While the institutionalized maintenance plan could not be secured, anecdotal evidence from conversations with park managers suggests limited maintenance in specific areas because of ecological issues and limited maintenance in other areas because of lack of access to capital. In a general sense, while some patches, specifically surrounding the water bodies, are left to develop according to natural processes, the majority of the landscape is maintained so as to maximize human accessibility and use.

Fertilizers and pesticides. Clearly, the use of fertilizers and pesticides, aside from simplifying the ecological network and contaminating the landscape, is in conflict with desire to promote species diversity and general ecology. Xochimilco Ecological Park does not use pesticides or fertilizers.

vii. TOWARDS ECOLOGICAL STASIS

In a very generic sense, an ecologically designed landscape should promote greater ecological health rather than detract from it. While this is a difficult concept to quantify, an ecological program should, in a qualitative sense, provide a spatial element through which ecological repair and/or creation of habitat is more possible than without it. Xochimilco clearly meets this goal, as its programmatic functionality was intended to assist in the repair a hydrological system, remove toxicity in the soil and water, and to move forward in a positive sense to recreate the previously naturalized landscape ecosystem.

2. Contextual Analysis: Cultural Ecology

i. PEDAGOGY

With the learning center and informative signage along major pathways, the park in a very immediate sense provides active communication with the parkgoer around issues pertaining specifically to the natural ecology. The provision of guided tours further promotes this objective. The revelation of the function of the landscape provides a passive communication that in combination with the signage, is intended to provide the parkgoer with a fundamental understanding of the relationship between the land and the natural functions, biotic and abiotic, that are in constant play in the landscape around them.

ii. INVOLVEMENT & STEWARDSHIP

School children are invited to the park as part of their lesson plans. Volunteerism in upkeep of the landscape and the plant nursery is encouraged to promote a sense of community ownership.

iii. ECONOMIC SUSTAINABILITY

Funding for operating costs is secured through a nominal sliding-scale entrance fee. Additional programmatic funding, such as for school outreach, is collected from corporate sponsors. Xochimilco is the only park in Mexico City that is promoted as being financially self-sufficient. The land on which the park was sited was the area of greatest accessibility, further enhancing the park's possibility of success. The park was also used as an element of a plan for greater economic sustainability of the entire Xochimilco region in that it was a critical, place-making feature that preserved the landscape's ability to remain undeveloped and to support the continued regional economic engine of agricultural production.

H. Discussion

Is there anything fundamentally different about Xochimilco that would make one say that it reflects a new park model? Is the landscape more ecological, naturally or culturally, than a picturesque landscape? This next section will provide discussion on these questions from the perspective of two hypothetical constructions: the *naturalist* and the *culturalist.*

i. Naturalist: Ecological?

From the perspective of the naturalist, is Xochimilco ecological? The naturalist in this context, it is assumed, would value the (re)creation of endemic habitat, the sustainable preservation of open space, the connection of that open space to larger regional networks, the repair of distressed natural systems, and the general reformation of a viable and ecologically productive mosaic.

The analysis at Xochimilco uncovered a clear focus (in both intent and realization) on flows - energy and water – while evidence for a naturalist's desire for habitat, species diversity, and regional connection is a bit more convoluted. In applying indicators for ecological value against the on-site

conditions at the park, there is not definitive evidence to suggest the creation/existence of an ecologically rich landscape.

Yet before any conclusive remarks are made, two elements compound the analysis and must be considered. First, the relatively limited size of the patch in relation to the regional landscape mosaic such as that found at Xochimilco makes an ecological assessment difficult. In other words, and perhaps generalizable to urban park landscapes around the world, the urbanistic context of these parks makes ecological merit in a traditional sense difficult to identify. This study presents the argument that the natural ecological conditions to be most concerned with are those that link the functioning flows of the park landscape and the greater city. In other words, the value, from a natural ecology perspective, of an ecological park should be to promote a greater health of the city's natural systems.

Secondly, in assessing the value of interventions to recreate ecological function, it is necessary to define which ecological landscape, in a historical sense, the comparison is being made. Is the passage, for example, of nearly two millennia enough to say that the *chinampa* ecological network is the endemic condition? Or, contrarily, is the passage of time at the human scale not relevant to ecological systems and therefore the endemic ecology is the ecology of the Valley of Mexico prior to human habitation? While the answer to this question is debatable, this study uses the following line of reasoning in order to come to a working definition. Because we concern ourselves here with the *urban* ecological park – 'urban' being a key qualifier – and the use of design, which is itself an intrinsically human exploration, the inexorability of the human condition from the ecology of the ecological park becomes clear. When we speak of the ecology of the landscape in the city, the city and the people who live in it are a large part of that ecology. Therefore, an attempt to highlight, or reintegrate ecological function, as the case may be, involves natural function as it relates to city. By applying this operative definition to Xochimilco, the ecology we speak of is the ecology of the *chinampa* system.

Cultural connection to the landscape. Here, a farmer moves along a canal (Power).

What defined the historical *chinampa* system was an ecological stasis that included the surface expression of subsurface aquifers integrated into a sustaining cultural system, a source of habitat for migratory birds, a connection to the system of the city - both physically in regards to water cycling and crop production, and culturally, in terms of promoting an understanding of the relationship of site systems with those of the city.

The physical implications of this focus were readily apparent on a first hand visit to the site. The physical design of the landscape was made in such a way as to invite the visitor to travel a path through the different zones of the park, in each being provided interpretive language both concretely in the form of signage but also experientially, with the understanding of integrated and connected water supplies. The citing of the ecological museum and cultural center requiring passage through it to enter the park, provides the context through which a visitor begins to interpret the landscape.

While the attention paid to both practicing and communicating knowledge about energy and natural system flows is a definable characteristic of the park, its ability to create sustainable habitat and regional connections is not. The exception to this of course is the intent (and ultimate success) of providing a critical wintering habitat for North American water foul. Subsequent study has shown that more and more endemically migrating birds are choosing Xochimilco as a place to winter.

There are also ecological problems, specifically in relation to water quality in the *Chinampa* system that, continue to persevere. The largest criticism lies with the quality of the treated wastewater that is placed back into the canals (Wirth, 1997). Periodic malfunctions of equipment translate into replaced water that is low in water quality. This is a serious problem that needs to be addressed if the hydrological system is to be considered repaired. Regardless, the turnaround from pre-park days is remarkable, and regardless of the faults that continue to persevere, the naturalist would agree that the park and its program contribute to the landscape's move towards natural ecological stasis.

The flagship species around which the notions of ecological degradation and repair revolve is the Mexican Axolotl (*Ambystoma mexicanum*), a waterborne salamander that maintains external gills throughout its lifespan. The axolotl is the subject of intense scrutiny, as it is endemic to the Xochimilco region and is highly sensitive to water contamination. The Darwin Institute, a UK group, has been actively involved with the municipality to promote the conditions – physically, educationally, and economically – to ensure the conservation of this species. While the current state of the axolotl continues to be threatened, the Darwin Institute is optimistic of its perseverance as a result of new public and private initiatives operated through the backdrop of the park (Darwin Institute).

ii. Culturist: Ecological?

The culturist, it is assumed, would value efforts to sustain and promote both the historical (archeological) and cultural contexts of the landscape. A cultural ecologist would look to see how the park program works to integrate and promote the human condition in the expression of the natural landscape.

As has been established, a guiding principle in the design of Xochimilco Ecological Park was the historical natural/cultural nexus of the landscape. The *chinampas* are a truly endemic invention that speaks to the very fundamentals of Mexican culture. Whereas Xochimilco could have taken the form of a nature preserve that excluded human interaction from the landscape in favor of protection of natural systems, the design of the park looked to use human interaction in a way that maintained the historical context of that interaction.

Xochimilco was designed as a living, breathing, outdoor classroom. Its primary function is to facilitate pedagogy and understanding of the landscape for inhabitants of the city. Xochimilco goes beyond the teaching of the significance of the site itself, and moves to explore the relationship between the site and the larger metropolitan context. It serves as a way to promote the notion that history, culture, and nature can synergize and produce a sustainable vision for the future.

Inherent to the design of the park was a fundamental linkage between cultural history and natural processes, expressed through design. If anything, this linkage, through cultural expression, is the redeeming lesson to learn from this study.

"*Until recently, the polluted and embattled district of Xochimilco... [was a] symbol of the low esteem in which the citizens and political leaders of Mexico City held their own past, in an apparent disregard both for the region's cultural heritage and for the environment of the Valley of Mexico. Today, [Xochimilco has become] ...a symbol of renewal and environmental responsibility. A more positive and worthwhile consequence of urban design is difficult to identify.*" Veronica Green Prize Jury report.

The attempts to link recreational use of the landscape (humanism) with the repair and restoration of a hydrological system are an ecological synthesis with a demonstrated intent to provide a more holistic interaction between park space and the city. The superimposition of park program on a repaired landscape so as to become the anchor point through which a connection to natural ecology becomes possible for parkgoers is an important aspect of Xochimilco.

As alluded to by Paul Bray (2004) in his philosophical exploration on the significance of the "new park," there is a fundamental need for park to be connected to city beyond being a place merely for recreation. It should be a place where cultural self-exploration and understanding of nature and natural systems merge, creating not only a vibrant experience in the park but a vibrant and more cohesive experience in the city.

I. Alternate frameworks thorough which to consider 'ecology' that might help in developing an understanding of what an ecological park might/should be.

The Xochimilco Ecological Park along with the greater restoration of the Xochimilco *chinampa* system, received, among many others, Harvard University's 1996 Veronica Green Prize in Urban Design. The use of the word 'ecological' is peppered throughout the jury report, yet little mention is given as to what this term is intended to connote. The park is "ecological," the landscape is "ecological," the water system is "ecological," and while this study does not intend to argue that the word is used irresponsibly, the possibility is offered that the ecology in this context is being used in a more conceptual manner, and that it is not intended to imply the true complexities of a mature

natural ecological system. If this is the case, what other ideas or a philosophical theory could *ecology* be intended to engender?

i. The Ecological City

White (2002, p.195) argues that the ecological city is one that "provides an acceptable standard of living for its human occupants without depleting the ecosystem and biogeochemical cycles on which it depends." Perhaps if we were to take this definition in an abstract sense and apply it to the question at hand, the ecological park (as a fractal of the city) provides an amenity of 'acceptable' standard that does not reduce the landscape's ability to re-cycle itself. The ecological park, under this line of reasoning, is a piece of the city intricately tied to that city's biologic and bio-geochemical cycles. Further, the ecological park acts to promote the health of these spaces, rather than detract from them.

The design of Xochimilco Ecological Park does reflect, to a certain extent, the 'ecological-city' model. Understanding the intricate connection between the *chinampa* system, groundwater, wastewater, agriculture, and the entire metabolic engine of Mexico City was perhaps one of the defining elements of the plan and suggests that perhaps 'cycling,' more so than biotic ecology, is emblematic of the intent behind the use of the word 'ecological' in this case.

ii. Ecology as Sustainability

A second possibility is that the use of the term 'ecology' within the context of an ecological park is intended to reference the sustainability of the program and maintenance more so than habitat or natural resource protection. Bunce and Jongman (1993) offer that sustainability is the most general or holistic of the concepts of landscape ecology.

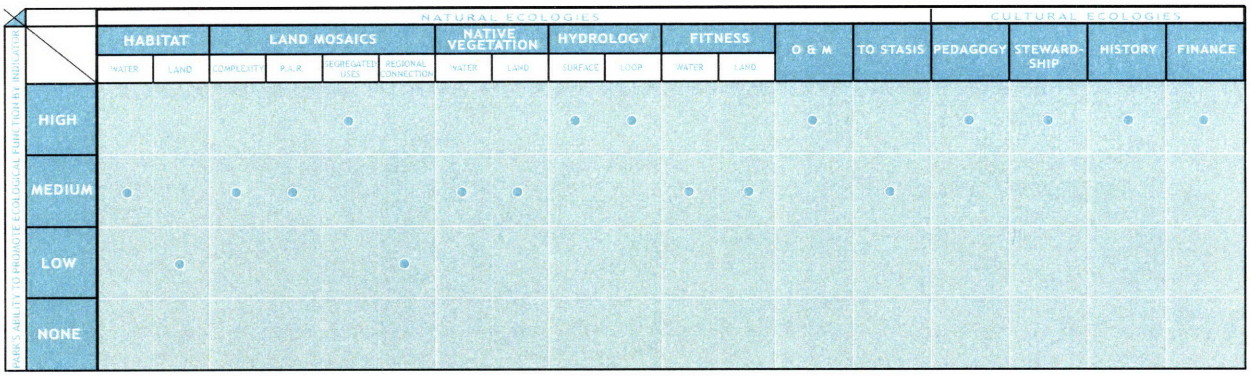
Xochimiclo and the *chinampas*.
(Carlos Ruiz)

Foreman (1995) addresses five fundamental components of a sustainable landscape: (1) adopts a time frame of human generations, (2) equal balancing of ecological and human dimensions, (3) focus on slowly changing attributes, (4) focus on relatively objective assays, (5) thrives for an optimal spatial arrangement or structure of a landscape mosaic.

Beer (1993) confines the definition of landscape sustainability as reflecting the ability to maintain safe minimum levels of biological assets while Bunce and Jongman (1993) add that sustainable landscapes maintain ecosystems which are self-reproducing and not losing of nutrients or species.

The idea of sustainability is an important element of the ecological park, yet 'sustainable' should not be used interchangeably with 'ecological' in the context of the urban park. Sustainability speaks to the ability of the park to provide what it may in the present without sacrificing the needs of the future. In the context of Xochimilco, sustainability is a fundamental concept of its design. The *chinampas* are an element of cultural heritage and it was a requisite of the park design to not only highlight this cultural heritage to the present generation but to also preserve that cultural heritage for future generations. Yet the concept of 'sustainability' is less powerful in capturing another fundamental element of the park, which is its attempt to integrate education with ecological repair. Or in other words - the linkage between the natural and cultural landscapes through teaching and experience to create a working dynamism between people and park and park and city.

J. Summary Matrix



K. Lessons to Extract

- Provision of park program that enhanced both the natural and cultural ecologies of the landscape.
- Attempts to repair the broken hydrological cycle between park, *chinampa* region, and Mexico City.
- Expansion of the notion of park to include a more functional and dynamic relationship with the city.
- Provision of important habitat for migrating water foul.
- Connection of historical preservation with natural resource conservation.
- Important catalyst in the promoting of a greater ecological consciousness relating to the *chinampa* region.

Chapter 5. Crissy Field: New Habitat and Pedagogical Explorations

"Crissy Field engages definitions of 'restoration,' 'nature,' and 'culture' to create a multi-layered design that will expand visitors' perceptions of what a park can be...By encompassing paradox, Crissy Field becomes a rich palimpsest, revealing a powerful approach to the redesign of sites that have been altered, disturbed, remediated, and need to be remade once again."

- Niall Kirkwood, 2001

Crissy Field, as presented in this next chapter, is the second study of an ecological park. Its design and program demonstrates strong commitment to the interconnecting of the natural and cultural ecologies of the landscape, doing so through a strong pedagogical and design program. This chapter will begin with an introduction to the landscape intervention that created the park, and will then turn to a historical analysis of the changing ecology of the landscape. This analysis will end with an exploration of the planning and design process that defined contemporary Crissy Field as an ecological park. The conclusions gained from this study, in combination with those from the analysis of Xochimilco Ecological Park, will help to complete the 'picture' or 'story' of what an ecological park is, or might be.

A. Crissy Field: Context

While there is a definitive body of literature on the history of Crissy Field documenting the programmatic shift from military to civilian use, literature that speaks to its ecological history is sparse. With its storied cultural history, starting with the first Native American inhabitants more than two millennia ago, continuing through the administration of first the Spanish and then the Mexican authorities, the Civil War and the Panama-Pacific International Exposition of 1915, the history of Crissy Field, in many ways, is the history of California. In order to better understand the restoration of both the natural and cultural ecologies of the landscape, it is important to begin with an understanding of the evolving relationship between these two ecologies as the have lead to the state of the landscape as it is found today.

The opening of the newly designed urban park in 1999 has increased public access and has reclaimed Crissy Field as one of the single largest public open spaces in San Francisco. From a naturalist's perspective, the back dune tidal marsh that once inhabited the site and which has now been partially recreated is indicative of a desire for a much grander regional initiative to restore some of the 90% of the wetlands lost to development in the San Francisco Bay Area. For naturalists, Crissy Field is seen as a model that should be applied elsewhere.

In addition to being a restored urban cultural landscape, the literature suggests that Crissy Field is perhaps the best representation of a constructed ecological park in the United States today (Cranz & Boland, 2004; Boland, 2001). Therefore, its use as a case study to better understand the ecological park movement is highly beneficial.

In considering Crissy Field, what defines its 'ecology' in ecological park? Is it a reflection of a *cultural* or *natural* ecology? Or perhaps both, as the literature would suggest (Cranz & Boland, 2004; Boland, 2001)? Yet this literature fails to make explicit the meaning of ecology, hinting instead at some amalgamation between natural and cultural functions. In attempting to address these questions, this section will trace the cultural history of the field as it relates to the changing natural ecology of the landscape over time. From this, a benchmark against which to compare the programmatic insertion of *park* on the landscape will help determine what this insertion is intended to embody. The methods described in an earlier section will be applied to Crissy Field in an attempt to disaggregate the cultural and natural ecologies and to better understand the significance of Crissy Field as an ecological park.

B. Crissy Field: Today

Crissy Field is situated on the western portion of what was originally an extensive back dune tidal marsh stretching from near the Golden Gate throughout what is today the Marina District. The shallow water immediately north of what is now known as Crissy Field provided the first protected ship anchorage just inside the Golden Gate, but was separated from the costal terrace of the main post of the Presidio by 500-600 feet of marsh (Haller 1994). By the early 1800s, the Army began to transform the vibrant marsh into a flat, logistical staging ground, which by the first decades of the 20th century, no longer retained any element of that natural ecological system.

Fast-forwarding to the end of the 20th century, following an extensive remediation of site contamination and an active planning process involving the community, recreationists, ecologists, educators, and local, state, and federal officials, the 'new' Crissy Field has become one of the most actively visited urban parks in not only San Francisco, but the country. A defining element of its design is a recreated back dune marsh and associated pedagogical program, the specifics of which will be discussed to follow. As part of the Presidio, it is the first National Park in the U.S. that is entirely financially self-sufficient, an important consideration in postulating on the meaning of an ecological or sustainable park.

C. Ecology in its '*natural* state'

The *natural* state of Crissy Field was once that of a back dune ecosystem that existed at the confluence of a creek and the bay. Because this purely *natural* state has not been in existence since at least the 1850s, there is a lacking of documentation that speaks specifically to the ecological condition and diversity of species at Crissy Field. Yet one can postulate as to what this natural ecology might have been by considering the ecology of the typical beach/dune/marsh system.

The first part of the coastal dune ecology, the beach, sits directly in front of the dune system and is most directly influenced by wave and tidal action. A self-sustaining beach, i.e., one in a state of depositional equilibrium, is divided between a wet and dry section. The wet section, influenced directly by the ebb and flow of the tide, is in a constant state of flux and supports borrowing crustaceans and their predatory birds. As sand accumulates within the dry section, defined by an absence of daily tidal influence, wind starts the dune construction process by pushing this sand further inland (Michaels, 2003).

As that blowing sand encounters either a natural or man-made barrier, it is deposited. Over time, a mound of sand begins to grow and the first portion of the coastal dune system, the fore dunes, begins forming. As a result of the characteristic regime of repetitive disturbance, a distinguishing element of the fore dune area is a lack of plant density and diversity. During storms, wave action often reaches this first line of coastal defense, washing away some or most of any pioneering flora (Michaels, 2003).

Paralleling the fore dunes, the back dunes are commonly composed of larger dunes that support a higher density of vegetative cover. In a well-developed coastal dune system subject to moderate to high wind velocities from the ocean, as is the case at Crissy Field, a last line of back dunes called the ridge can be distinguished. This ridge sets a quasi-boundary between the primarily sandy coastal dune ecosystem and another, which at Crissy Field was composed of a brackish marsh (Michaels, 2003).

All coastal dune ecosystems support a set of living species that increase in diversity and complexity as a function of the distance from the wave edge (Micheals, 2003).

At Crissy Field, tidal wetlands buffered from the sea by a ridge of dunes known by locals at the time as Strawberry Island or Sand Point, "names evocative of the original nature of the area,"

extended some two miles along the shore between where Fort Mason is today and to the point where the bluffs move in to hug the shore at the harbor entrance (now the site of the former U.S. Coast Guard Station). Streams from the Presidio uplands added their freshwater flow to the tidal waters of the bay through this marsh system.

Archeological evidence (much of it uncovered during the development of the park in the late 1990s) suggests that as many as 9 species of shellfish, 31 species of fish, 25 species of migratory and perennial birds, and 20 species of mammals – including sea otters, harbor seals, grizzly bears, and tule elk – could be found living and feeding within this back dune ecosystem (Olmsted et al, 1977).

D. Crissy Field: The creation of a cultural landscape and ecological implications

i. 740 A.D – 1776

Historical artifacts found along the northern shore of the San Francisco peninsula date back to around 740 A.D., left by the Ohlone (also known as the Costanoan) people who inhabited much of the land around the San Francisco bay as far back as 8,000 B.C. It is believed that the Ohlone used the area around present day Crissy Field as a seasonal camp, evidenced by a series of large shell mounds and unearthed hunting elements (NPS). The Ohlone are also known to have conducted periodic burning of the landscape around Crissy Field to promote the growth of native grasses for seed gathering and to create forage for deer and elk (Bean, 1994). The Ohlone cultivated the native plants of the marsh area for food and medicinal uses, including yerba buena (*Satureja douglasii*), bracken fern (*Teridium aquilinum*), soap root (*Chlorogolum pomeridianum*), arroyo willow (*Salix lasiolepis*), and California poppy (*Eschscholzia californica*) (NPS).

ii. 1776 A.D. – 1846

The arrival of the Spanish in 1776 and the establishment of a garrison on the bluffs overlooking the entrance to San Francisco Bay marked a shift in what had up until that point been an equilibrious relationship between man and the ecological function of the landscape. While the establishment of the Presidio at once marked the beginning of a storied military history for the site, it also marked the beginning of a methodical denigration of the ecological system. On first viewing of the peninsula, scouts described what they saw:

"This place and its vicinity has abundant pasturage, plenty of firewood, and fine water, all good advantages for establishing here the presidio or fort which is planned. It lacks only timber, for there is not a tree on all those hills, though the oaks and other trees along the road are not very far away.... Here and near the lake there are yerba buena and so many lilies that I almost had them inside my tent." (Spanish scout, 1776)[1]

After the establishment of the settlement, the Spanish soon realized that the dune scrub and grasslands that canvassed the Presidio had little productive value. The harsh and incessant coastal

1. Historic Resource Study El Presidio de San Francisco: A History under Spain and Mexico, 1776-1846
John Phillip Langelier, Daniel Bernard Rosen, 1992.
United States Department of the Interior - National Park Service - Denver Service Center

winds and thin, dry, sandy soils made the land unsuitable for agriculture and provided little forage for livestock during the dry summers. While the Spanish did not significantly alter the landscape, at least at first, their grazing of livestock did have a damaging impact on the landscape. With the arrival of cattle and sheep came the first appearance of many different exotic plant species. Over time, grazing eventually decimated the Presidio's sensitive native perennial bunchgrasses and caused widespread soil compaction and erosion. Spanish settlers also cut the few oaks and other trees near the Presidio for building materials and for fuel. This transformation of the flora impacted the native people as well, as the removal of the oak trees prevented the production of acorns and grazing by introduced livestock prevented the production of grass seeds, both staples of the Ohlone diet (NPS). In 1791, an unidentified Ohlone man commented on this emerging transformation of the landscape:

"The cattle ate the seeds, and new plants could not sprout. In the old times, we didn't see a bad year."[2]

Yet for all the later damage on the uplands portion of the Presidio brought about by the Spanish, the coastal marsh in the lowlands remained much as it had prior to their arrival. This is because the supply vessels for the isolated garrison anchored in the shallow waters offshore and small boats brought soldiers and supplies ashore. The Spanish had little need for a developed shoreline, and hence left it "much as they found it" (Haller, 2001, p.6). While the ecological network of the lowlands remained largely unchanged, the newfound absence of larger fauna, including elk and bear, remained the exception.

In 1821, with the Mexican Republic newly independent from Spain, the Presidio transferred allegiance to Mexico. Little changed at the Presidio during this time, aside from a gradual densification of the uplands area, with the built form expanding beyond the original plaza walls built by the Spanish. A series of farmsteads and homes were constructed along the eastern portion of the Presidio on sites considered most suitable for agriculture because of protection from the cold wind and fog from the ocean. These sites were located along a spring-fed creek which emptied into the lowland marshes. While accounts tell of declination of the water quality in the stream resulting in large part from contamination from livestock, evidence suggests that the marshes remained resilient and the hydrological system largely intact.

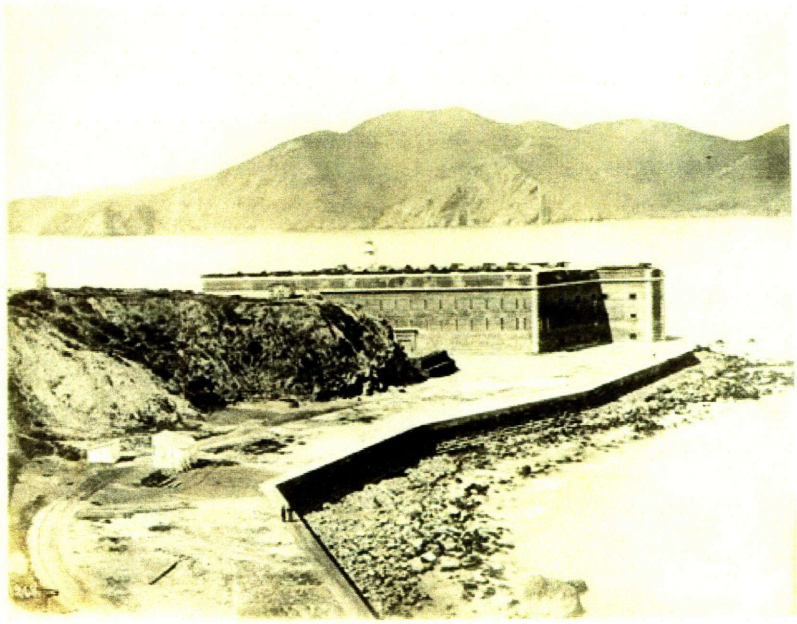
iii. 1846 A.D. – 1906

With the deeding of California to the U.S. in 1846 and the discovery of gold not too long afterwards, President Fillmore ordered the repair and fortification of the Presidio to protect the opening to San Francisco Bay. At the very western edge of the lower Presidio, Fillmore ordered the construction of Fort Point – a massive four-tiered brick and granite garrison designed to hold 126 large cannons (NPS). This was the first fortification and stabilization effort along the banks of the bay along the lower Presidio, and is significant from an ecological perspective as it served, most likely, as the engineering and philosophical impetus that would lead ultimately to the destruction of the marshes directly to the east.

2. As quoted in http://www.nps.gov/prsf/history/spanish_period.htm

Dunes and Strawberry Island, 1857, showing original natural condition. Crissy Field would be built on the waterfont across from island. Present day Russian Hill in foreground. (SFPL)

Sometime between 1863 and 1865, a macadamized road was completed along the shoreline, connecting Mason Street in San Francisco to the newly constructed Fort Point, along the entire length of the lower Presidio.[3] This was an exceedingly important intervention from an ecological perspective because it served as a stabilizing element along the length of the marsh that subsequent efforts at compartmentalization and fill would all be linked to. One can imagine a spine that facilitated the protrusion of earthen ribs into the marsh to describe this advancement. Over the next few decades, the Presidio's trash and debris from construction and demolition were dumped into the marsh, slowly shrinking its extent and contaminating its waters (Haller, 2001, p.6).



Fortification and embankment at Fort Point., ca. 1855. (SFPL)

3. I have found conflicting dates, but sources agree on an 1863-1865 range.

Macadamized Road, ca. 1863. Note marsh in foreground. (SFPL)

In the 1880s, a well-planned large-scale tree planting and 'beautification' program was instituted within the Presidio, as hundreds-of-thousands of Monterey Cyprus, Eucalyptus, and other non-native trees were planted on an otherwise barren landscape. The desire, at that point, in addition to beautification, was to make the Presidio not only appear larger and with more relief from ocean-going vessels, but to provide protection from the incessant wind and to "limit visibility into and out of the post."[4] This desire for an aesthetic ideal was in line with the picturesque notion that was sweeping the country at the time, including San Francisco with the newly demarcated Golden Gate Park a decade earlier. A landscape devoid of any canopy, such as that found at the Presidio, was not in line with the pastoral conception of the idealized landscape, and therefore human intervention was necessary to provide the bucolic superlative, or so planners thought. This planting program extended to the southern periphery of the lower Presidio.

iv. 1906 A.D. – 1915

The Great San Francisco Earthquake and Fire of 1906 displaced as many as a quarter-million city dwellers. While many moved and started new lives across the bay, others took temporary refuge in the Presidio and Golden Gate Park. In the presidio specifically, four temporary housing camps were established, housing over 16,000 people. One of the largest of these camps was sited adjacent to and directly to the east of the lower Presidio, where an organized street grid and street numbers marked each individual tent. As residents found permanent housing, the tent camps slowly dismantled, closing outright by 1911 (Bronson, 1959). Yet even with the increasing intensity of use in and around the lower presidio, the actual shoreline, or the interface between dune and sea, had changed little from its natural state (Haller, 2001, p.5).[5]

4. Although now considered a 'cultural forest' worthy of preservation, questions have emerged in recent years, with the trees reaching the terminus of their lifespan as to whether the forest should be artificially maintained.
5. This is in opposition to the fortification along the southern edge of the marsh where a road linking the city and Fort Point had been built.

Planting of Monterrey Cyprus in the Presidio, 1880s. (SFPL)

A year after the Great Earthquake and Fire, Major William W. Harts, an engineering officer on the staff of the Army's Department of California, presented "what may be regarded as the reservation's first comprehensive plan." Describing the Presidio as "a site of great beauty," he described the lower Presidio and its shoreline in line with the contemporary image of wetlands:

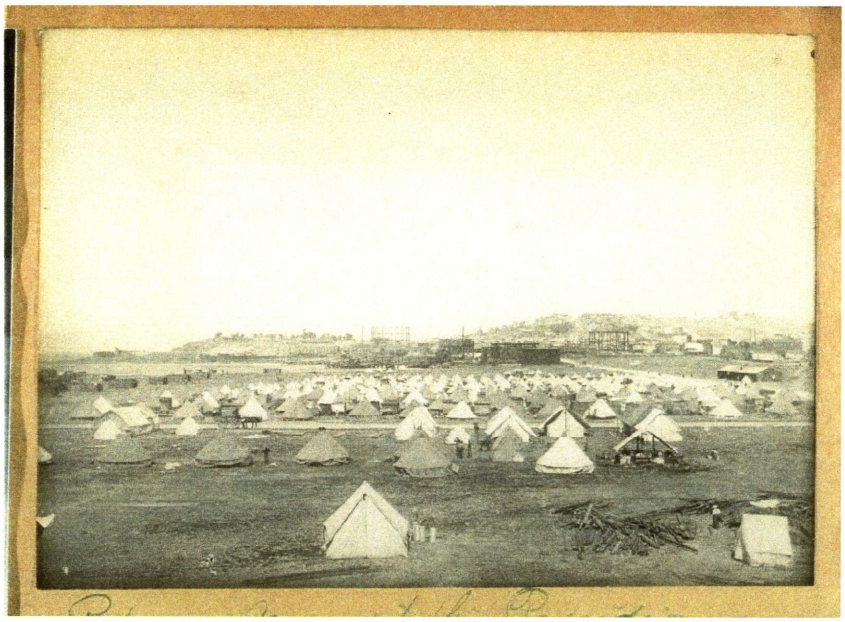
"*A large area of the Presidio lying along the bay front, amounting to about 110 acres, is so low that it permits the ingress and egress of the tides, which flood the greater portions at certain stages. This forms a swamp of considerable area. It is so badly drained in many places due to its low level making good drainage impossible, that during the rainy season, the drainage water from the higher country to the south collects in large, shallow lakes, much of it remaining until evaporated. This swamp not only renders the largest portion of the level area of the Presidio absolutely useless but is an obstruction to the use of the bay front and is probably a source of ill health. It is in any case a waste of valuable land besides being a disagreeable and unsanitary feature in the post.*"[6]

As Haller (2001) illuminates, "the major intended the wetlands to be turned into an '*artificial plain of ample size*' for drill grounds, ceremonies, and future construction as the post expanded. It was five years before his plans were implemented" (Haller, 2001, p.8).

As San Francisco continued its rebuilding after the earthquake and fire, local boosters promoted the city in a competition to host a world's fair that would celebrate the completion of the Panama Canal. The new San Francisco, the largest and wealthiest city on the west coast, was the perfect choice, these boosters touted, and Congress agreed (NPS b.).

The award of the fair spurred a rash of planning relating to the citing of the exposition grounds. In a city defined by its extreme topographical relief, the extended flatlands of the lower Presidio appeared a logical choice. The only impediment, of course, was that it was a marsh. This was an

6. Thompson and Woodbridge, "Special History Study: Presidio of San Francisco – An Outline of Its Evolution as a U.S. Army Post, 1847-1990," p. 149. As quoted in (Haller, 2001, p. 7).



Refugee camp on Crissy Field Site, 1906. (SFPL)

easy obstacle to overcome, these planners decided, as mounds of fill composed of destroyed and demolished buildings were readily available.

In the end, it was the world's fair, not the Army, that was responsible for the watershed change to the landscape – transformation of what had been up until that point a largely intact natural tidal marshland into a flat, dry, open field suitable for construction.

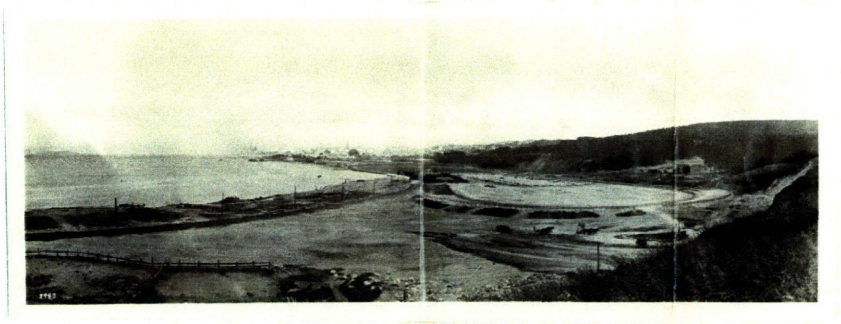
v. 1911-1915: Filling the Wetlands

The scale and design of the Panama-Pacific International Exhibition was truly exceptional. Spreading across more than 635 acres of newly reclaimed waterfront property, the Horticulture Palace had a glass dome larger than Saint Peter's Basilica in Rome, and the Palace of the Machinery, the largest structure in the world at the time, was the first building to have a plane fly through it. The Tower of Jewels soared 40 stories skyward, one of the highest constructed buildings in the city at the time, and held 102,000 pieces of multicolored cut glass that sparkled by day and were illuminated by intense electric lights at night. The evening fog triggered 48 torchlights of seven different colors to illuminate, making the sky look like the "northern lights" (NPS b.).

Yet in order to build this grand fair, over 630 acres of bay-front tidal marsh, extending three miles from Fort Masson to east of the Golden Gate (today's Marina District and all of Crissy Field), were filled (Haller, 2001, p.8).

The Army, in cooperation with a series of private contractors, began a multi-year effort in 1911 to eliminate the marsh by erecting pile-supported boardwalks traversing the marsh, anchored at the end to the berm constructed decades earlier to provide road access to Fort Point. These boardwalks were succeeded by earthen causeways that effectively compartmentalized the marsh, terminating the last remnants of tidal exchange. The freshwater streams that drained the Presidio watershed into the marsh were culverted. The new 'compartments' of brackish water were

Filling of the wetlands begins. Note offshore barge used to pump sand and. Also, note remaining marshland in foreground. (SFPL)



Filling of the wetlands complete. (SFPL)

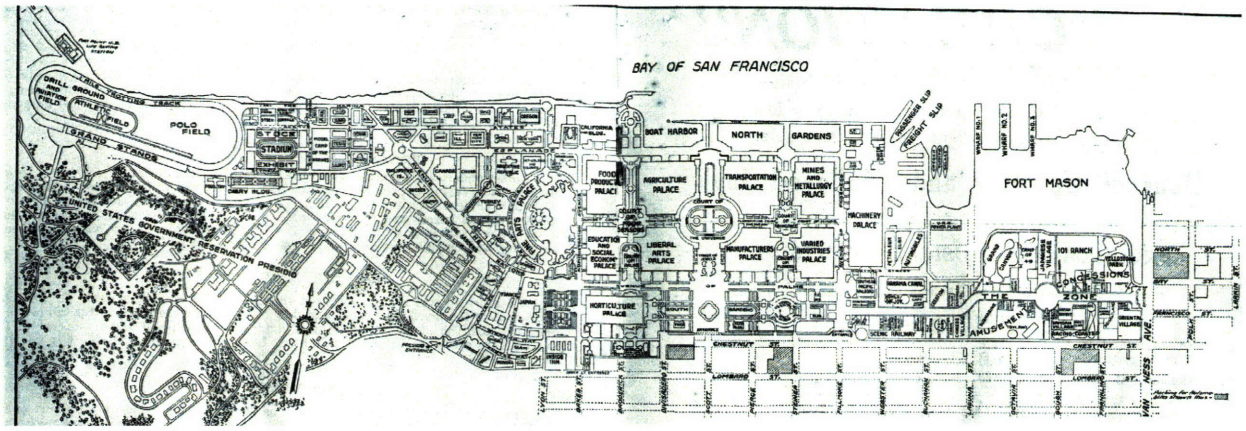
systematically filled with bay mud and sand hydraulically pumped from offshore shoals by dredges and barges. The site was "graded to a near-flat datum ten vertical feet above sea-level, erasing all traces of tidal mudflats and marsh" (Haller, 1994).

The westernmost part of this new filled land became a 'kidney-bean-shaped' automotive racetrack one mile in circumference, with grandstands large enough to accommodate 25,000 people. It was this circumferential development that would become, as aviation quickly became viewed as the way to the future, the footprint upon which the Crissy Field airstrip would be constructed.

With the completion of the Exposition in 1915, the Army would increasingly use the grass field within the racetrack as a landing strip, ultimately leading to the establishment of the first military air station on the west coast in 1918. The heavily trafficked grass airfield, as decades passed, soon gave way to a longer, asphalt-paved airstrip to accommodate the requirements of more powerful aircraft (Rieder, 2001).

(left) Postcard of Panama-Pacific Internatinal Exhibition, ca. 1915. (SFPL)

(below) PPIE plan. Note racetrack at the western edge. This was the forerunner of Crissy Field Airfield. (SFPL)



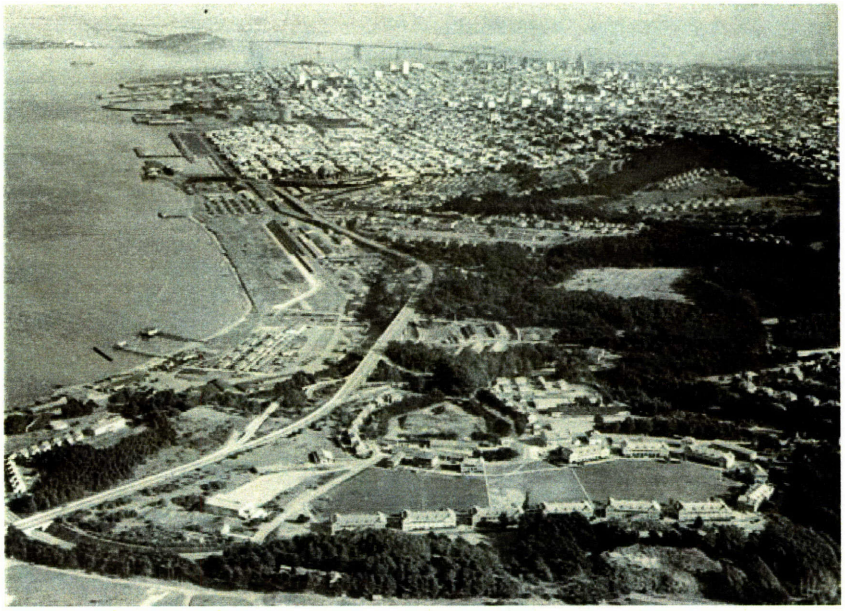
vi. 1930s – 1994

The period between the 1930s and the transfer of the Presidio to the National Park Service in 1994 witnessed varying waves of Army presence at Crissy Field, including the militarization of the entire California coast during WWII, but will not be considered in detail as the 'ecological status' of the landscape was fixed across the period. The next significant event in the ecological history of Crissy Field was the remediation effort that was conducted in the late 1990s.

E. Reflection on Ecological History:

In fifty years, the lower Presidio, now known as Crissy Field, was transformed from an ecologically stable, ecologically rich, natural environment to a completely constructed, ecologically sterile, and ultimately ecologically unstable, landform. The way that the new Crissy Field as a so-called

ecological park dealt with the juxtaposition of this truly non-ecological cultural landscape with a reintroduced natural ecology is an interesting story to tell and will be considered in further detail next.



Crissy Field during WWII. (SFPL)

F. Crissy Field: Interaction between culture, historical elements, preservationists, ecologists in planning for a new urban eco-park

i. The Ecological "Problem" and "Restoration"

Much has been said about what should constitute an ecological restoration of a landscape, and whether a 'pure' restoration should even have a definition (Rieder, 2001). Ecologists would say that a landscape restoration requires the repair of any human-induced damage to the point of returning the landscape to its original condition. The National Park Service, perhaps unexpectedly in today's political climate, best codifies this philosophy on restoration:

"Altering an area in such a way as to reestablish an ecosystem's structure and function, usually bringing it back to its original (pre-disturbance) state or to a healthy state close to the original."[7]

Many ecologists and popular environmentalists would follow the above line of reasoning, offering that the only way to restore the wetlands at Crissy Field was to design them in such a way as to be 'ecologically natural,' or in a state representative of the way they were prior to human degradation.[8] The more urbanistically pragmatic Society for Ecological Restoration (SER), on the other hand, defines an ecological restoration as:

7. [available online] http://www.nps.gov/plants/restore/library/glossary.html
8. According to an interview with Michael Boland who was actively involved in the planning, design, and construction of Crissy Field, many environmentalists emerged in the debate willing to settle for nothing less than a complete ecosystem restoration.

"...the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."[9]

This definition allows for some flexibility in how that recovery might be conducted or what exactly the end state must be for the project to be considered a success, yet continues to place emphasis on the natural condition when defining site ecology.

An alternative conception of ecology within the highly urbanized context of Crissy Field might ignore natural ecologies, arguing instead that a complete restoration would bring back to the forefront the cultural elements that defined a specific historical chapter of the landscape.

According to The Secretary of the Interior Standards for the Treatment of Historic Properties 12, *"restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of removal of features from other periods in its history and reconstruction of missing features from the restoration period."*[10]

Yet a cultural restoration of the ecology in absolute would necessarily preclude any natural ecological restoration. Rieder (2001) refers to this type of restoration as a "cultural layering" that often begins to favor "specific intervals of time to the exclusion of others," promoting the "reuse of a site driven by historic precedent" without considering current use or natural conditions. Nevertheless, given Crissy Field's poor state at the time, most agreed that restoration was the preferred policy directive. Yet each actor's definition of restoration defined how they believed these directives should be formulated into design.

ii. Planning Process

In the late 1980s, anticipating the Army's departure, the National Park Service (NPS) instituted a series of planning studies to consider what might be done at Crissy Field. For almost a decade prior, civilian use of the strip had been slowly increasing, and it had become, by the late 1980s, a part of the collective recreational consciousness of San Franciscans. A fifteen-year tradition started in 1979 when the Chronicle's 21st Annual Fourth of July fireworks display found a new home at Crissy Field. Upwards of 100,000 people were attracted to this carnival-like event each year.[11] Events such as this and others hosted by the Golden Gate National Recreation Area were germane to the subsequent development of the park in that they helped to establish a new recreation-based cultural relationship to the landscape.

In 1990, a week-long observation of Earth Day was celebrated at Crissy Field. Rows of booths and activities for parents and children alike drew as many as 200,000 people to the event. Citing the 'sublime' setting, event planners chose Crissy Field, among others reasons, for its dramatic natural

9. Society for Ecological Restoration International. [available online, http://www.ser.org/about.asp] According to its mission statement, SER "is a non-profit organization infused with the energy of 2300 members – individuals and organizations who are actively engaged in ecologically-sensitive repair and management of ecosystems through an unusually broad array of experience, knowledge sets and cultural perspectives. They are scientists, planners, administrators, ecological consultants, first peoples, landscape architects, philosophers, teachers, engineers, natural areas managers, writers, growers, community activists, and volunteers, among others." SER is widely recognized in the field.
10. As quoted in Kirkwood, 2001.
11. This 4th of July celebration at Crissy Field is rooted in my own collective consciousness as a cherished family event growing up.

setting.[12] With the emergence of a new collective recreational consciousness oriented around Crissy Field, with events such as Earth Day and others, an emerging shift in the philosophical consciousness connecting the field to the environment was seen as well.

The shoreline portion of Crissy Field was deeded to the Golden Gate National Recreation Area in 1988, affording for the first time continuous public access to the waterfront, albeit a deteriorating military shoreline of concrete slabs, rubble and chain link fencing (Rieder, 2001). This land transfer triggered the National Park Service and the Golden Gate National Parks Association (GGNPA) to initiate the planning studies previously mentioned to postulate the future of the Crissy Field parcel. This process, which included a wide range of contributing participants, culminated in the Presidio General Management Plan of 1994. Operating under four defining principles - restoration, remediation, recycling, and renewal - the plan provided the following vision for the new Crissy Field:

"People entering on foot from the east will encounter the Golden Gate promenade and connecting paths spanning a broad recreational open space interspersed with restored wetlands. As they walk west along the promenade, the restored dune systems along the bay will give the feeling of a natural beachfront. The Golden Gate Bridge and its dramatic setting will be the focus of views to the west. The historic airstrip and buildings beneath the bluff will evoke images of past activities at Crissy Field... The historic airfield structures at the west end of the field will be rehabilitated for new uses, and the 1920s grass landing field will be restored to its historic appearance..."[13]

With this statement, the NPS had defined an aggregated conception of "restoration," aiming to change the landscape condition in order to restore, to the maximum extent possible, the naturally functioning systems of the pre-military backdune tidal marsh while highlighting and preserving the cultural significance of the landscape as well (GGNRA 1994). Heargreaves Associates was retained to provide a physical design for the NPS master plan.

iii. Natural, Recreational, and Aesthetic Goals in Conflict

According to Michael Boland, (Director of Planning for the Presidio Trust), the most contentious element of the design plan for Crissy Field was its natural element, or the constructed wetland. Ecologists argued that the 20-acre tidal marsh, because of its limited size, would be unable to support any functioning ecology. They envisioned a much larger system more in line with the historical extent of the original marsh. Recreationists, on the other hand, most noticeably represented by avid windsurfers, believed that the reintroduction of the wetland and a connecting channel to the bay would ruin one of their most prized surfing beaches. Not only did they fear that their launching beach could be eroded by the marsh, they also feared the loss of their parking lot facing that beach that provided them with easy loading and unloading vehicular access for their boards.

Ecologists wanted the marsh to empty at or near its historical point, even though the feasibility of this was next to impossible. Historical photographs show the original channel passing though what is now the completely built-out Marina District of San Francisco. The windsurfers wanted no

12. The equation of sublime with nature is not lost here, as in many ways it references the same link promoted by picturesque planners and philosophers.
13. 1994 NPS General Management Plan for Crissy Field, as quoted in (Haller, 2001 p. 134)

channel at all. The end result was a channel somewhere in between the desires of the two main constituent groups, the design of which being the product of intense engineering and hydrological study *[for a discussion on the specifics on the channel controversy, see boxed text below]*. Nevertheless, the self-regulation of the marsh and its channel has failed, and backhoes are required to clear blockages within the canal once a month to keep tidal exchange flowing (Boland, 2006).

Conflicting Goals: Marsh Channel

When a beach is in equilibrium, as was the case at East Beach, waves add the same amount of sand as they wash away – a condition known as littoral sand transport. However, excavating a channel to open the marsh introduced a new current into the marsh and across the beach, disrupting the beach's equilibrium and causing the loss of most of the sand. Within a matter of months, the beach had shrunk by as much as 25 feet, to the point that many feared it would disappear completely.

But the siting of the channel was the result of a storied process, and the belief, at least at the time, was that the final decision would prove a sustainable one. Yet it was not this easy, mainly because of the proximity to East Beach, a popular windsurfing spot.

As an example of the many design decisions confronted, the location of the tidal channel was examined from several vantage points: historical, political, technical, and design. The proposed restoration of this crucial component, the sustaining element of the design, would, over the course of four years, be tested in numerous locations. The channel became the pivotal point for the project in that without a well-positioned channel, the reduced acreage of the marsh would be prone to frequent closure and mounting maintenance, and therefore not sustainable (Williams & Josselyn, 1994).

Politically, the channel had to look like and function according to the publicly held perceptions as to what a natural channel should look like, ruling out a hydrologically superior concrete culvert. This was central to the effort to provide educational and interpretive opportunities for the NPS, as well as securing donor support. Similarly, the vocal constituency of boardsailors extolled the virtues of this particular stretch of beach as one of the best boardsailing locations in the world. (Rieder, 2001).

From a technical standpoint, hydrological and marine engineers advocated for the same protected location coveted by the boardsailors. Historical documents, coupled with current statistical analysis of littoral transport, indicated that the channel would function to a grater level of confidence in this protected location, without generating "the abundance of decaying plant matter that the boardsailors feared." The proposed 25-acre marsh, a reduced portion of the once 180-acre marsh, would avoid unacceptable risks only with a protected channel (Rieder, 2001).

Different alternatives were considered to deal with this 'problem', spurred in large part by the angered windsurfers. Alternatives ran the gamut from completely redesigning the entire waterfront, to redirecting the outflow of the marsh, to just leaving the condition as it was to allow for a new equilibrium to establish itself. The agreed-upon solution, somewhere in the middle of this spectrum, called for sinking a series of piles parallel to the beach while allowing for the channel to be located where it was most likely to succeed. These piles, over time, in interacting with the new sand transports post channel construction, have allowed for the beach to regain its previous equilibrious condition.

iv. Site Ecology: Integrating Remediation and Restoration

Prior to construction of the park, and as a condition of the agreement of the transition from *post to park*, the Army agreed to clean up the contaminated areas of the Presidio, including Crissy Field. With nearly a century of military occupation, the Army had contaminated the area with a variety of toxics, which at Crissy Field included polycyclic aromatic hydrocarbon plumes (PAHs), pesticide plumes, heavy metals, and solvents. Remediation of onsite soil and groundwater occurred in one of three ways (Porter, 2003):

- Excavation and offsite disposal of the most heavily contaminated soils, leaving holes to be dealt with as part of the subsequent park construction
- Excavation and offsite disposal of the most heavily contaminated soils, replacement with native soils from within the Presidio to avoid introduction of non-native seed stock and soils to the park
- Excavation of soils for onsite treatment by Low Temperature Thermal Desorption (LTTD).

Of the approximately 95,000 tons of contaminated soils excavated from Crissy Field, 7,000 tons were treated onsite using LTTD (considered an ecologically sensitive, ecologically effective solution for petrochemical remediation) (Power, 2005), while the remainder, or approximately 88,000 tons of soil were hauled offsite to certified toxic dumps in the Central Valley. Groundwater contamination was addressed with the use of a magnesium peroxide compound injected into the soil. This compound provided a steady source of oxygen for a native type of bacteria that would decompose the hydrocarbons (Porter, 2003).

In keeping with the goal of recycling as many on-site materials as possible, contractors dismantled more than 50 permanent and temporary structures on the site by hand in order to preserve old-growth redwood timbers. Over 40 surface acres of old runway and asphalt paving, along with 15,000 tons of concrete and rock from the shoreline, were crushed and used as underlying fill in the subsequent development of the park and to form the foundations for new hillocks and dunes. An additional 380,000 cubic yards of soil excavated in creating the marsh were repositioned onto the old airfield, providing topographical relief and grade separation to an otherwise level site.

v. Crissy Field: Site Design and Natural Ecology

The restoration of the tidal marsh took approximately a year to complete, with six months required to excavate 227,000 tons of fill from the site and another six months needed to plant about 100,000 native plants raised from seed in Presidio nurseries. In balancing needs for recreation space, planners decided on a smaller footprint for the man-made marsh – 25 acres as opposed to what originally been over 135. Located at the entry to the park as one comes from the city of San Francisco, the constructed marsh is 2,000ft long by 400ft wide, and just about 1ft deep at low tide.

In designing the marsh, attempts were made to replicate the natural hydrology of the entire Crissy Field area. The original site drainage, consisting of rotting wooden stave pipes over 70 years old,

had proved inadequate with flooding during seasonal rain events. While excavation was occurring as part of the remediation process, new pipes were laid that directed stormwater outflow into the newly constructed wetland, to allow for bioremediation and biofiltration of stormwater prior to being discharged into the bay – the condition endemic to the site.

Attempts were also made to restore the original wetland's rich biodiversity, including fish, birds, and other small aquatic organisms. The all-native plantings were placed in late 1998, and plants continued to be added well through 2000. Post-occupancy study of the marsh has suggested that the reintroduction of native flora has served to precipitate a rapid recovery of the site's predevelopment ecosystem.

Other notable design features are worth mentioning as well. On the eastern edge of the park, vehicular parking is provided by two frequency-defined zones. The first, smaller zone provides limited parking for weekday visitors, and is paved using permeable asphalt. The second, larger zone, which provides overflow parking on weekends and special events, is not paved and is instead seeded with resistant grasses to allow for stormwater penetration where the raindrop falls. Early failure of these grassy parking areas, especially during the rainy winters, has prompted improvements in parking management and soil stabilization and is considered to be an ongoing process (Boland, 2006).

Extending from this parking area along the entire 1.5 mile waterfront is a wide promenade along the bayfront. It is on this promenade that the most active recreation occurs, including jogging, bicycling, rollerblading, and dog walking. This walkway curves along the crest of the dunes, which are themselves roped off to prevent damage to sensitive habitat. The patches of roped dunes vary in size, level of vegetative cover, and slope, suggesting varying degrees of habitat provision.

Recreated marsh at Crissy Field. Note pedestrian promenade. (Power)

vi. Crissy Field: Site Design and Cultural Ecology

An important element in the redesign of Crissy Field was the preservation and revelation of historical elements of the site. The most visual example of this preservation effort was the grass airfield itself. Although no longer used for aviation, the field was reconstructed in its exact location first defined by the Panama-Pacific Exhibition in the 1910s. The curvilinear 'kidney-shaped' edge was preserved and pathways were constructed to define the perimeter of the area. In addition, preservation of Spanish-colonial style buildings was conducted in coordination with extensive renovations and reprogramming (one of the buildings became the Crissy Field Community Center and another became a coastal ecology center).

In addition to the incorporation of physical elements of the site's storied cultural ecology, non-physical elements were used as well. First, strong emphasis was placed on integrating the development of the park with the development of community stewardship and pedagogic programs. With site remediation complete, the "Help Grow Crissy Field Campaign" was launched, attracting over 3,000 volunteers from schools and community-based groups to help plant an additional 100,000 native plants in a two-year period. Volunteers were taught directly about site conditions, ecological values, and botany, and more indirectly on the importance of community participation and organization. This program has continued with a weekly Saturday drop-in clinic to provide for the ongoing maintenance of park plantings (NPS c.).

According to the National Park Service, *"it was their [volunteers'] first experience with a natural area and a national park. Being able to see the results of their work both on the day of the activity and over time as the plants mature - allowed many people to develop a sense of ownership for the restoration. When a community establishes a sense of guardianship for an area, it is less likely to be vandalized or used inappropriately."*[14]

Protected dune habitat at Crissy Field. (Power)

14. http://www.nps.gov/partnerships/rest_crissy_field.htm

The project's commitment to "community inclusiveness" as a fundamental driver in the creation of park created a prominent place for contributions of time and money from individuals and community groups through the Help Grow Crissy Field Campaign. Whenever possible, activities were staffed with trilingual personnel – English, Spanish, and Chinese – so that volunteers could enjoy the interpretive aspects of the program and make a strong and long-lasting connection to the site (NPS c.).

The National Park Service also collaborated with Ohlone individuals and tribal groups to include the midden in the development of the park. The Ohlone and the National Park Service signed an agreement to set aside 5 acres to preserve the midden adjacent to the new marsh site, leaving it to be disturbed as little as possible. This celebration of place as cultural history differs from the more traditional archaeological approach, which would have excavated and removed discovered objects, preserving them in a museum (NPS d.).

vii. Outcome: Crissy Field as an Ecological Park

In creating its eventual program, park designers integrated cultural ecology, natural ecology, pedagogical experience, community building techniques and venues for active recreation. The outcome, as thus described, is a landscape defined by both a celebration of its history and current site conditions as well as its connection to a larger urban condition. Attention will now be paid to understanding the different ecological elements that define Crissy Field.

Pedagogic signage along pedestrian promenade.
(Power)

G. Application of Ecological Analysis

[A summary chart is provided at the end of this chapter.]

1. Positive Analysis: Natural Ecology

i. HABITAT DIVERSITY

Water: The primary creation of habitat revolves around the constructed marsh system, where subsequent assessment has indicated the presence of a naturalized system, including mud-dwelling crustaceans, mollusks, fish and predatory native birds. Migratory birds flying the Pacific Flyway between South America and Alaska have begun to use the marsh as a feeding and resting spot in both fall and spring. Careful attention was paid in the engineering of the outflow channel to ensure the appropriate level of salinity and tidal ingress/egress.

Land: Enclosed plantings of native shrubs adjacent to the wetland on the site of the Ohlone midden provides a habitat patch for small mammals, insects, and native and non-native birds while a roped enclosure 'protects' from the presence of dogs and people.

Patches of habitat were also created along the length of the restored sand dunes, although their limited, elongated size bounded on both sides by intense human activity questions their ability to provide habitat for animals larger than small birds.

Protected habitat and dramatic vistas. (Power)

Pervious promenade which runs the entire length of crissy field. Dunes to right, marshland to left. Note preserved historic structures in background. (Power)

ii. LAND MOSAICS

Complexity. Heterogeneity in patch dynamics is better than homogeneity (Selman, 1993; Forman, 1995). The creation of an irregularly shaped marsh, varying widths, densities, and height of foliage, and alternating conditions along the dunes would suggest support for ecological diversity.

Perimeter-to-Area Ratio of patches: Increased fragmentation of habitat patches correlates with an increased perimeter-to-area ratio (PAR). In other words, an increasing ratio of this sort leads to a decrease of the habitat core, which the literature suggests correlates with decreased ecological viability for those species requiring core habitat (Dramstad et al., 1996). Patches within the park are small and therefore contain high PARs, suggesting a decrease in the ecological richness of the site. The decrease in the marsh area from the original 135 acres to the 25 current acres speaks to this loss of core habitat area and an increased PAR. Those species that thrive in edge conditions, such as smaller birds, are promoted, while other species such as sensitive plants, insects, and other fauna might be hindered. Overall, an increased PAR speaks to increased risk of, or tendency towards, loss of species diversity.

Disaggregation of human and natural uses. Attempt was made to disaggregate and physically separate the parts of the landscape into three typologies. The first, the most 'natural' setting, precludes the presence of direct human activities. These areas include the dunes, the marsh, and a buffer around the marsh. The second typology allows human entry but only along designated paths. A wood-planked walkway crosses the midden area to allow human exploration but keeps the majority of the area off-limits. In this area dogs are precluded. The third typology allows for active recreation, and includes the entire length of the beach (aside from a preserved connecting corridor between the dunes and the bay), the wide walkway behind the dunes, as well as the grass airfield and picnic areas. Allowing for patches that remain undisturbed by people and dogs would suggest a decrease in disturbance and an associated increase in ecological richness in those areas.

Regional Relationship: The restored marsh at Crissy Field is the only marsh within a many-mile radius. This would suggest little lateral transfer of species from other marsh areas. The exception to this reality would be that of birds and insects able to fly greater distances as well as perhaps waterborne species. Crissy Field's main regional connection is that to migratory bird species.

iii. USE OF NATIVE VEGETATION

Native vegetation was used for all plantings onsite. This includes the grass airfield, which used native bunch grasses instead of standard turf. According to documentation on the NPS website, over 100,000 native plants were seeded onsite and used in the design.

iv. HYDROLOGICAL SYSTEM

Surface Water: The design of the park replicated, albeit to a limited scale, the natural surface water condition at the site.

Water Loop: The design of the park revolved around the engineered reproduction of natural site hydrology. Stormwater outflow, instead of being piped and discharged directly into the bay as was the condition prior to restoration, is redirected into the marsh to allow for biologic filtration. Although not a part of the original design, planning work is being done to consider the extension of restoration efforts along the creek that feeds the marsh, creating a linear, continuous upland riparian corridor.

Irrigation: The only area of the site that is irrigated is the grass airfield. The original intent was not to provide any irrigation, yet public discontent over the natural browning of the grass has lead to the establishment of a limited irrigation program.

Impervious Coverage: Impervious surfaces were kept to an absolute minimum. The pathways and the promenade are all pervious, constructed of crushed, compacted stone. Most surface parking is seeded earth. No new impervious construction, with the exception of a small public restroom and outdoor shower source for surfers, was added to the site.

v. SITE FITNESS

Physical aspects of the site, such as size, topography, aspect, climate, soil, hydrology, vegetation and wildlife, together with cultural and social influences, and current uses combine to give a site its distinct character. An ecological approach would take prevailing site conditions at its lead. Efforts to integrate natural and cultural features at Crissy Field into a self-sustaining system would suggest a desire to promote improved site fitness.

In overlaying the park design on historical photographs of the natural site condition, there is a clear correlation between the placement of design features and historical conditions. Dunes are located generally in the same place and are around the same size, while the marsh, albeit a bit smaller, is also located generally on a portion of its original site. This demonstrates an understanding of the

need for design to consider fitness as it speaks to the pre-established equilibrium as a result of natural processes.

vi. OPERATION & MAINTENANCE

Maintenance. Increased maintenance of the landscape to suit aesthetic desires is correlated with decreased biodiversity. While the intent of the program at Crissy Field was for maintenance to be kept to an absolute minimum, the realities of maintaining native flora on a landscape with continuous non-native seed deposition has proved difficult. Volunteers are needed to weed the landscape on a weekly basis.

In order to maintain the opening of the marsh channel, the monthly use of a backhoe has proved necessary. Again, this was not part of the original design plan, but has resulted from unanticipated littoral sand drift along the beach.

Overall, the maintenance program at Crissy Field is required to maintain the 'natural' state of the design but is less intensive than the maintenance program one would encounter at most urban parks.

Fertilizers and pesticides. Fertilizers and pesticides are not used at Crissy Field.

vii. TOWARDS ECOLOGICAL STASIS

In a general sense, an ecologically designed landscape should promote greater ecological health rather than detract from it. While this is a difficult concept to quantify, the program of an ecological park should, in a qualitative sense, provide a spatial element through which ecological repair and/or creation of habitat is more possible than without it. Crissy Field meets this threshold, as it has provided for the addition of native habitat and hydrological cleansing that would otherwise not be found on the site.

2. Contextual Analysis: Cultural Ecology

i. PEDAGOGY

With the learning center and informative signage along major pathways, the park in a very immediate sense provides active communication with the parkgoer around issues pertaining specifically to the natural ecology. The provision of guided tours further promotes this objective. The revelation of the function of the landscape provides a passive communication that in combination with the signage, is intended to provide the parkgoer with a fundamental understanding of the relationship between the land and natural functions, biotic and abiotic, that are in constant play in the landscape around them.

A trailway around the marsh is lined with signage that discusses the historical context of the marsh, from its pre-human days to the designed restoration. Discussion of specific ecological processes and accompanying imagery is provided with this signage. Design features that do not detract

from the quality of the landscape also impart the idea of respect for nature through sensitive interaction. Ropes, for example, are low to the ground and blend into the foliage. Pathways are clearly delineated so as to define paths of entry while areas of highest critical environmental concern are labeled as such to discourage entry.

The level of pedagogic programming at Crissy Field, channeled through the Crissy Field Center, is impressive in both its scope and scale. The Center is housed in a renovated Army building, and contains a media lab, urban ecology lab, arts workshop, bookstore, library, museum center, classroom, and meeting space. A dedicated staff runs the Center, while volunteers from different academic, professional, and cultural backgrounds provide a series of seminars and outdoor events. A look at the events calendar shows at least one activity each day of the month.

ii. INVOLVEMENT & STEWARDSHIP

An ongoing open call for volunteers to "help keep Crissy Field green, clean, and free of invasive weeds" is a popular attraction at the park (NPS e.). Donations through the Conservancy Membership program help secure financial means to promote park programming while encouraging a sense of stewardship of the land.

iii. ECONOMIC SUSTAINABILITY

As part of the Presidio, Crissy Field is financially self-sufficient. The restoration of the park was financed completely with charitable donations and programming is maintained through leasing of space on the Presidio. Public appropriations are not used to finance park operations.

H. Discussion

This study began by postulating on the notion of ecology and what the use of the word in the redesign of Crissy Field was intended to reflect. If Crissy Field is a physical representation of the ecological park model, what can it tell us about that model? From this, what can the park tell us about the importance of a designed interrelationship between the cultural and natural landscapes?

In considering first the *natural* features of the park, both the park designers and current administrators concede that there have been unanticipated failures in the sustainable functioning of the constructed marsh. While natural ecology has been reintroduced and is thriving, continued success, at least in the short term, requires mechanical intervention. This outcome is not what was intended, and a study to better determine how to allow for natural regulation of the marsh has recently been returned on commission.

While the lack of sustainability is not ideal, is this failure relevant? If in fact what is important is intent, and not necessarily outcome, should we not consider as the defining element the fact that the design called for the reintroduction of a missing natural system as the central feature of the park? It is argued that the significance of Crissy Field lies in its placing of natural ecology as

its central feature, the way perhaps a picturesque designer would have molded hills and trees to create the perfect image. What separates Crissy Field from the picturesque is that its aesthetic was driven by the natural conditions, not by an *idealized* vision of that condition.

From a purely systematic perspective, the marsh's connection to the larger hydrological system at Crissy Field and the greater Presidio area is being reestablished and is beginning to function much as it had prior to human intervention in the 19th and 20th centuries. Although smaller in scale, it is clear that inclusion of the marsh in the design of the park represents not only an aesthetic insertion to the landscape but a learned natural insertion reflective of a positive ecological ethic.

Further, if in fact aesthetics were the only desired outcome in including the marsh, the project could have been done easier, cheaper, and perhaps in a more visually dramatic fashion. While aesthetics are part of any design process, the primary goal of the intervention was a functioning natural ecology that through its own internal workings, could become self-sufficient.

Tied to this *natural* program is a *cultural* program that integrates parkgoers with the natural and historical ecologies of the landscape. The intent to provide a pedagogical experience to observers that speaks to the relationship between the site on which they stand and the larger urban and regional landscapes around them is commendable. The park thus becomes an outdoor classroom, providing a revelatory experience of both the natural and cultural ecologies that would otherwise go unnoticed.

The myriad of different activities organized through the Crissy Field Center with respect to both the natural and cultural ecologies of the site is testament to this resolve. Summer programs bring youth into the park, teaching them the value of stewardship, while weekend activities attract visitors and community members alike to help with the ongoing ecological maintenance of the park.

The notion of revelation, both through signage in a direct sense but also in a slightly less demonstrable experiential sense, is key at Crissy Field. While recreating natural ecologies and preserving cultural ecologies is an important aspect of the park design, perhaps of greater importance is the communication of those natural and cultural ecologies to the parkgoer. With this, the purpose of the ecological park becomes the provision of an improved understanding of the natural systems functioning with the landscape and the connection of those systems to the surrounding urban environment.

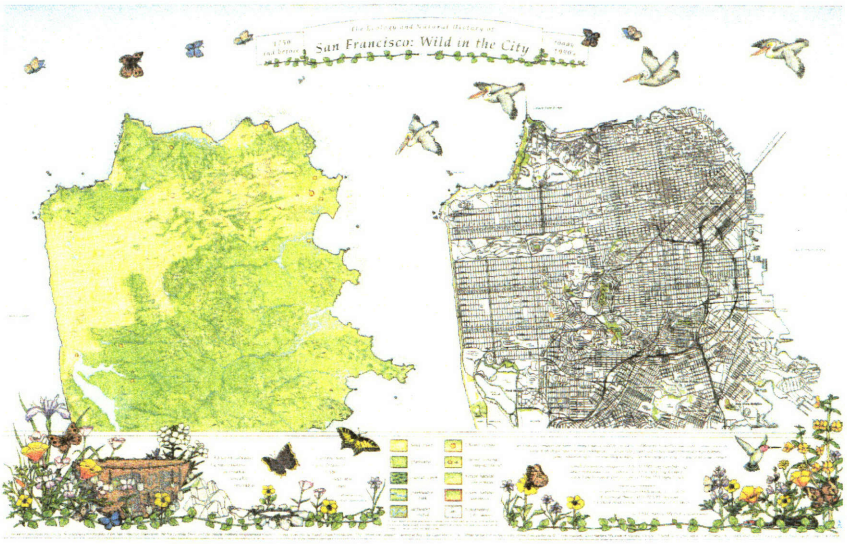
What is so impressive about the design of Crissy Field is the balance that was found between the natural and cultural landscapes. Instead of feeling as if this balance came at the expense of one landscape over the other, one cannot help but experience the synergistic relationship between these two programmatic interventions, that in the end, provide a whole better than the sum of the parts.

I. Summary Matrix

PARK'S ABILITY TO PROMOTE ECOLOGICAL FUNCTION BY PHYSICAL FORM	NATURAL ECOLOGIES													CULTURAL ECOLOGIES			
	HABITAT		LAND MOSAICS				NATIVE VEGETATION		HYDROLOGY		FITNESS		O & M	TO STASIS	PEDAGOGY	STEWARD-SHIP	HISTORY	FINANCE
	WATER	LAND	COMPLEMENTS	P.A.R.	SEGREGATED USES	REGIONAL CONNECTION	WATER	LAND	SURFACE	LOOP	WATER	LAND						
HIGH	•	•			•		•	•	•	•	•				•	•	•	•
MEDIUM			•	•								•	•	•				
LOW						•												
NONE																		

J. Lessons to Extract

- Emphasis on ecological and historical revelation.
- Using a restored natural system as a central design element.
- Provision of habitat.
- High level of programmatic and design fitness.
- Strong pedagogical component.
- Ongoing didactic programming and opportunities to promote stewardship.
- Ecological aesthetic as a communicative device.
- Physical and experiential connections to city.
- Sustainable operation & maintenance and planning practice.



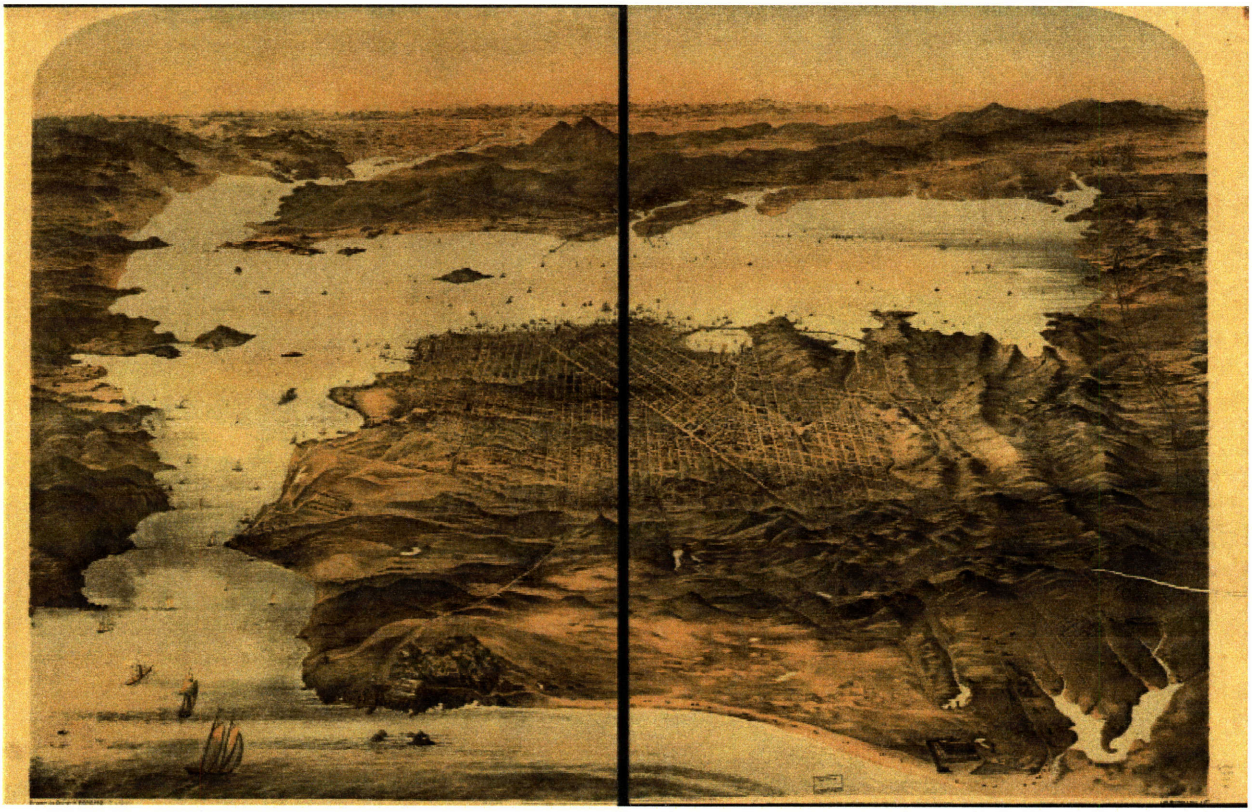
San Francisco before 1750 and today. Note the extensive marsh along the city's northern waterfront before development. (Nature in the City)

Chapter 6. Comparison to Golden Gate Park: The Early Picturesque

"When man undertakes to make a woodland park, his object and sustained endeavor must be to cause the result to seem to be a work of nature...[As a result] the most artistically and practically successful woodland park making may not challenge the widest praise, simply because those who see it do not realize that it is the work of man. They instinctively take it for granted that nature made it."

–William Hammond Hall, designer of Golden Gate Park

Having considered two ecological parks in rather extensive detail, this study now turns to its consideration to the first of two non-ecological parks. The intent again is to help identify the significance and meaning of the ecological park by comparing it to the park type from which it purports to distinguish itself. As with the ecological parks, the role of ecology, both natural and cultural, will be considered in the design conception and current manifestation of Golden Gate Park. This chapter will begin with an analysis of the ecological conditions as they existed prior to the park development and how they were changed as the park was built. Intent will be discerned from an analysis of the dialogue, both historical and contemporary, as it deals with ecological value. The chapter will conclude with a brief discussion on the significance of Golden Gate Park as representative of the Picturesque movement, and the possible distinctions between its design and the lessons previously discerned from the analysis of the ecological park.



Early image showing the as yet undeveloped "Outside Lands." Note the dunes leading to the beach. This was to be the site for Golden Gate Park. (Library of Congress)

A. Introduction

Golden Gate Park, conceived and designed during the early part of the picturesque municipal park movement, demonstrates the contemporary attitude towards nature, ecology, and the role of park. Its selection as a case study is intended to demonstrate the ideas and principles that guided the design and construction of the picturesque park and the influence of the natural world in this design and construction process. Golden Gate Park was the product of an Olmsted protégé, and the dialogue between the two illuminates the contextualization of the park within a grander movement. This chapter will focus on the siting of the park, the dialogue leading up to construction, and will end with a consideration of Golden Gate Park's current state.

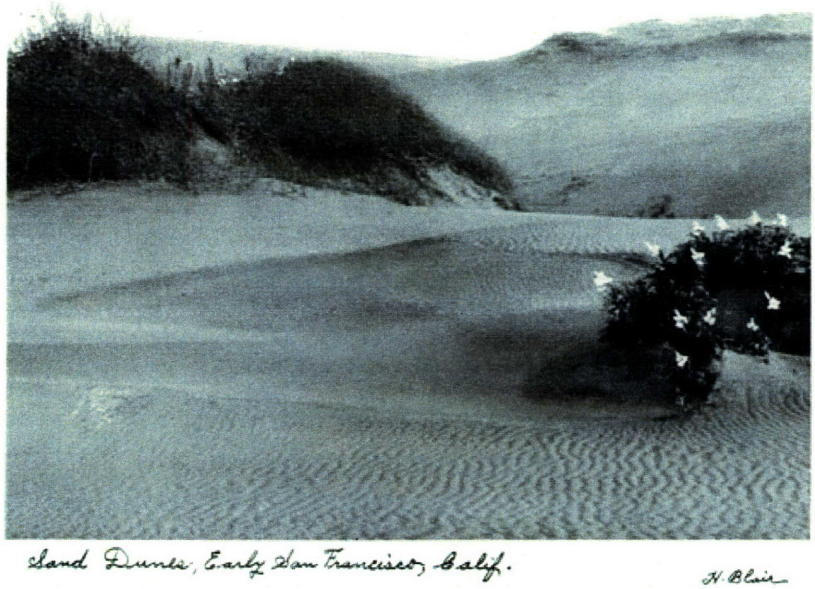
B. Preexisting Site Ecology – The "Outside Lands"

A contemporary historian on California coastal ecology, John Young's reserved assessment of the park site is probably the fairest one: *"The land for the new park was not selected with reference to its fitness for the purpose, but it was the best land that could be obtained."* In fact, the inhospitable nature of the landscape from the perspective of 19th century society was a formidable levy on the land, warranting reference only as the "Outside Lands." It was a landscape of rolling, shifting sand dunes, an incessant biting wind from the ocean, foggy days and nights during the summer and wet winters.

Of the 1,000-acre site, shifting sand dunes covered all but 270 acres at its east end. Of these 270 acres, approximately 200 were also originally dunes, but according to William Hammond Hall, Golden Gate Park's first superintendent, they "had by natural process become clothed with native growths" of grasses and other binding herbaceous species, making them relatively fixed. Wrote Hall:

Lower structure along beach is at the approximate location where Golden Gate Park would meat the ocean. Note the dunes and the lack of tree cover. 1865. (SFPL)

"The pronounced hills and ridges of this eastern 270 acres...carried a scrubby live oak [Quercus agrifolia or Q. berberidifolia] growth, which seldom attained a height of more than 10 feet... The intervening valleys in this portion of the park were unsightly, hummocky surfaces of sand, held by the rough native sand-plant growths, in which the blue lupine [Lupinus chamissonis] and prostrate escallonia [Escallonia spp?] predominated. The hummocks were densely overgrown, the intervening depressions generally bare, loose sand. Through the winter and spring, water to the depth of a foot or two accumulated in the three larger depressions, making ponds each an acre or less in area, where frogs croaked and snakes wriggled through the little marshes of sedge grass around the margins. This portion of the park site presented a bright appearance in the springtime when the lupine and other flowering plants were in bloom, but the bright effect was of very short duration."[1]



Endemic dune conditions within the "Outside Lands." (SFPL)

The Outside Lands included what are today the Richmond and Sunset districts of San Francisco, a sizable area to the west of the Height-Ashbury and what is now downtown San Francisco. The vast majority of these roughly 8,400 acres were covered in blowing sand dunes which blocked streams in the west to create a series of tidal and freshwater ponds and lakes, the most significant of these being Lake Merced, Pine Lake, Laguna Honda, and Mountain Lake, many of which exist to this day, albeit in highly altered states. The constantly shifting sands, cool temperatures, and the inability of the sand to hold water, proved a harsh environment for plant life (Young, 2004).

Yet despite this adverse environment, vegetation here was rich in diversity, with a "variety of grasses, herbaceous species, and a few shrubs." These grasses included dune grass (*Leymus mollis*), salt rush (*Juncus lesuerii*), Pacific wild rye (*Leymus pacificus*), and sand-dune blue grass (*Poa douglasii*). Low-growing groundcovers like sand verbena (*Abronia latifolia*), California salt bush (*Atriplex californica*), beach strawberry (Gragraria chiloensis), and sea plantain (*Plantago maritime*), were found along

1. William Hammond Hall, as quoted in (Young, 2004).

the interior rows of dunes. Yellow bush lupine (*Lupinus arboreus*) and chamisso beach lupine (*Lupinus chamissonis*) were the most conspicuous shrubby plants, the latter being most common where sand gave way to dirt. Elsewhere, one could also expect to come across coastal sagewort (*Artemisia pycnocephala*) and coyotebrush (*Baccharis pilularis*)" (Young, 2004).

As one critic who preferred a competing site later described this area, the park had *"been located in the midst of sand hills that are devoid of any natural beauty or attraction – a mass of barren, desolate sands, utterly unsusceptible [sic] of any improvement whatever."* Others were more blunt; Thomas Magee, the influential editor of the San Francisco Real Estate Circular, repeatedly refereed to it simply as *"The Great Sand Park"*(Young, 2004). Clearly, the windswept, shifting, and yellow sand dunes with their scattering of vegetation failed to approach the landscapes described by Andrew Jackson Downing or the picturesque parks *en vogue* designed by Calvert Vaux and Frederick Law Olmsted.

C. Contemporary Dialogue on *Park* for San Francisco

With the discovery of gold in the foothills of the Sierra Nevada in 1848, San Francisco grew from a meagerly population of an estimated 1,000 in 1846, to 30,000 in 1856, and 234,000 by 1880.[2] In 35 years, San Francisco had gone from being nothing more than a pueblo on the Pacific coast to being the 9th largest city in the United States. With this growth in population came a new wealth, and the new social and political elite that were created began to demand the civic qualities of the best "eastern cities." How better to catapult San Francisco into the realm of the great cities than build a picturesque park of grandeur as had been done recently in New York City and Brooklyn. And who better to build this park than Fredrick Law Olmsted himself. Only he could bring sophistication and culture to wild San Francisco.

Upon invitation, Olmsted submitted a preliminary plan for an open space system in 1866, consisting of a "Rural Ground" of approximately 200 acres connected to a series of linear corridors and avenues extending north and northwestward. "Olmsted carefully avoided the term *park* for any portion of the project," Terence Young, a prominent Golden Gate park historian, describes, because a park, in his mind, was inappropriate for the semi-arid west (Young, 2004).

But Olmsted's plan for a park system was lukewarmly received. It wasn't the grand, densely planted, Central Park of New York that an influential group of constituents desired nor was it in line with the immensely popular writings of Andrew Jackson Downing. As in New York City and decades later in Boston, a primary motivating factor in the desire for park was the real estate value such an improvement would create. It is not completely coincidental that the constituents pushing for a park owned much of the Outside Lands. Yet another group rejected the notion of park altogether, arguing that San Francisco's "treeless, wind shorn and sandy suburbs" offered "no fair opportunity of forming a park."

The Daily Alta California, a major San Francisco-based newspaper at the time, added its voice to the rising chorus in support of parks but against the Olmsted plan for a system. Instead, in solidarity with those pushing for new real estate, and in line with the contemporary picturesque

2. 1846, Museum of San Francisco; 1856 and 1880 populations, U.S. Census

philosophy of the time, the paper favored a large central park where one could be completely immersed in a natural landscape. Under the banner of "*A Great Public Park Wanted in San Francisco*," the Daily Alta California maintained that the city's landscape, devoid of any "real and necessary" nature, was in great need of a grand park.

"Looking at our city from the bay, or the Golden gate, in the summer and fall, we see a mass of yellow houses on yellow hills of yellow sand or yellow rock... We want a place where, under the protection of our hills, we can have fifty, a hundred, or two hundred acres, sown with grass, planted with trees and laid with roads pleasant for walking and driving. We need the reviving influences of beautiful nature."[3]

Homesteading along the edge of the site to be chosen for Golden Gate Park. This area would become the present-day Sunset district of San Francisco. Note the sandy nature of the soil. ca 1860s (SFPL)

Olmsted was sympathetic to the naysayer who based his argument on what was thought of contemporarily as poor site conditions. He himself considered the project a daunting endeavor, but realized that any opportunity of success would be hinged upon the ability to design an open space particular to the arid coastal conditions of San Francisco, not the verdant semi-tropical gardens east of the Mississippi. *"It must be admitted that the attempts to form a park in the style of Central Park or the parks of London and Paris, would be absurd... That it would need to be of an original and quite peculiar style is probable."* But thoughtful design could overcome these anticipated barriers and produce a space particular to San Francisco yet as equally dramatic in the style of the picturesque, Olmsted argued. *"Though, it would perhaps require much careful study to secure it, it is not unreasonable to believe it practicable"* (Olmsted, 186x).

D. Site Selection

Olmsted's park system in present day Hayes Valley was coolly received. Most people in San Francisco preferred a single, large park to a series of smaller, linked facilities. George Fitch, the editor of the *Daily Bulletin*, captured the popular sentiment at the time, arguing that San Francisco should be like New York, a world-class city. The latter, he noted, did not create a system of parks. Why vary from a proven formula?

3. Young, 2004.

Instead, city commissioners, many of whom stood to profit by improved real estate, voted to acquire a large parcel within the Outside Lands to become the new park for San Francisco. Hired first as an engineer to survey this newly designated reservation, William Hammond Hall (1846-1934) reflects on the site selection in an 1886 report to the park commission:

"The selection of the present Park site was made in the face of bitter opposition. It was generally believed and repeatedly urged by a good portion of the local press, that an attempt to built and maintain a Park on the dry sands and brush-covered hillocks which composed the site, would prove a costly failure...declaring that no Park could be built there, and no verdure maintained, at any cost which the city could afford... As a matter of fact, the selection has proved, and will continue, as time rolls on, to prove, a wise one. The sands afford a warmth essential in a Park for San Francisco, which a clay soil would have rendered impossible to attain..." (Hall, 1886).

With the site selected, the next task became surveying the land and planning for a park that would reflect the popular conception of what nature *should* look like – green – but pragmatically feasible on a landscape of sand.

E. Site Design, Programming, and Ecological Implications

Faced with this daunting prospect of programming a park upon a landscape of "sand waste," the new park commissioners in April 1870 called for bids for a land survey. Numerous offers were received, but the lowest bid, at $4,860, came from William Hammond Hall, "a pivotal character in the creation and definition of Golden Gate Park" (Young, 2004).

The contract was awarded to Hall in August 1870, and he immediately set to work with a corps of assistants to identify the boundaries, soil, and surface features of the park on an otherwise uncharted piece of the city. In February of the next year, Hall presented his completed topographic survey to the commission, reporting that, of the park's 1,019 acres, only the easternmost 270 or so "were clothed with native growths" with the remainder a wasteland of Pacific sand dunes. The commissioners accepted Hall's report and deliberated the next course of action. Obviously, if a Central Park-type landscape were ever to emerge from this unpromising site, the dunes would have to be removed or stabilized. There was no room in the static picturesque idea for an evolving landscape. But how could this stabilization occur and who would do it?

Hall, an inexperienced landscape designer (or 'gardener' as the profession was called at the time), immersed himself in the literature written about the great eastern parks, including Central Park and Prospect Park. A firm believer in the Romantic ideal of the picturesque, Hall caught the idea of taking those plans and closely adapting them to the specific conditions found in San Francisco. He exchanged a series of letters with Frederick Law Olmsted, soliciting advice on the planning and design of this new park. In a reply to Hall, relating specifically to the notion of adapting and applying a preconceived plan, Olmsted wrote:

"I do not believe it practicable to meet the natural but senseless demand of unreflecting people bred in the Atlantic states and the North of Europe for what is technically termed a park under the climatic conditions of San Francisco. Experience in Persia, Turkey, Smyrna, Spain & Portugal would afford more

suggestions for what is practicable and desirable than any that could be derived from English authorities. But the conditions are so peculiar and the difficulties so great that I regard the problem as unique and that it must be solved if at all by wholly new means & methods. It requires instruction, not adaptation."[4]

Nevertheless, any park design would require the taming of the dunes in one way or another, yet no clear precedent existed in the U.S. for how to do this – early attempts to mimic European efforts failed in San Francisco. Ultimately, after repeated failures, the method that proved to work was discovered by accident, after soaked barley seeds fed to one of Hall's horses germinated and developed a thick mat over the sand. Hall then mixed these seeds with those of endemic coastal pine and lupine and spread the mixture over all the dunes both within the boundaries of the park site and on adjoining parcels, 'halting' the movement of well over 1,000 acres of drift sands in as little as a year or two.

Topsoil, which was otherwise non-existent, was created using horse-manure collected from the streets of the city by municipal sanitary services.

With the temporary stabilization of the dunes and a developing soil medium, quick-growing and hardy evergreen trees were planted in many places throughout the park. Intended to serve as shrubs and to give the appearance of deliberate care in the short term, these evergreens were also used to provide shelter from "the driving winds" for the intended specimen trees planted directly behind them. Of all the natural systems at play on the site, wind, more so even than the sandy dunes, proved the most important consideration in the ultimate design of the park.

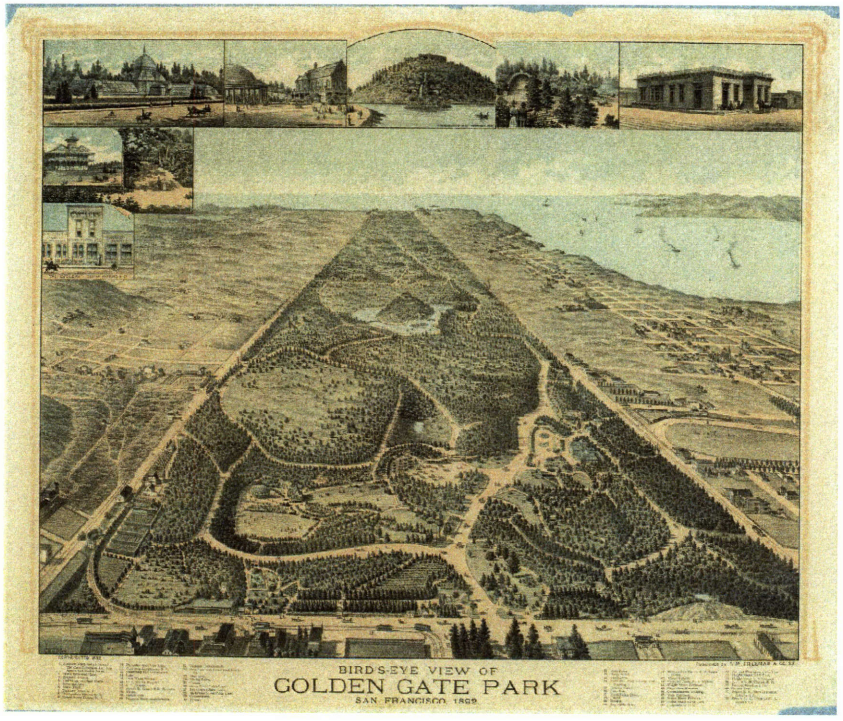
On the overall design concept for the park commented Hall:

"Simplicity of design and economy of construction, improvement, and maintenance, were ever held in view. I was early warned from an experienced source, and confirmed the lesson by observation, that it was an easy matter to make a great garden and lawn of the Park by the expenditure of sufficient money, but that it would cost enormously to maintain such a place, and that the most desirable ends of "repose" and "warmth" were chiefly to be obtained by simpler means; namely, a judicious shaping of the grounds, a sheltered location of roads and walks, a skillful disposition of trees and shrubbery, and the maintenance of a green covering to the ground without constant watering."[5]

F. Site Hydrology

Yet given the sandy soils and varied topography, drainage on the park site was very good – too good in some areas. In the sandiest of soils, the only way to keep the newly planted verdure green was with extensive, almost daily, irrigation. Fortunately, a significant aquifer existed beneath the park site, varying between 10 and 35 feet below surface grade. The aquifer was closest to the surface on the eastern edge of the park, which coincidently was also the highest topographical point. The gravity advantage that this provided in combination with the easy to dig sandy soil throughout the park made the construction of an elaborate system of drainways and irrigation piping a relatively easy endeavor (Clary, 1980). The primary intervention against the preexisting

4. Letter from Frederick Law Olmsted to William Hammond Hall, October 5, 1871, Hall Papers, Bancroft Library, p.1-3 as quoted in (Young, 2004)
5. Hall, 1886.



Vision for the park. Notice the lack of development along both the north and south sides of the park. (SFPL)

With the development of the park and the stabilization of the dunes, real estate value was quickly generated. This is a photograph looking south towards the Sunset District ca. 1915. (SFPL)

site hydrology was bringing the water to the surface. In the year prior to 1876, an estimated 17,822,600 gallons of water were used to irrigate the newly planted greenery throughout the park (S.F. Parks Commission, 1870-1).

G. A Philosopher of the Picturesque Comments on Golden Gate Park in 1886:

If one person need be chosen to represent the picturesque philosophy, Frederick Law Olmsted would be an easy choice. In many ways, his personal beliefs defined the popular philosophy towards park and nature and their meaning to the city. Therefore, Olmsted's commentary in the 1880s on the development of Golden Gate Park is a useful addition worthy of further exploration. In the 1880s, the Park Commission conducted a post-occupancy study of sorts, looking at the progress and considering the future of Golden Gate Park. It was to this Commission that Olmsted submitted an open letter.

On the role of parks in a general sense "fit for occupation by a city's crowds", Olmsted offered that the use of "natural outlines and growths" need be considered in designing a landscape "suitable for the distinctly rural recreation of people." With this, the park becomes a venue through which "relief and counterpoise to the urban conditions of [the] ordinary circumstances of life" is achievable. In order to attain that rural landscape, Olmsted continued, "the work of nature" must be harvested, and in doing so, the "the obstacles to the necessities of use must be removed." In line with the agrarian ideal of the American experience, he offered that natural processes should be encouraged and controlled or "started and assisted." For Golden Gate Park, Olmsted argued, the most important consideration need be in the "provision of ways by which the results of nature's work may be enjoyed by the public without injuring and wearing them out."

With this, Olmsted criticized a section of the park known as Conservatory Valley. Here, manicured gardens, not a rural landscape, were programmed into the landscape.

"What has been done for this purpose, chiefly in the garden of your Conservatory Valley, is a good piece of handicraft in the style that for some time past been in fashion, but from which a reaction seems now setting in through communities older than your own. Your ornamented ground and flower garden being in no respect the product of local circumstance, or representative of distinctly local taste or study, and its full value being already realized, calls for no expression of judgment from me as to the possibilities of its future. I will only say that I am included to think that it was unfortunate the ground was taken for this purpose within the territory to which the term park has been applied, because it tends to confusion of public opinion between the wholly irreconcilable purposes of a rural park and those of an urban garden, and to favor neglect of the more substantial and more permanently important of the two."[6]

Yet overall, Olmsted's commentaries were positive. He offered that Golden Gate Park could not "fail" in the notion of the picturesque ideal so long as "decently conservative management and sustained study of the demands which nature makes apparent" were to continue. Nature, if channeled correctly, could make Golden Gate Park far more attractive and useful in ten years and "a hundred years hence than ten," he added.

To this letter from Olmsted, Hall offered his own personal predications. Yet Hall's commentaries were ironic, even to the standard of the time.

"The art of improving grounds has undergone great changes in modern times. It was formerly the practice to make everything assume an artificial appearance, after fixed and regular forms, a seeming

6. Olmsted, 1886.

attempt to apply the rules of architecture to landscape gardening. Of late years, however, it has become the practice to leave nature as nearly in her normal state as possible, and only to endeavor to hide that which is unsightly, while still concealing the means applied."[7]

Yet with this said, the entire endemic landscape and ecological function of the Golden Gate Park site was reformed, leaving nothing in its "normal state."

In an extended commentary to the San Francisco Park Commission about 10 years after the initial construction of the park commenced, Hall reflects back on his motivations and design considerations, specifically relating to nature, as he defined it:

"The theory of this whole improvement was clustered around the ideas of "repose," and "warmth" and "enlivenment." To attain these in our particular climate, without sacrificing breadth of treatment... and to make a park-like effect by simple and inexpensive means, was the subject of seven years' thought and work on my part..."

"The forestry and landscape architecture of the place was particularly the subject of consideration. What was the nature of the landscapes, which could be produced and maintained under the circumstances, at reasonable cost? What was the character of verdure with which the place should be clothed, and what its general plan of disposition to effect the leading ends desired? These were the ideas and questions that led the thought and guided the work, in originally laying out and planting the Golden Gate Park."

"When the work of grading was to be begun, there was a proposition strongly urged by outside influences, and seriously entertained, to grade off the place to a plane, like a public square, and run straight avenues athwart it, thus destroying all semblance of natural configuration, and all possibility of rural and true park-like effect... On the other hand, when after the present plan had been adopted, and the work of grading was in progress, the idea was practically developed of retaining the general topographical configuration of the place, and planning to it – opening up reasonably direct lines of communication from valley to valley, by partially cutting away intervening hills, where absolutely necessary so to do, and filling up unsightly hollows to give a breadth of effect, and secure open spaces of reasonable size for lawns, meadows, and concourses – the cry went up that the face of nature was being ruthlessly destroyed, and money being uselessly expended....The result shows that had the gratuitous suggestions offered been taken, we would now have a place akin to a contracted beer garden in plan, and in no way affording the space and relief which the Park of today presents, much less the broad landscape effects which are being developed there."–William Hammond Hall

From *The Development of Golden Gate Park and Particularly The Management and Thinning of its Forest Tree Plantations: A Statement from the Board of Park Commissioners. 1886.*

Published by *Bacon & Company*, S.F. Calif., 1886. Document attained at the San Francisco Public Library History Center and Archives, March 2006.

7. Young, 1886.

H. Golden Gate Park Today

Golden Gate Park is at a crossroads, one that will significantly define its future relationship to both city and the land. This crossroads is most eloquently encapsulated by the reality that almost all the trees on the site, now 125 years old, are reaching the end of their lifespan. Natural succession has not occurred, and according to the GGP maintenance plan, without intervention, it is estimated that in 25 years, only 50% of trees will be left standing. A replanting program at varying levels of intensity has been conducted over the last decade, and the goal of this program is to replace and replicate the exact siting of trees first established by Hall. Neither ecological considerations nor sustainable principles are guiding this reforestation effort.

The current management plan for the park begins with the following preamble:

"*Golden Gate Park's landscape is almost completely manmade, and as such has maintenance requirements that belie its naturalistic appearance.*"

The plan points out that the park in its current condition retains minimal provision of natural habitat. Almost all lake water is eutrophic and banks artificial, precluding the establishment of any lacustrine habitat. With the aging canopy, removal of dead wood, and a reduction of understory vegetation (also not self-replicating), availability of habitat in the park has decreased in recent years. Evidence suggests that predation by, and competition with, domestic and feral animals such as cats have reduced the site's fitness for what was once its primary wildlife – migrating birds (Golden Gate Park Master Plan, 1998).

Recognizing the difficulty in balancing the conflicting objectives between habitat provision and public use, the management plan refers to Hall's original plan for the park, which created two distinct zones based on level of activity. In the western portion of the park where programmed human activity is to a lesser degree than in the eastern part, the plan calls for a greater emphasis in provision of habitat. Whether or not this plays out in practice is unknown.

Golden Gate Park today, looking eastwards. (Roberto Foa)

Key ecological components of current management plan:

- Encouragement of a multi-age, structurally diverse forest, with variation in height and density
- Preservation of the woodland/meadow edge zone
- Leaving ground cover intact to provide protective cover for wildlife
- Leaving snags, dead trees and branches standing as long as possible in the western portion of park
- Strict enforcement of leash requirements
- Designation of important habitat areas and management of these areas for habitat values as a priority use
- An increase of interpretive programming

An important element in the management of the park and its ecological sustainability is its use of water. Total park irrigation is estimated to range between 1.5 mgd during low use periods and 4.0 mgd during high use periods, or the equivalent to that which would supply between 4,000 and 10,000 average California homes per day.[8] Onsite wells supply two-thirds of the water supply while municipal tap water provides the last third. In light of the staggering water consumption of the park, the city of San Francisco is considering the use of reclaimed water from a proposed tertiary plant. No plans beyond conceptual proposals have been documented.

Aging tree canopy. Without an extensive re-planting program, most of the park's canopy will be dead within a quarter century. (Power)

8. Calculated using average home's consumption of 385 daily gallons (http://www.scwd.org).

I. Application of Ecological Analysis

[A summary chart is provided at the end of this chapter.]

*** Historical" indicates the period when the park was first designed, "today" indicates the condition as reflected by the current management master plan. ***

1. Positive Analysis: Natural Ecology

i. HABITAT DIVERSITY

Water

- *(Historical):* No habitat provision was considered. Dales in the sand dunes that had once collected seasonal rainfall and had supported a functioning ecosystem were filled and drained during the course of park development.
- *(Today):* Minimal attempts at providing riparian habitat are discussed in the management plan, yet poor quality has hampered attempts to 'naturalize' the lakes and ponds.

Land

- *(Historical):* Although providing an experience of 'nature' to the city dweller was an intended goal of the plan, designing for habitat was not part of that provision. Some reference has been found to migratory birds using the park early in its development as a resting spot, but this could not be confirmed.
- *(Today):* Minimal attempts at providing upland habitat are discussed in the management plan. Special zones are designated in the park where primary use objectives are defined by habitat provision. Management practices in these areas include reduced woody debris collection and reduced maintenance of growth. Establishing a multi-staged forest in the park is argued to help promote increased habitat for migrating birds.

ii. LAND MOSAICS

Complexity

- *(Historical):* Although zones were curvilinearly shaped and designed of various sizes and heights, the high level of maintenance and low level of endemic plantings would suggest minimal possibility for provision of habitat.
- *(Today):* In calling for a multi-staged, multi-aged canopy and a vigorous, yet diverse, understory, the management plan suggests a strategy towards increasing patch complexity.

Perimeter-to-Area Ratio of patches

- *(Historical):* Curvilinear design, by virtue of an extensive perimeter, often reflects a high PAR. The original design of the park contained few large patches and an associated low PAR.
- *(Today):* With a current management emphasis in keeping, to the highest degree possible, with the original design, the lack of patches with low PAR ratios is likely to persist.

Disaggregation of human and natural uses

- *(Historical):* The original design called for two levels of programming throughout the park. The first, with an intended emphasis on active human interaction, was unlikely to be engaged as functional habitat. The second area, which minimized human interaction by design, would suggest greater possibilities for biodiversity.
- *(Today):* The current management plan continues to reflect this zonal separation, allowing for increased natural function in the western section of the park.

Regional Relationship

- *(Historical and Today):* Regional connections are minimal.

iii. *USE OF NATIVE VEGETATION*

- *(Historical and Today):* Native vegetation was, and continues to be, interspersed throughout the park, although no area is predominantly endemic. Current management calls for special attention to certain native species that are being out-competed by invasives.

iv. HYDROLOGICAL SYSTEM

(Historical and Today):

Surface Water: All surface water is introduced and highly eutrophic, with little likelihood of supporting natural ecology.

Water Loop:Although water used as part of the irrigation program is introduced, the majority of onsite water comes from underground aquifers. This allows for a large portion of the water that is pumped to the surface to percolate back into the aquifer, establishing a closed loop hydrological system.

Irrigation: In order to maintain the verdant foliage of the park on an otherwise arid site, intensive irrigation is required.

Impervious Coverage: In keeping with the picturesque vision of a rural landscape, the use of impervious surfaces was, and continues to be, minimal.

v. SITE FITNESS

(Historical and Today):

Physical aspects of the site, such as size, topography, aspect, climate, soil, hydrology, vegetation and wildlife, together with cultural and social influences, and current uses combine to give a site its distinct character. An ecological approach would take prevailing site conditions at its lead.

In keeping with the picturesque ideal that calls for the use of 'nature' and natural site conditions to be the driver of design, a clear correlation between the placement of design features and historical

conditions does exist. Although the physical form of the park and the distribution of hills and valleys might reflect endemic conditions, the highly unsustainable planting program demonstrates an overall low fitness of design.

vi. OPERATION & MAINTENANCE

Maintenance.

- *(Historical):* In promoting the *ideal* landscape, historical maintenance activities were extensive throughout the entire park, reducing the availability of natural habitat.
- *(Today):* The current management plan does call for alternative practices in certain areas that would suggest promotion of ecological habitat, including the allowance for understory growth and the delayed removal of dead wood.

Fertilizers and pesticides

(Historical and Today): Extensive use of fertilizers and pesticides are employed.

vii. TOWARDS ECOLOGICAL STASIS

(Historical and Today):

In a general sense, an ecologically designed landscape should promote greater ecological health rather than detract from it. While this is a difficult concept to quantify, the program of an ecological park should in a qualitative sense provide a spatial element through which ecological repair and/or creation of habitat is more possible than without it. The program at Golden Gate Park does not suggest a promotion of ecological stasis. Large amounts of irrigation are required to counteract the natural tendencies of the site to revert to dune.

2. Contextual Analysis: Cultural Ecology

i. PEDAGOGY

(Historical and Today):

The level of pedagogic programming at Golden Gate Park is minimal. Outside groups do lead tours through the park and have mobilized recently around preservation of the windmills along the western edge of the park (windmills that Hall believed were distasteful and not in keeping with the picturesque ideal). Volunteerism in regards to park maintenance has been encouraged in recent years by the San Francisco Parks Trust, although ecologically-based pedagogy is absent from these programs.

ii. INVOLVEMENT & STEWARDSHIP

(Historical and Today):

In the course of research for this study, little evidence was found to suggest an active and involved stewardship program.

iii. ECONOMIC SUSTAINABILITY

(Historical and Today):

Park construction and maintenance have been, and continue to be, funded by public expenditure.

J. Discussion

While it is clear that Golden Gate Park is an entirely synthesized landscape with little or no connection to natural ecological conditions, can anything be deemed from its planning and development processes that might shed light on a positive role that ecology and natural functions might have played on its design? Golden Gate Park was selected as a case study of the picturesque in order to gain a firm understanding of the ideas and principles relating to the natural conditions that guided the design and construction of park. Was there any designed and synergized connection between natural site conditions and the needs of the city, its residents, and natural systems?

As was made clear in the analysis of the history of Golden Gate Park, quite a bit of attention was paid to the nexus between intended program and existing natural features. In fact, these natural features were used to define and organize the program. As has been discussed, this is keeping with picturesque philosophy.

But this is where the connection to natural ecologies began and ended in the story of Golden Gate Park. Nothing about the park is *natural*, nothing speaks to the condition of the site prior to being park, and very little, if any, connection exists between this constructed landscape patch and the greater ecological mosaic of the region.

Without extensive maintenance, including irrigation and fertilization, the park would not exist in its present form, reverting over time much to its state prior to being park, a maze of ecologically dynamic interconnected sand dunes. The current program is therefore unsustainable.

From a cultural perspective, this park continues to lack a significant pedagogical component. Other picturesque parks, on the other hand, such as Prospect Park in Brooklyn, have introduced a greater educational program. The ravine, an area which has been replanted with native herbaceous species, is being left to develop *naturally* – i.e. with few maintenance interventions – and in so doing, has begun to allow for active learning pertaining to the dynamism of an unfolding *natural* environment. Prospect Park is also home to the Brooklyn Center for the Urban Environment, which has a significant educational program relating to the park and the greater city area, much like the Crissy Field Center at Crissy Field. A similar level of pedagogy is not found at Golden Gate Park, even though the area is known for its progressive philosophies towards the environment.

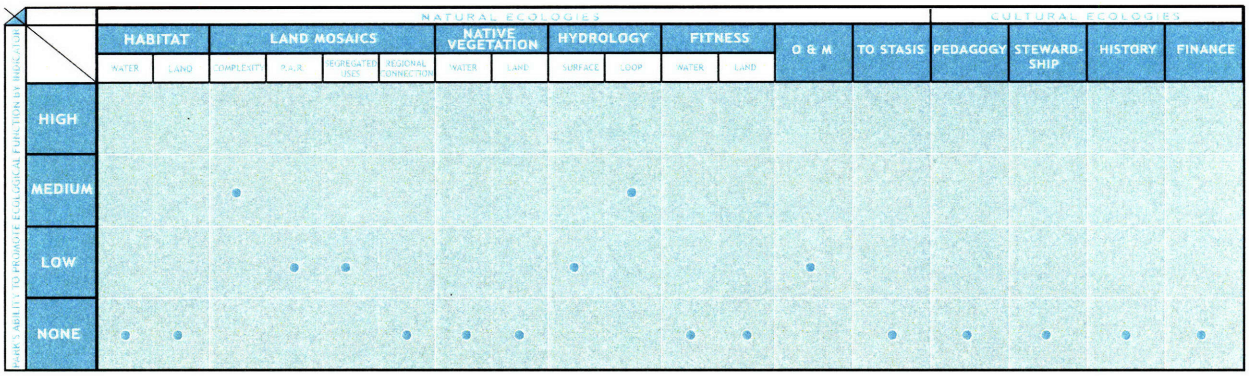
Why does the level of ecological programming continue to be so low at Golden Gate Park? While it is impossible to answer this question definitively, it is proposed that given the inherent conflicting role between the park and its site ecology, such programming would be both difficult to produce and would not be enthusiastically supported by an otherwise environmentally-literate populace. A fascinating proposal for the park, although not a likely one, would be the allowance of certain areas to revert to their natural state, and organizing a pedagogic experience around that reversion.

Yet Golden Gate Park is cherished in the collective consciousness of San Franciscans, and in no way should the criticism of ecological merit be taken as a criticism of the merit of the park itself. From a programmatic standpoint, it is highly successful and is an important element of the recreational network and aesthetic quality of the city.

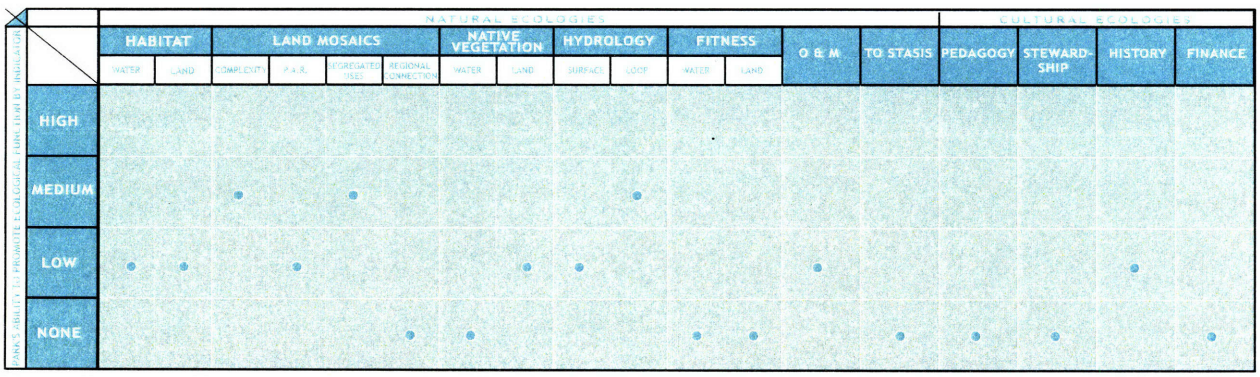
Golden Gate Park is fairly representative of the early picturesque park. It represents an insertion of a program that would otherwise not exist on the site and would not persevere against reversionary tendencies without constant human intervention. Next, a study of a park conceived during a much later, more mature, period of the picturesque movement will be considered in continuing the development of the story of the picturesque park and the natural and cultural environments.

K. Summary Matrices

(Historical)



(Today)



Chapter 7. Comparison to Back Bay Fens: The Later Picturesque

"[The Back Bay Fens] is a direct development of the original conditions…in adaptation to the needs of a dense community. So regarded, it will be found to be, in the artistic sense of the word, natural, and possibly to suggest a modest poetic sentiment more grateful to town-weary minds than an elaborate and garden-like work would have yielded."

- Frederick Law Olmsted, 1880

The following chapter provides the second exploration of a picturesque park. In earlier chapters, two ecological parks have been considered, while a first comparsion against a picturesque park, Golden Gate Park, has also been made. Here, with a second picturesque park, we add the last installment to the story set out upon at the beginning of this thesis. Specifically, in examining the Back Bay Fens, we consider what many offer to be the precursor of ecologically-based landscape planning and design. For this reason, it is important to keep the lessons learned previously and the following question in mind as one reads this next chapter: *is the ecological park new?*

Back Bay Fens, along the Muddy River. Notice the phragmitis choking the riparian zone. (Ron Gilbert)

A. Introduction

Although emerging from the same municipal park movement that produced Central Park, Prospect Park, and Golden Gate Park, among others, the Back Bay Fens, as part of Boston's Emerald Necklace, reflected a more mature, ecologically sensitive conception of what an urban park should be. Instead of being one park, the Emerald Necklace was a string of many that followed natural topographical and hydrological systems. The Back Bay Fens, which is detailed in the next section, moved beyond a mere *reference* to natural systems as at Golden Gate Park, instead harnessing these systems to define a synergistic relationship between recreational space, open space preservation, and improvement of natural systems.[1] The Back Bay Fens was as much about repairing a hydrological system as it was about creating a park. This was a truly revolutionary concept.

Olmsted envisioned a park system as a way to enhance several natural features – linked waterways, heavily massed vegetation, and picturesque islands – as much needed relief to the rapidly urbanizing Boston area (O'Connell, 2001). In 1880, Olmsted wrote that the Muddy River plan would involve "the preservation of the present channel with certain modifications and improvements adapted to make it permanently attractive and wholesome...The result [being] a chain of pleasant waters.... all of natural and in some degree picturesque outline (O'Connell, 2001).

The use of the Back Bay Fens as a case study is important in that it reflects a latter, more developed picturesque philosophy. Many consider the Emerald Necklace as the crowning achievement of both the picturesque movement and the Olmsted firm. The use of this case study, when paired against the work done at Crissy Field and Xochimilco, which both involved significant attention to hydrological systems, will help illuminate one of the questions underlying this thesis research – is the ecological park a new model in park design or is it merely an aesthetic re-conception of established practice?

B. Boston Park Movement

The municipal park movement was late to make it to Boston. It was between 15-20 years after Central Park had been commissioned that Boston would commission its first picturesque park at the Back Bay Fens. But this elapsing of time brought with it an evolved conception of park, and in this light reflects a mature picturesque philosophy. The result of the Fens came as the culmination of almost two decades of discussion, debate, and philosophizing as to the role, form, and feasibly of a public park in the densely built Boston area. The following presents a brief synopsis of this dialogue as presented in the definitive source on the subject, Zaitzevsky's *Frederick Law Olmsted and the Boston Parks System.*

In the early 1860s, in response to Central Park, Boston held a design competition for the Public Garden. Up until that point, the legal status of the plot of land was unclear, and the relationship between the vested elite and the public citizenry in their use of this space was convoluted. But the design competition operated under the assumptions that this plot of land would become a jewel of the public domain, much like Central Park, albeit smaller in scale and condensed in scope.

1. Improvement of natural systems, in contemporary language, was synonymous with sanitary improvement.

The public garden, Zaitzevsky (1982) argues, is best seen as the "preamble" to a much more ambitious debate on the need for a park system in the city of Boston. But its significance lies beyond the site itself, as it reflects the attraction of the picturesque philosophies of curvilinearity and a rural ideal to one of the densest cities in the United States. This sparked a conversation within public discourse on the need for increased quality public space in Boston. After a brief hiatus during the Civil War, this conversation "resumed with vigor in 1865" (Zaitzevsky, 1982).

This conversation was driven by the Boston daily papers, much as in San Francisco, where countless editorials and letters on the subject of parks were published (Zaitzevsky, 1982). In October 1869, a group of citizens presented to the City Council a petition for a public park beyond the public garden. Approximately 40 individuals and corporations, including Marshall P. Wilder, a prominent horticulturalist, and Jordan Marsh and Company, signed the petition. In response, the council established a special committee "to report on what action the city should take." Two public hearings were held in November 1869. As a result of the testimony at these two hearings, the council "passed an order requesting mayor Nathaniel B. Shurtleff to petition the Massachusetts General Court to purchase land for one large park or several small parks" (Zaitzevsky, 1982).

Uriel H. Crocker, a conveyance lawyer, wrote a letter, first to the *Boston Advertiser* and then to the special committee, describing a *system* of parks. His plan included embankments on both the Cambridge and Boston sides of the Charles River, "but its main feature was a continuous winding parkway leading from the Charles River to Chestnut Hill Reservoir." The largest portions of the land proposed for development lay in Brighton (which had not yet been annexed), but had segments in Boston, Brookline, and Cambridge. Zaitzevsky (1982) explains that rather than imitating Central Park by providing a site where "a drive of considerable length might be made to wind so ingeniously that those who passed over it should not be made unpleasantly aware of the fact that they were riding round and round within narrow and confined limits, Crocker proposed an extended linear park in which people could ride or dive directly into the open country." Crocker felt that his park plan was a true central park, in the context not of municipal boundaries but the metropolitan region. It would provide easy access to the vast majority of city dwellers. This was a clear departure from what had at that point been conversations bounded by municipal delineations.

Crocker's plan reflected the dialogue occurring in Boston at the time which was dissimilar in one but very important way from the dialogue that was occurring in other cities across the United States: a park for Boston would be a metropolitan park – one that transgressed municipal boundaries – following natural features and topographical distinctions rather than political artificialities. This was uncharted territory in local politics, and the legislative process enabling such action was slow to develop. After a series of failures, the Park Act of 1875 set the stage for a *park system*. But the system that actually developed, unlike the Crocker Plan and other similar plans set forth afterwards, was smaller in its metropolitan scope, although it did include two cities – Boston and Brookline – using the Muddy and Stony Brook rivers as the spine of a park system rather than an unguided imposition on the landscape.

Over the next twenty years, the plan that emerged from the Park Act changed significantly. As a result of financial constraints imposed by the Great Fire in 1872 and the general economic

downturn of the country, the park plan found itself in direct competition with other municipal projects, such as new Boston sewers (Zaitzevsky, 1982).

In 1877, a "meager" $450,000 was appropriated by the City Council to purchase land of "no less than 100 acres" for the Back Bay Park. After a failed design competition, Olmsted was asked to design the landscape (Zaitzevsky, 1982). Olmsted's savvy was in aligning the park construction with the movement to build new sanitary sewers in the city – once considered competitors for the same pot of money – the goals (and means) were to be aligned in Olmsted's plan.

C. Preexisting Conditions, Site Design, Programming, and Ecological Implications

Presented with the site, Olmsted's first challenge was to resolve the difficult hydrological and engineering problems posed by the Back Bay park site. Because of the limited funding appropriated for the park, the most undesirable lands were purchased, most of which were submerged under water during high tides. Although once part of vast salt marsh which lined the entire portion of the Boston peninsula, the area then was nothing more than an expanse of foul-smelling mud flats littered with debris and raw sewage.

With the growing population of Boston and Brookline after 1820, the full basin, as it was known, became progressively fouler. Both the Muddy River and Stony Brook, which together drained several thousand acres of Roxbury, Dorchester, and Brookline, also received raw sewage, depositing it in the basin. As estuaries of the Charles, both streams were influenced by the tide for quite a distance upstream and tended to overflow during high tides. With the increasing urbanization of the area and the associated increase of raw sewage, the last vestiges of salt marsh had all but vanished by the 1850s. A survey conducted in 1877 concluded that "animal life was no longer able to survive in the waters of the Back Bay" (Olmsted, 1899).

The area that Olmsted had been asked to turn into park was the portion of the Back Bay Basin to the west of the Cross Dam, the area into which both the Muddy River and the Stony Brook discharged.

The park proposed by the commissioners in 1876, to which Olmsted was requested to advise, "was in the form of a narrow parallelogram, connected by one arm to the Charles River and by another to the proposed park on Parker Hill" (which never was built).

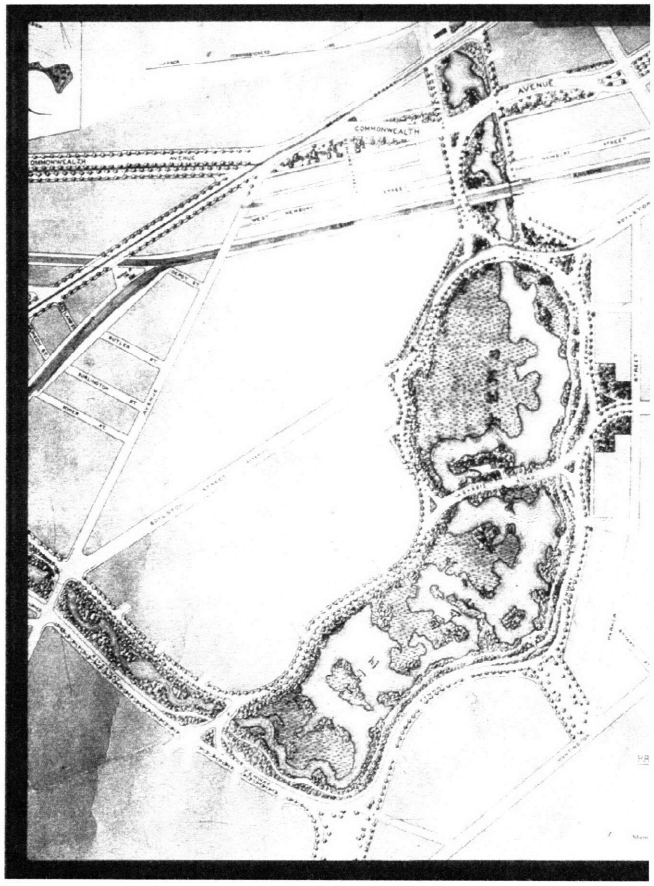
Working with the commission's proposal and the survey work subsequently conducted, the Olmsted firm drafted its first detailed plan for the site (and the city of Boston), dated October 24, 1878. Although satisfied with the plan, Olmsted himself was skeptical about his own work. He had asked to meet with the city engineer, Joseph P. Davis, before the plan was formally adopted" (Zaitzevsky, 1982).

Because of the widely recognized nuisances of both flood and smell and newly appropriated funding for sanitary improvements, plans had already been drafted for a "conventional masonry storage basin" that would serve not only to collect the overflow of the Muddy River and Stony Brook, but also to keep the odorous mudflats submerged under water. Because the entire Back

Bay area was slated to become a wealthy enclave, a sewage filled basin in the area was clearly not the optimal solution to the problem. In this light, as well as perhaps because of his personal convictions, Olmsted sought to modify the basic concept into an acceptable landscape design that would be more sensitive to the natural flows on the site.

A new plan was published in the commission's 1879 annual report, entitled the *"Proposed Improvement of Back Bay."* In the plan, Olmsted designed a meandering waterway emblematic of the state of a natural river as it passes through a marsh. The marshland itself is diagrammatically dissociated from the borders of the park "which were to be planted more conventionally with trees and shrubs." In order to manage flooding, a gate was planned at the confluence of the marshland and the Charles River. Charlesgate, as it was named, would regulate the daily ebb and flow of the tide (Zaitzevsky, 1982).

Olmsted's proposal for the Back Bay Fens was quite different from the common preconception of park, and was revolutionary in tying together recreational program and natural systems. As Olmsted himself took every attempt to argue, the design was "primarily a sanitary improvement, the main feature of which was a storage basin for storm waters of Stony Brook." Yet in contrast to the means typically used at the time to secure sanitary improvement, Olmsted realized that an integrated landscape feature that replicated the functionality of the preexisting site condition could bring about the needed sanitary improvement in way that could also provide a recreational and aesthetic amenity to the city. With this realization, a primary goal of Olmsted's plan was to return the site to its original salt marsh condition.

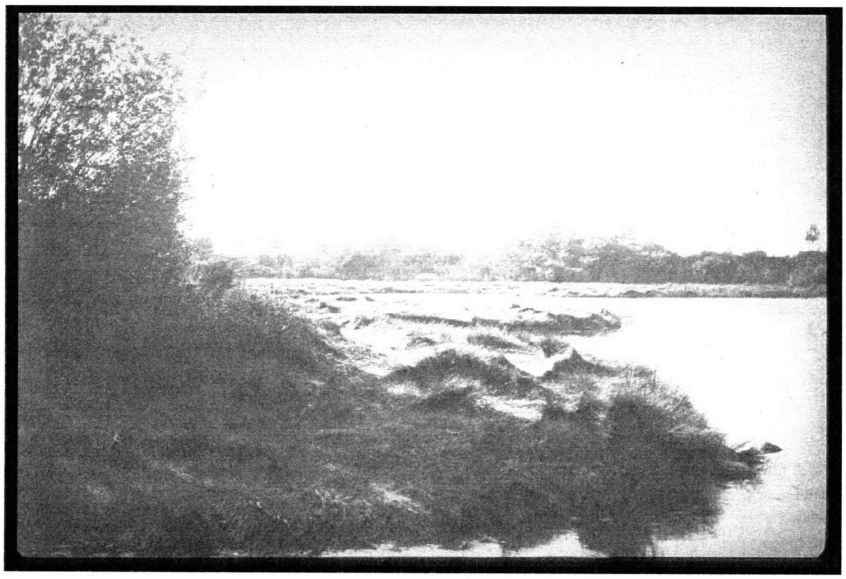


Olmsted Plan for the Back Bay Fens. Notice the meandering character of the Muddy River and the proposed extent of the marsh. (Courtesy of the Loeb Library, Harvard)

As a result of talks with the city engineer, intercepting sewers were to be constructed around the site, and the Muddy River and the Stony Brook would be diverted to the Charles by a conduit. Salt-water flow into and out of the thirty-acre basin was to be carefully regulated by a gate, but one that would allow for an additional twenty acres to flood during high water periods (Olmsted, 1880).

With the exception of the trees lining the roadways on the periphery of the basin, Olmsted used marsh grass and shrubs that could tolerate salt water as the planting elements along the banks of the stream channel. His intent was to create a landscape that appeared as if it had always been there – a remnant of an ecology surrounded by city. The effect of such a landscape, he explained,

Grading and fortification of river embankment, Muddy River. (Courtesy of the Loeb Library, Harvard)



Early photograph of newly established salt grass within the Fens. (Courtesy of the Loeb Library, Harvard)

"would be novel, certainly, in labored urban grounds, and there may be a momentary question of its dignity and appropriateness...but [it] is a direct development of the original conditions of the locality in adaptation to the needs of a dense community. So regarded, it will be found to be, in the artistic sense of the word, natural, and possibly to suggest a modest poetic sentiment more grateful to town-weary minds than an elaborate and garden-like work would have yielded."[2]

This ecological design of the basin left about 50 acres, or one-half the total acreage, for recreational purposes. The major parkway of the system (now the Fenway), paralleled by a bridle path, ran along the eastern edge, with a second road (now Park Drive) on its western edge. Footpaths

Muddy River as it flowed into the Back Bay Fens, 10 years after construction. (Courtesy of the Loeb Library, Harvard)

ran along the border of the marsh, but not into its interior, thus providing a distinct physical separation between human use and natural functions. With time, Olmsted was able to convince the park commissioners to change the name from the Back Bay Park to the Back Bay Fens in keeping with the character of the scenery (Zaitzevsky, 1982).

According to Robert France, assistant professor of landscape ecology in the Department of Landscape Architecture at Harvard University's Graduate School of Design, "The Fens proved that landscape architects could use inspired engineering to integrate the functions of nature and people harmoniously. It was a brilliant multifunctional design, with bridle paths, walkways, canoeing, and park drives in addition to sanitary and flood control features, a trend away from the single use of a landscape (France, 2003).

In many ways, Olmsted's combination of environmental management, ecological repair, and ecotourism (putting natural systems on display), forms the fundamental basis of ecological landscape interventions today. This will be discussed more in detail in the discussion section of this chapter.

Yet Olmsted's plan was as much about creating perception of nature as it was about actually repairing natural systems. Although the design of the park would lead one to believe that both

2. (Olmsted, 1880).

the Stony Brook and the Muddy River emptied into the marshland, the reality was that concrete culverts channeled the water from those streams underground and directly into the Charles, bypassing the marsh entirely. This was because Olmsted did not know how to deal with the aesthetically displeasing 'slime' that forms at the confluence of fresh and salt waters (Zaitzevsky, 1982).

When complete, the Fens was designed to appear 'natural,' and to many at the time, it did. But at closer observation of this new landscape, noticeable differences between the Fens and a natural salt marsh could be found. In order to avoid the bare mud banks exposed at low tide endemic to salt water marshes, Olmsted limited the rise and fall of the tide to only a foot using a mechanized gate at Charlesgate. In order to create a more dramatic visual aesthetic, he also chose a far greater variety of plants than would have normally grown in such a confined area (Zaitzevsky, 1982).

But the intent to integrate natural function and human intervention into a symbiotic relationship is not lost in these deviations.

D. Back Bay Fens Today

When the Charles River dam was completed in 1910, the water flowing into the Fens from the Charles was fresh in nature instead of salt, thus rendering the entire design obsolete. As a result of this perceived obsoleteness, the Fens was used as dumping ground for fill taken from other projects across the city, such as the excavation of the subway. Even a highway interchange was built over it.

Today, because of a lack of maintenance, the river channel is highly silted, and choked along its banks by an invasive reed - *Phragmites communis*. Little is left of Olmsted's original design, except perhaps for the general boundaries. The riparian ecology of the river is in a state of disrepair, flooding is once again a serious problem, and sediment contamination is an emerging concern.

E. Muddy River Restoration Project

The Muddy River Restoration Project is the first phase of the comprehensive Emerald Necklace Master Park Plan, published in 1989 by Tom Walmsley and Marion Pressley and updated by Pressley Associates in 2001. The plan calls for the following objectives for the Muddy River:[3]

- Improvement of flood control
- Improvement of water quality
- Enhancement of aquatic and riparian habitat
- Rehabilitation of landscape and historic resources
- Implementation of Best Management Practices (BMPs)

The municipalities of Boston and Brookline have teamed, putting together a panel of landscape architects, engineers, ecologists, and preservationists, as well as a 29-member citizen advisory committee. The Massachusetts Office of Environmental affairs has matched federal funds and the

3. Muddy River Restoration Project, Project Description. Downloaded from www.muddyriverproject.org (MRRP).

Boston Parks and Recreation department has been named the coordinating manager of the project (O'Connell, 2001). The master plan as drafted is guided by the Department of Interior's standards for the treatment of an historic landscape: rehabilitation, restoration, and conservation.[4]

With the construction of the Charles River dam, tidal influences no longer purged the river channel, allowing for sedimentation to build up over time. Currently, the Muddy River is only 1 foot above the mean water level of the Charles. The resulting slow current has encouraged the growth of a litany of invasive species, choking any remnant aquatic habitat.

In order to minimize the flooding that has become more common in recent years, sediment will be dredged to restore the original depth and width of the river. Submerged areas of the river will be daylighted and remaining culverts will be expanded. Invasive vegetation, including phragmites, will be completely removed and the shoreline restored to its designed picturesque condition.

Although aesthetically pleasing, phragmitis, a common reed, has become a serious ecological problem within the Fens. (Courtesy of the Loeb Library, Harvard)

In addressing the water quality of the river, attention is being paid to eliminating combined sewer overflow during storm events. The town of Brookline has eliminated all such discharge, while the city of Boston is in the process of studying mitigation effects on its side of the river. Illegal drainage connections from abutting buildings have been discovered and removed in both cities. Study is also being conducted on improved management of adjoining catch basins so as to minimize intrusion of sediment into the river.

Aside from the improvement of water quality and the promotion of aquatic habitat, the plan calls for the reestablishment of riparian habitat lost to invasive species over the years. This riparian habitat is to be characterized by a "diverse section of plantings including emergents, wetland species, low and high shrubbery, and trees" (MRRP).

In addressing the cultural ecologies of the landscape, key elements of the Olmsted plan, including original grading, plant distributions, placing of trees, and preservation of buildings, are incorporated

4. See restoration section in Crissy Field chapter.

into the restoration plan. While phase I calls for the ecological restoration of the Muddy River, phases II and III focus more specifically on the cultural landscape. The execution of these phases has not yet begun.

A series of BMPs will ensure the sustainability of the project and protect the newly reestablished natural and cultural ecologies. These BMPs run the gamut from increased street and catchment area sweeping, to particle separators in storm drains and vegetative swales.

Phragmitis grows into an impenetrable mass, out-competing any endemic riparian ecology. (Power)

Lauren Meier, a historic landscape architect at the Olmsted Center for Landscape Preservation and a member of the citizens advisory committee on the project, describes the work:

"I look at this project as a rehabilitation, as opposed to restoration…It's an intensive amount of work that well exceeds the kind of repair work you'd do in a normal preservation project and includes some new elements that are compatible with the historic character."

Because flood prevention was the primary motivator of the restoration project, it is receiving the earliest attention. In order to maintain 'sensitivity' to the historic landscape, innovative dredging practices that vacuum sediments into a filter rather than using a typical dredging 'clamshell' are being used to minimize impacts on both the cultural and ecological landscapes.

A total of 5 acres of phragmitis are being removed from the riverway as well. The rootstock of these reeds has captured years of contaminated sedimentation, which has resulted in the reeds having been classified as a toxic substance. This requires that the phragmitis be disposed of at a regulated toxics landfill, adding an enormous expense to the project (O'Connell, 2001).

F. Application of Ecological Analysis

[A summary chart is provided at the end of this chapter.]

*** "Historical" indicates the period when the park was first designed, "today" indicates the condition as reflected by the ongoing restoration master plan****

1. Positive Analysis: Natural Ecology

i. HABITAT DIVERSITY

Water

- *(Historical):* Restoring the natural salt marsh condition was a primary design intent of the original plan. Although the natural hydrological flow of water was regulated, flood management and pollution control was attained by 'naturalizing' the site.
- *(Today):* The restoration plan does call for water quality improvements and a restoration of aquatic habitat, although the site's endemic salt water condition will not be reintroduced, nor could it be, given the damming of the Charles River.

Land

- *(Historical):* Significant riparian habitat, using native vegetation, was created within the marsh and along the banks of the Muddy River.
- *(Today):* The restoration plan calls for repair of riparian habitat, including the daylighting of several culverted portions of the river.

ii. LAND MOSAICS

Complexity

- *(Historical):* By designing a meander through the marshland and upland portions of the river, varied habitat patches were created. A successional cross-section of plantings – from salt-water grasses that could be submerged in water daily, to salt-tolerant shrubbery that could withstand exposure to salt-laden winds periodically and finally plantings along the edge that were salt-intolerant – a variegated character in the patch dynamic was created, similar to endemic conditions.
- *(Today):* Although the salt marsh is not being recreated, riparian and aquatic habitat is. Albeit an introduced ecological system based on new hydrological conditions, the recreated network does contain complexity through patch dynamics in its provision of habitat.

Perimeter-to-Area Ratio of patches

- *(Historical):* As designed, the marsh itself attained a low PAR, which in this particular case, is likely to have promoted habitation by species of concern.
- *(Today):* New habitat will be almost entirely riparian, which by definition, has a high PAR. It is left to be seen how areas upland of the riparian corridor will be designed and how they will interact with the newly reestablished habitat.

Disaggregation of human and natural uses

- *(Historical):* By necessity, a defining element of the design was separation of human and natural uses.
- *(Today):* The redesign preserves some of this separation of use, although to a lesser extent.

Regional Relationship

- *(Historical and Today):* As part of larger park system, regional connections were much stronger than most parks designed at the time. The parks were anchored by a natural feature, a river corridor, which further enhanced biotic biodiversity. This regional connection is being strengthened by the current restoration proposal, linking the entire network with a strong, endemic, riparian corridor.

iii. *USE OF NATIVE VEGETATION*

- *(Historical and Today):* Native vegetation was, and will continue to be, used extensively.

iv. HYDROLOGICAL SYSTEM

Surface Water:

- *(Historical):* Although the design replicated the original hydrological condition of the site, it remained contaminated with sewage. In order to regulate the site hydrology, a gate at the confluence of the marsh and the Charles River was constructed to ensure that the marshland was always covered in water. This prevented noxious smells from exposed mudflats.
- *(Today):* The redesign facilitates a more naturalized function of the Muddy River and Stony Brook. The management plan incorporates a series of interventions to improve water quality and the watershed's ability to self-regulate.

Water Loop *(Historical and Today):*

The natural cycling of water along the park between Jamaica Pond and the Charles River is a defining element of both the original design and the restoration plan.

Irrigation *(Historical and Today):*

Historically, the park was not irrigated. Current language pertaining to irrigation has not been found, but is assumed to be minimal.

Impervious Coverage *(Historical and Today):*

In keeping with the picturesque vision of a rural landscape, the use of impervious surfaces is minimal.

v. SITE FITNESS

(Historical and Today):

The program of the park is in line with natural site conditions, suggesting a high level of site fitness. The restoration of the hydrological system and associated habitat push the park to improve the overall ecology of the area beyond the site boundaries themselves.

vi. OPERATION & MAINTENANCE

Maintenance

- *(Historical):* Need for maintenance within the marsh and along the riparian corridors, the areas with the highest likelihood for biodiversity, was minimized by design.
- *(Today):* The current management plan calls for the use of BMPs, including ecologically sensitive techniques, to guide the management of the park post-restoration.

Fertilizers and pesticides

(Historical and Today): Fertilizers and pesticides are not used in the 'natural' zones of the park. It is unclear how the current park master plan speaks to the use of petrochemicals within the active recreational areas, however the use of pesticides and herbicides by the Boston Department of Parks and Recreation is minimal. As of 2002, only two people are authorized to use pesticides at the Parks Department, and their use is generally regarded as a last resort. Use of herbicides and pesticides in the Arnold Arboretum, which is considered to be a model of BMP, decreased by 85% in the late 1990s as a result of the adoption of Integrated Pest Management (IPM) strategies that rely on natural predators (Kellogg et al., 2002). Simmilar conditions could be expected at the Back Bay Fens.

vii. TOWARDS ECOLOGICAL STASIS

(Historical and Today):

In a general sense, an ecologically designed landscape should promote greater ecological health rather than detract from it. While this is a difficult concept to quantify, the program of an ecological park should in a qualitative sense provide a spatial element through which ecological repair and/ or creation of habitat is more possible than without it. The program, in both its original design, and the proposed restoration, does suggest a promotion of ecological stasis. The park, and its associated elements, works to promote ecological health along the Muddy River rather than detract from it.

2. Contextual Analysis: Cultural Ecology

i. PEDAGOGY

- *(Historical):* None.
- *(Today):* An ad hoc assortment of ecologically based programming is conducted by the Emerald Necklace Conservancy, the Urban Environmental Initiative at Boston College, the Boston Parks Department, and others, yet this network of different organizations has not been formalized into the operation plan of the park, questioning the long-term sustainability of the effort.

ii. INVOLVEMENT & STEWARDSHIP

(Historical and Today): None.

An aerial shot of the Back Bay Fens showing the extent of the phragmitis problem, in brown. (Pinebank.org)

iii. ECONOMIC SUSTAINABILITY

(Historical and Today): Park construction maintenance has been, and continues to be, funded by public expenditure.

G. Discussion

Olmsted attributed his motivations at the Fens to improving the sanitation condition of the site, and that the provision of park and open space, endeavors through which he had defined himself, were secondary. His design used a landscaping program in line with the best sensibilities of the picturesque as a driver to improve the overall health of the landscape. It is this use of design – integrating the desire for open space, recreational amenity, and improved real estate potential – but in a way that also improved an impaired natural system, which truly distinguishes the Fens from Olmsted's (and the picturesque's) earlier work. Instead of using the most sophisticated technologies of the time to build a catchment basin, Olmsted believed that he could harness the power of natural systems to provide a solution equal in functionality but far superior urbanistically and aesthetically. The Back Bay Fens revealed an ecological system and reconnected this system to the cultural landscape, using park programming as a vehicle to do so. It would not be for eight decades or more that the landscape profession would once again entertain this powerful philosophy.

With this said, the ecological merit of the project is open to debate. While it did attempt to recreate the endemic hydrological and associated ecological systems, it did so by providing an 'idealized' representation of these systems. It took the best features of the salt marsh and mitigated those that were considered less than best. It used a gate to control water flow in order to minimize the unsightly presence of mud flats in the marsh. In fact the gate itself was the source of many ecological problems during the early years of the park (Zaitzevsky, 1982). In keeping with picturesque philosophies, the design maximized curvilinearity and emphasized dramatic view, even if doing so detracted from the naturalization of site ecology.

Yet it is important to remember to measure the implications not necessarily by today's standards, but instead relative to contemporary practice at the time. With this considered, perhaps the genius in Olmsted's work was the realization that in defining the landscape, both phenomenological and ecological benefits could and should be the goal. He had over time learned that the early picturesque philosophies of providing allusion and reference to nature in order to satisfy the 'needs of the soul' could be expanded through design to actually provide real interaction with endemic natural conditions.

What is also important to consider is not that the Fens was unable to recreate a perfect ecological system (we have difficulty doing this today), but that the project marked a fusion between a desire to improve the environmental conditions of the city, the provision of park space, and a restoration of a natural system. As can now be said, this work and ideology can be seen as the underpinning of today's ecological park.

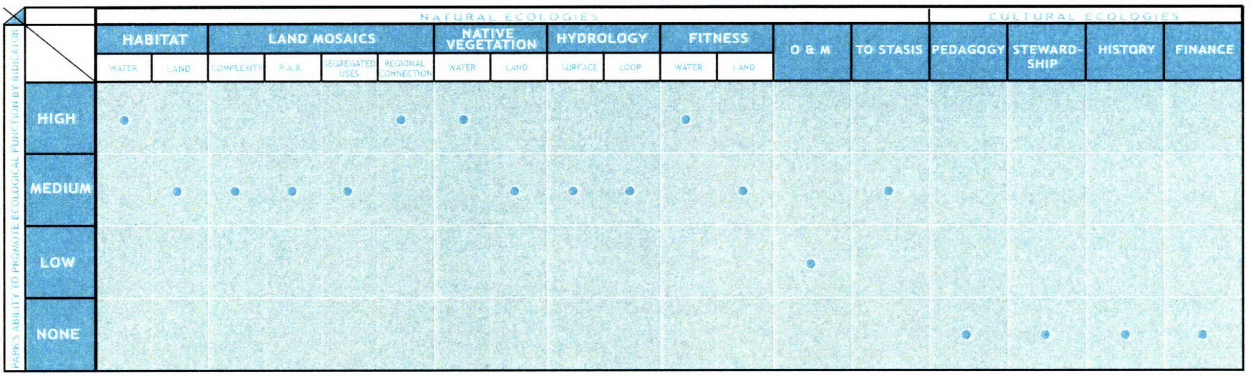
Borne out of a movement to create for Boston what other great cities in the U.S. were building for themselves – municipal parks – the Back Bay Fens took the landscape profession to a new

and more holistic level by recognizing regionality, natural systems, and cultural expression through space.

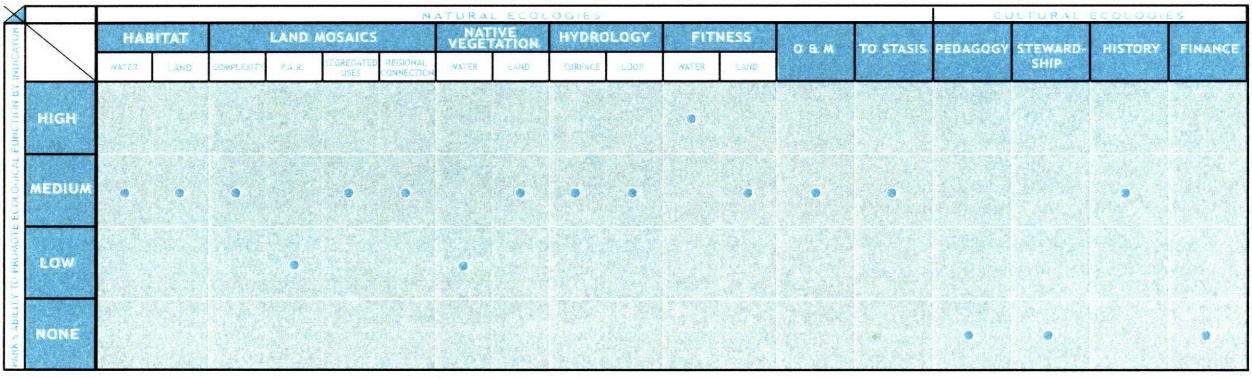
An omission of the plan, both historically and today in restoration efforts, has been a lack of connection to sustainable cultural ecologies, including pedagogy and stewardship. Efforts to improve the natural ecological conditions along the Muddy River have, in contrast, taken precedence in recent years. Perhaps with time, a connection to the cultural landscape of the city will reinforce itself organically. While the effects of this resolve to reintegrate the Fens with the city have yet to be demonstrated, there is hope that the Muddy River and Back Bay Fens can once again be reconnected into a synergy of natural and park systems – in other words – a living symbiotic relationship between the natural and cultural landscapes.

H. Summary Matrices

(Historical)



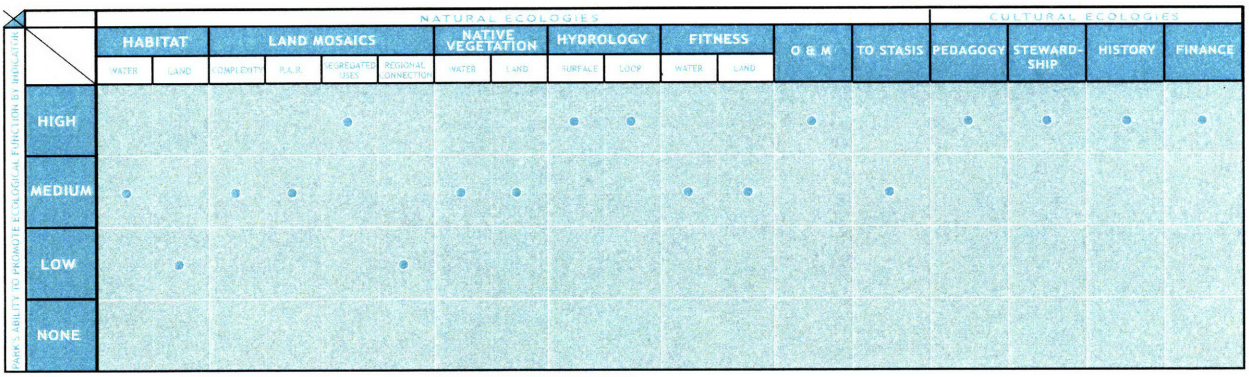
(Today)



Chapter 8. Results of Investigations

* *See methodology chapter for a discussion on the measurement scale used below.*

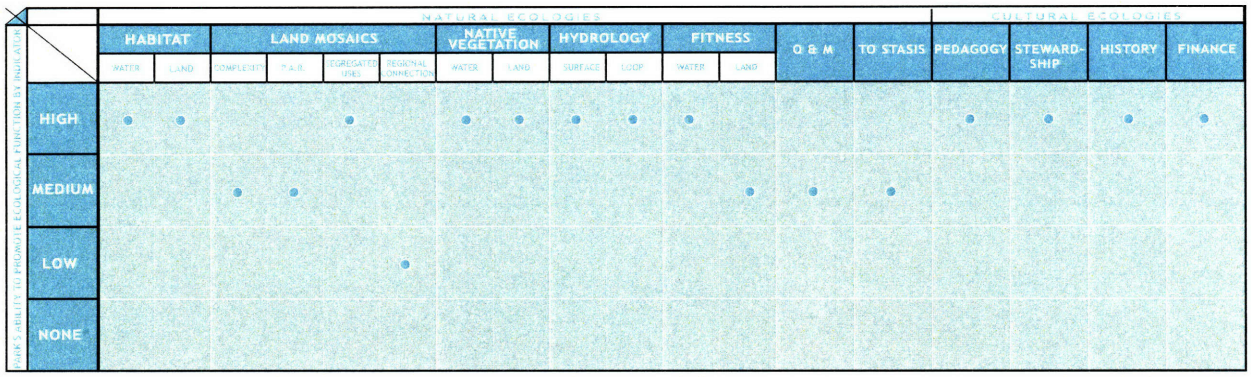
Xochimilco Ecological Park



Points

High (x4) = 32
Med (x2) = 16
Low (x1) = 2
50

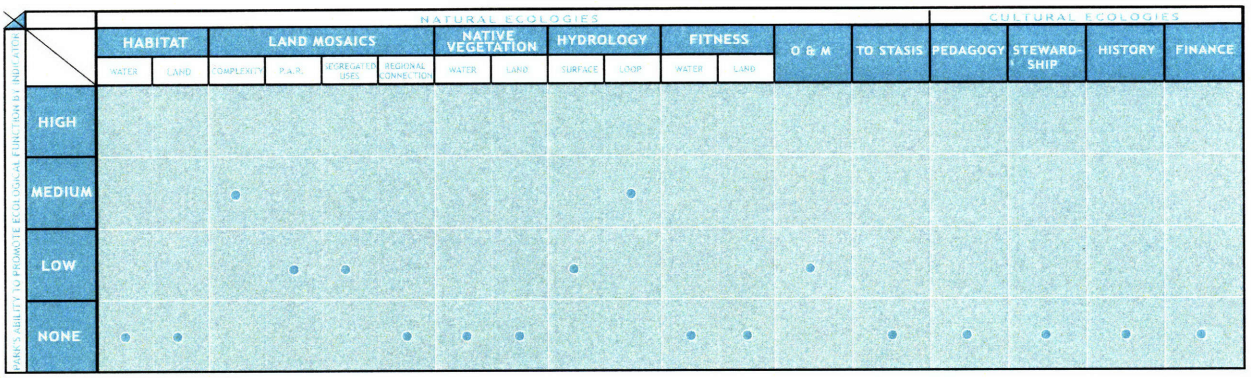
Crissy Field



Points

High (x4) = 48
Med (x2) = 10
Low (x1) = 1
59

Golden Gate Park (historically)

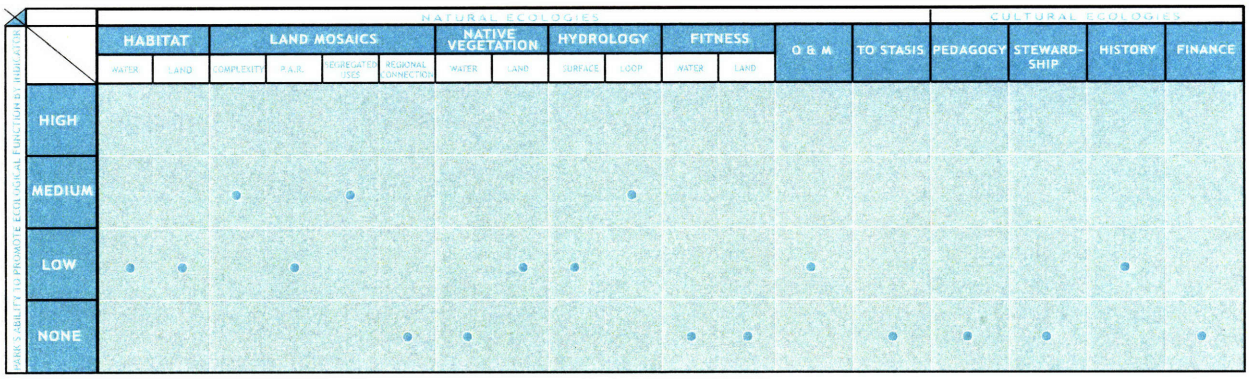


Points

High (x4) = 0
Med (x2) = 4
Low (x1) = 4

8

Golden Gate Park (today)

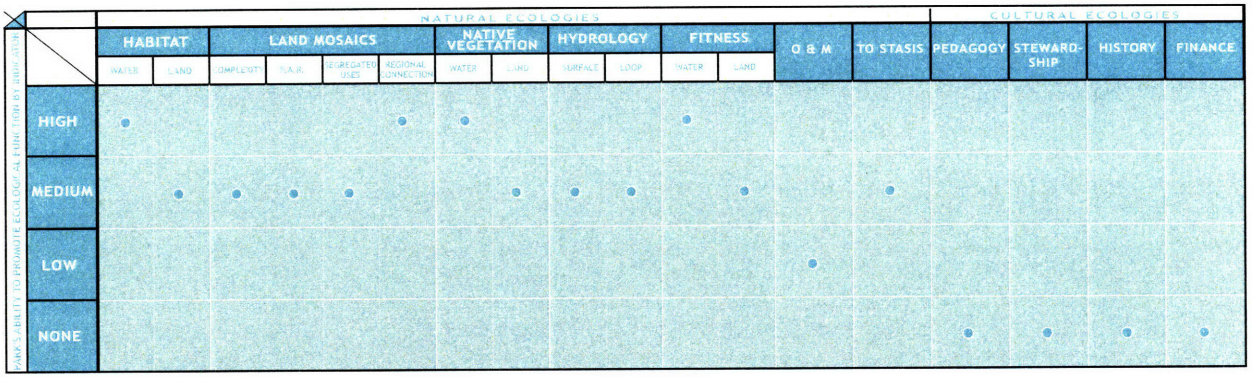


Points

High (x4) = 0
Med (x2) = 6
Low (x1) = 7

13

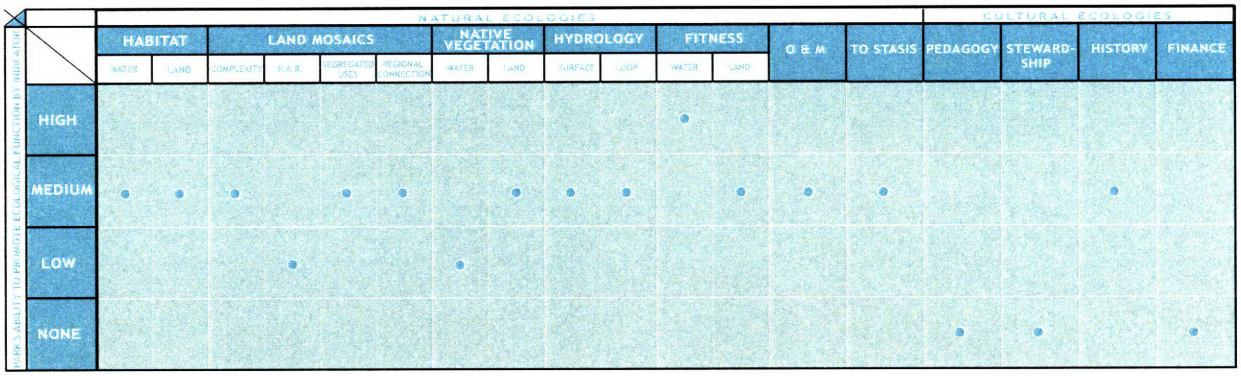
Back Bay Fens (historically)



Points

High (x4) = 16
Med (x2) = 18
Low (x1) = 1
35

Back Bay Fens (today)



Points

High (x4) = 4
Med (x2) = 24
Low (x1) = 2
30

Comparison

As one can see, the ecological parks score consistently higher than the picturesque parks in their reflection and embodiment of an ecological landscape, as defined by the literature.

Chapter 9. Discussion

Discussion

A. Ecological Park – As a model

New names are given to old ideas as often as old ideas become new again. There is predication in our society to assume that what seems novel today has never been considered before, even though the likelihood of this being the case is empirically quite low. Therefore, new ideas in cites are often in fact old ones. In considering the ecological park and the arguments that are used to describe this typology as a *new* model, it becomes necessary to reflect back on the ideas and motivations of historical precedent before jumping to the conclusion of outright novelty. A thorough presentation of the history of the municipal park and the relationship of these landscape interventions to the natural and cultural environments has been explored. A more synthetic and focused analysis has been provided for two picturesque parks. From this, philosophizing on any 'newness' offered by the ecological park became a logical and possible progression.

If in fact the ecological park is new, then what are the introduced implications of this park typology on the quality of the built and cultural environments? The intent of this research was to deconstruct the physical and cultural elements of the ecological park and its purported predecessor, the picturesque park, and in doing so, coming to some fundamental understanding of a new significance between the former and the latter, respectively.

In order to focus within this otherwise nebulous conceptual framework, two case studies of each the ecological and picturesque were selected based on their ability to represent, or at least reflect, their respective movements. Against these case studies, an exhaustive review of the literature relating to both the notion of park and the notion of landscape was applied. Based on this review of the literature, the basic significance of two ecologies – the natural and the cultural – and the synergies between them as they play out in an urban landscape emerged as an important tool in analyzing the parks.

The supposed dichotomy between nature and culture is germane to this postulation, and hence the requirement to pay equal attention to both individually and to their intersection. The significance here lies in that an ecological park, or any other park for that matter, in attaining for that intersection, is, or should be, different from an ecological landscape where a pole on the nature-culture continuum is perhaps better preferred. The idea of *park* and its connection to the city both formally and programmatically is one that should not be forgotten in this discussion. This is because the design of an ecological restoration where natural habitat is the only concern is likely to be, and should be, different from that same design intent when championed by a park intervention. This next section discusses the results of the above-referenced investigation, focusing on the characteristics that define the ecological park.

B. Ecological Park – On methodology

On first look at the methodology used in this study, it is possible to debate the disaggregated presentation of the natural and cultural elements of a landscape. But in closer detail, it is important to entertain the inexorability of these two phenomena and the importance that their interrelationship has within an urban landscape. Parks, as a design product, are inherently a cultural landscape. This holds true from the smallest pocket park in a neighborhood corner to the largest municipal park in center city. Parks are products of social constructs and societal predication and are therefore important physical representations of contemporary philosophical ideas. They are much more than a grassed or treed plot of land – they reflect how it is that we envision the space around us and how we define the nexus between our *cultural* world of buildings and varied artistic expressions and the *natural* world of ecological process and flow. With this, the park becomes a representation of how it is we see the idealized vision of two intersecting landscapes.

C. Ecological Park – Evidence from case studies

Before continuing with the discussion, the following is a bulleted presentation of the main ideas identified in the exploration of two prominent ecological parks:

Xochimilco Ecological Park

- Provision of park program that enhanced both the natural and cultural ecologies of the landscape.
- Attempts to repair the broken hydrological cycle between park, *chinampa* region, and Mexico City.
- Expansion of the notion of park to include a more functional and dynamic relationship with the city.
- Provision of important habitat for migrating water foul.
- Connection of historical preservation with natural resource conservation.
- Important catalyst in the promoting of a greater ecological consciousness relating to the *chinampa* region, championed through pedagogical programming.

Crissy Field

- Emphasis on ecological and historical revelation.
- Use of a restored natural system as a central design element.
- Provision of habitat.
- High level of programmatic and design fitness.
- Strong pedagogical component.
- Ongoing didactic programming and opportunities to promote stewardship.
- Ecological aesthetic as a communicative device.
- Physical and experiential connections to city.
- Sustainable operation & maintenance and planning practice.

Having explored in rather extensive detail both the cultural and natural ecologies of two ecological parks, it now becomes the task to use generalizations to provide implications on what an ecological park *is*, and what distinguishes it from, a non-ecological park. This thesis has used the picturesque park as the "non-ecological park" for a variety of reasons not the least of which is the fact that the picturesque, undoubtedly, reflects the vast majority of municipal parks in this country. As discussed in an earlier chapter, Galen Cranz provides further credence to the use of the picturesque by arguing that it is the only park model, of four, that has truly engaged the natural ecology in one way or another in providing for the design and program of the site. The character of this engagement has been discussed in detail in focusing on two representative picturesque parks and the considerations and respective dialogue engaged upon at the time of their conception. Using the results of this paralleled analysis, what can be said about the ecological park?

D. Ecological Park – A refocus on the natural and cultural landscapes

This thesis began with the proposition that the significance of the ecological park lay not necessarily on its ecological merit, although natural ecology is an important and necessary component, but in redefining what John Dixon Hunt has called a "third nature." This redefinition, it is proposed, allows the ecological park to transgress this tri-partite categorization of first, second, and third natures, allowing it to embody what could be considered a fourth nature.[1] But how would a fourth nature be characterized?

In careful analysis of Xochimilco Ecological Park and Crissy Field, the most significant element that would define this fourth nature is the use of cultural landscape to provide pedagogical experience about the natural landscape. Ecological Parks take an endemic natural system, whether by repairing a degraded condition such as at Xochimilco or recreating a lost condition such as at Crissy Field, and using the power of revelation as a central and defining element of the landscape design, communicate an ecological understanding of the landscape to the parkgoer.

One of the most important elements of the ecological park is its ability to recast itself based on the needs of the community in which it is housed. Within a broader philosophical conception, there is variability from one application to the next in the provision of contribution to the city's cultural and natural landscapes. While Xochimilco focused its program less on provision of habitat and more on historical revelation and repair of hydrological systems, Crissy Field focused its program more on the design of viable habitat and less on historical revelation. This is indicative of the ecological park's ability to adjust its focus based on particular local conditions and is the fundamental root of its strength and relevancy to today's city.

With the word 'ecological,' an immediate connotation is that of nature. While nature is important to the ecological park, it is not necessarily the defining characteristic. Both Xochimilco and Crissy Field could have been more successful given the perspective of natural ecology if in fact their only focus had been to repair a natural system. There are numerous examples both in the United States and abroad of an ecologically-based focus having allowed for the *re*-introduction

1. Hunt describes the primeval landscape predating human experience as being "first nature," while the landscape utilized by humans for their benefit is the "second nature." A "third nature," Hunt argues, is the synergistic relationship between first and second natures and is best reflected by the municipal park.

of an endemic, natural, ecosystem – the Florida Everglades come to mind. But the ecological park does not purport, not could it purport with any reasonable level of credibility, to embody such work. Doing so, almost by definition, would be succumbing to the idea offered by some that the preferred policy solution in all landscape intervention should be to return the site to its pre-human or pre-cultural condition. Instead, the ecological park highlights the natural landscape through the cultural landscape – whether by exploring historical elements or uses of the land such as Duisburg Nord in Germany or by promoting active engagement with nature through didactic program – and in doing so, highlights the importance and fundamentality of people and ecology in the urban landscape.

Both Xochimilco and Crissy Field use a natural system as an organizing feature around which all other program revolves. It uses the landscape, both directly and indirectly, as a teaching element of the presence and importance of natural systems in the city. In doing so, the ecological parks examined in this study have had the added benefit of providing both natural habitat and hydrological repair of impaired systems. The ecological park uses its cultural program to reinforce its natural program with the intent to move towards both cultural and ecological stasis over time. With this, the park itself becomes a vehicle through which sustainability of landscape, and the sustainable use of the landscape, becomes a real and feasible possibility.

E. Ecological Park – Spatial reformations

The contextual relationship between the park and the city is reconceived in the ecological park. Whereas the park was once seen as a place to escape from the city (recall Olmsted's writings on the topic), the ecological park becomes an integrated element of the city. Connections to the urban fabric - physically, pedagogically, and experientially - are highlighted and supported by both program and design. Golden Gate Park and the Boston Fens, contrarily, are defined by sharp physical boundaries between where city ends and park begins. Crissy Field and Xochimilco blur these edges, suggesting a greater integration between park and its natural systems and the greater milieu in which the park is contained. In this regard, the typology of landscape as characterized by use, becomes less distinguishable from one to the next, and the notions of natural systems reconnecting with the city are therefore reinforced. This physical reconnection is supplemented by cultural connections, which celebrate the inexorable relationship between communities outside of the park with those inside of it. Or in other words, that experience within the park becomes an experience within the city.

F. Ecological Park – Aesthetic representations

An important concept of the ecological park is the re-conceptualization of the relationship between man and nature. As Nassuauer (1995) has pointed out so eloquently, landscapes that do not seem to be cared for will not succeed in the critical eye of the public. Good design in ecological landscapes must demonstrate in a visual way to the casual participant that any perceived disarray is not a result of lack of care but is instead a designed aesthetic. For many, the picturesque park, manicured to perfection, is the quintessential representation of an ecological landscape – it is, after all, quite green. Therefore, for a truly ecological landscape to be successful – one that may not necessarily reflect that same level of 'green' - it must demonstrate a level of care and intent through visual cues.

At Crissy Field, careful communication is used to allay what an optimist might see as being the work of a poorly trained horticulturalist or a pessimist as a complete failure of the planting program. Carefully designed guides situated to minimize visual intrusion used in combination with signage that tells the parkgoer to mind the delicate vegetation not only legitimizes what might seem like a lack of care but imparts a desire to protect this sensitive landscape. After all, who cannot sympathize with the underdog?

While a generalization could be drawn to describe ecological design in ecological parks as communicative of natural processes and form, there is not, and there should not be, a formal ideal of what ecological design in ecological parks should look like. The strength of this aesthetic, and its differentiation from the picturesque, is that it is inherently defined by local conditions. From this, there is no one physical embodiment of an ecological park that could be emulated universally. Instead, the specific ecological conditions and formal products of the ecology at the particular park site define the aesthetics of that park. Xochimilco and Crissy Field could not be more different aesthetically from one another, yet they are unified by a philosophy in practice that states that local conditions, above all else, need define the successful and appropriate aesthetic expression.

G. Ecological Park – How different from the picturesque?

At first glance, perhaps the most striking difference between the picturesque and ecological parks is one of aesthetics. At Crissy Field, for example, very few, if any, trees were planted as part of the landscaping program. To many, it is difficult to imagine a park without a tree. But in experiencing the park, one does not feel as though trees are missing. This points to the fundamental difference between the ecological and picturesque parks. Golden Gate Park, for example, which was superimposed on a physical and ecological landscape very similar to that of Crissy Field, could not look more different in practice. Here, there is lush tree canopy (although currently unsustainable), and the aesthetic vision of the landscape reflects the irrelevancy of endemic conditions, imparting instead a place-*un*specific idea of an idealized natural condition. The ecological park, in contraposition, defines its aesthetic based on the natural conditions of the site. Therefore, the visceral reaction to a strong aesthetic dissimilarity speaks to a much deeper philosophical divergence.

In considering the Back Bay Fens, one cannot help but question whether this philosophical divergence holds true, or that perhaps the Fens departs from the picturesque by reflecting the philosophies more attune to the ecological park. While it is true that Olmsted, in this latter work of his career, adapted the idea of the picturesque to more adequately address local site conditions, the park as a whole was still reflective of the notion of natural idealism – or that in other words, aesthetics should be used to present an ideal representation of natural systems. This contrasts with the ecological park's use of aesthetic representation to effectively reveal and communicate endemic natural systems. While it is not argued that the Back Bay Fens, in its design guided by a greater understanding of regional connection and endemic site conditions, was a step forward for the picturesque, it is not distinct enough in its reflection on the relationship between landscape and city and the inter-dynamics of ecological systems, both natural and cultural, to be considered a fundamental departure from the picturesque.

H. Ecological Park - Encapsulated

With the analysis thus presented, the characterization of the ecological park has been considered and has been compared to the picturesque park. This comparison has shed light on - and provided support for - the argument that in fact the ecological park *is* fundamentally different from the picturesque, and in such, moves beyond being a mere aesthetic recomposition of its predecessor.

With this said, the ecological park:

- Integrates the natural and cultural ecologies of a landscape through a park program
- Provides a strong direct and indirect pedagogical experience that revolves around revealed ecological process
- By focusing on systems, addresses natural and cultural issues that extend beyond park boundaries
- Uses park programming to actively engage community members, and in doing so, promotes the importance of stewardship
- Uses endemic site conditions as the underlying principle guiding its physical design, defining a strong sense of place and identity.

The ecological park, in its different representations, can also:

- Promote resource sustainability and self-sufficiency
- Extend its pedagogical experience through demonstration of best management practices[2]
- Promote community empowerment
- Allow for innovative financial partnerships with the aim of financial self-sustainability.

What is *always* important to remember is that at the end of the day, people visit parks because they enjoy spending time in them. An over-dominance of didactic experience at the expense of more subtle phenomenological experience can easily translate into an unsuccessful intervention. Providing places that people enjoy must be the driver of all good decisions in urbanism and the ecological park is not an exception. Tying together the provision of good urban spaces with good ecological program becomes the challenge to the profession.

I. Ecological Park – Next steps

While the relationship between natural and cultural ecologies has been stressed, this does not necessarily minimize the importance and significance of the natural ecology itself within an urban construct. As White (2002) argues, with an ever-increasing portion of the population living within metropolitan regions, the need for cities to move towards ecological sustainability in both the use of resources and their interaction with the natural systems that intersect them becomes ever-greater. Ecological Cities, as White (2002) calls them, interact with the landscape in a way that is sustainable over time. Can then the ecological park become the means through which this

2. A post-occupancy study of residential sites around Crissy Field has shown an increased use of native plantings in landscape design (Farrell, 2006).

sustainability is achieved? It is not too difficult of a conception to imagine that ecological parks within cities become places where both the systems of cities and the systems of nature reconnect. The Arcata Marshland Recreation Area, where a series of constructed wetlands replaced the city's only sewage treatment plant, moves in this direction by not only providing new natural habitat and new recreational amenity (an extensive system of trails and didactic signage provides experience through the landscape) but reintegrates the city's and the natural hydrological system in a way that then becomes mutually beneficial.

It is difficult to imagine a truly urban park where wastewater treatment becomes the centerpiece, but both Crissy Field and Xochimilco have taken steps, albeit mitigated ones, in this direction. The marsh at Crissy Field bio-remediates stormwater runoff, while the constructed lakes at Xochimilco recharge depleting groundwater aquifers with tertiarily treated wastewater.

But the future of ecological parks could and should include greater synergies between city and natural systems than perhaps seen today, and depending on the needs of the site, improved provision of natural habitat, improved capabilities of mitigating adverse environmental conditions, and broader experiential explorations of nature in the city.

Temporality is an important element of ecological processes and is therefore an important value in the ecological park. Downsview Park in Toronto has used the concept of change over time as an intrinsic element of its design expression. Instead of programming a static representation onto the landscape, Downsview celebrates change in spatial structure given the forces of environment and natural and cultural systems. Much of the dynamism of true ecological landscapes is their ever-changing form and the conversations that take place between one evolving element and another. This idea of change has been fought against historically in most landscape designs, but an ecological park should reverse this focus on domination and instead engender the idea of change as a fundamental characteristic of an urban park. How to do this through design is a challenging proposition. Having to consider at all times the requirements for accessibility and safety and the realities of a litigious society, the forces seem to collude to favor a static and predictable, and therefore controllable, landscape expression. Much as the idea that complexity in patch characteristics promotes ecological biodiversity, it can be argued that an ecological park can satisfy the requirements for dynamic change while recognizing the need for pragmatic stability by strategically using design to create zonal separation, all the while minimizing this effort as an intended effect. With this idea in mind, organic change becomes possible, and the expression of the park at any point in time reflects contemporary changes in social predication. Or put more simply, the landscape within the ecological park changes as the specific needs for that landscape evolve.

With the changing spatial conception of park, the ecological program could easily extend beyond the site boundaries with the use of planting and permeation of design elements that suggest a greater integration into the city. Much like how Olmsted used tree-lined Parkways to connect parks within the city, ecologically based design elements could distribute themselves into the fabric of the city blurring, or perhaps making indistinguishable, the transition between city and park. This would produce a duplicitous achievement – an expansion of natural habitat and regional connection and also promotion of a more livable, aesthetically enviable, and increasingly sustainable urban environment.

J. Ecological Parks – And then there were many

Ecological parks hold the promise to help cities move towards more sustainable futures. They are fundamentally flexible, providing particular benefit as the site or city requires. They can help clean water or celebrate a cultural history; they can help provide needed habitat or outdoor classroom space; all in order to provide the city with a venue through which engaged connection to the landscape becomes possible, and systems, both cultural and ecological, are pushed towards greater stasis. All this, while providing a place of quality for recreation and relaxation - elements that we have come to expect from open space in our cities. In taking from Spirn's (1984) prologue, ecological parks can help us imagine *what the city could be like if designed in concert with natural processes.* If the successes of Xochimilco and Crissy Field are of any applicable conclusion, the future city holds promise.

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