Beyond Pastoralism: Through Community Gardens to a Model of Sustainable Design and a Metaphor of Integration

by

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Abstract

This thesis demonstrates the necessity of looking at cities as a component part of "nature." It seeks a common denominator for sustainable design in three simplified principles and outlines a method for evaluating the built environment according to these principles. And it suggests how community gardens may begin to serve as both, a productive metaphor which integrates cities and "nature," and a model for sustainable design.

In order to view cities within "nature," it is necessary to discard popular idealizations of "nature." The pastoral ideal is particularly prevalent in America and represents a common mythos which constructs an idealized middle landscape between city and "nature," isolating both. Community gardens present us with a productive way of seeing "nature" and cities together and the gardens gives us a metaphor which can facilitate the sustainable design of our built environment.

The criteria and priorities of sustainable design frameworks vary, but they all contain components which can be broadly defined under three interrelated principles.

1 Create environments which sustain ecosystems.
2 Create environments which sustain communities.
3 Create environments which sustain people.

Indicators give us a good measure of the extent to which a particular environment is sustainable. Ecological indicators reflect the regenerative processes of ecosystems. Community indicators measure the capability of environments and the processes they engender to sustain human society. Personal indicators reflect the extent to which environments can heal and restore well-being to body and mind.

The community gardens in the Dudley Street neighborhood of Roxbury and Dorchester in Boston are evaluated and an outline is presented of how the gardens begin to realize the principles of sustainable design and suggest a new integrated and productive metaphor for building. A sustainable environment can only be achieved through an integrated consideration of ecological systems, social and cultural fabrics and individual human supports.

Thesis Supervisor: Reinhard Goethert
Principal Research Associate

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Leo Marx
Reinhard Goethert
Mel King
Michael Immel and the Boston Urban Gardeners at the Community Farm
Elizabeth Meyer
Ros Everdell and the Dudley Street Neighborhood Initiative
John Berg, Sherry Flashman and the Public Facilities Department
Aldo Ghirin and others at the Parks and Recreation Department
Lois Craig
Valerie Burns and Boston Natural Areas Fund
Eleanor Strong
Anne
and my father who first taught me the value of plants

Introduction

The pastoral ideal has influenced the way we regard "nature" for thousands of years. Its opposition of city and "nature," in the establishment of an idyllic middle landscape between the two, influences the world we make. From picturesque urban parks to the American suburban dream, we find its manifestation in landscapes which are largely disconnected from ecological systems and social fabrics. Community gardens stand in sharp contrast to the static, formally designed, public landscape, of pastoral metaphor which has dominated urban open space planning since the mid 19th century.

Community gardens realize a large number of sustainable design criteria, as they contribute to more sustainable ecological systems, social and cultural fabrics and individual human supports.

The community gardens in the Dudley Street neighborhood of Roxbury and Dorchester in Boston are evaluated through a combination of site observations, informal conversations and the review of a large body of secondary data. The gardens are looked at individually and as part of a linked open space network. An outline is presented of the existing sustainable qualities and future opportunities in the gardens and the open space network they are a part of.

The gardens suggest a new integrated and productive metaphor for the sustainable design of our built environment. They are creative expressions shaped by individuals, working in concert with ecological systems and guided by a community framework. They suggest an integrated and productive way of making buildings as gardens. Sustainable design necessitates that we stop making buildings in gardens and we begin building gardens.

One

Moving Beyond Pastoralism

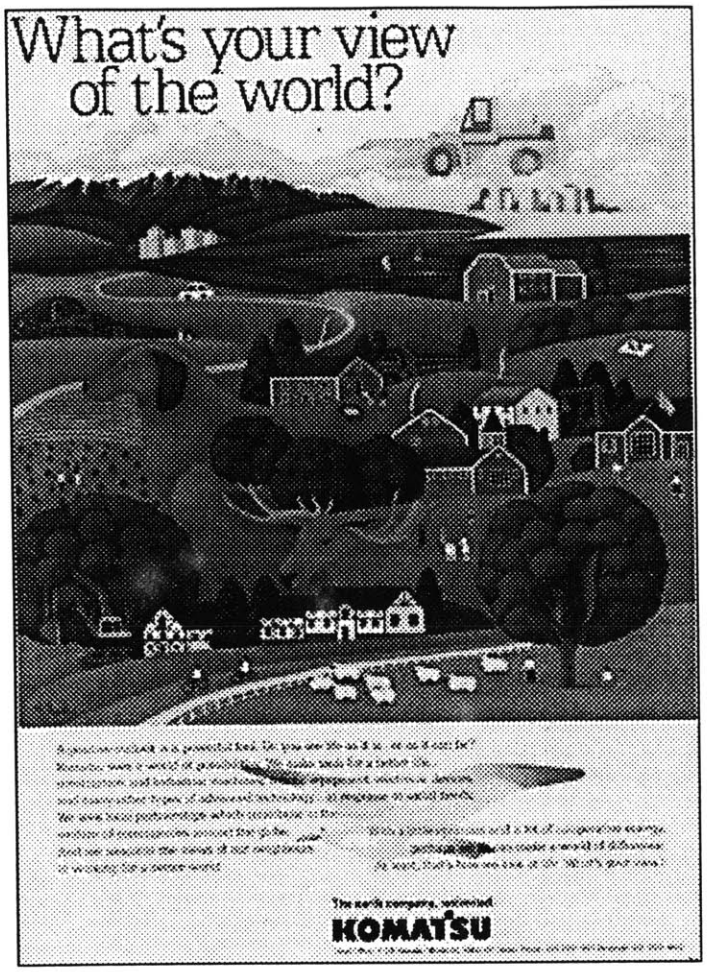

Fig. 1.1 Pastoral image in advertisement for Komatsu, *BusinessWeek* (March 29, 1993)

The Pastoral Lesson

The Middle Landscape

Our cities are functioning ecological systems and an integral part of the biogeophysical environment. They are not being designed as sustainable ecological systems because we continue to maintain a popular mythology which identifies "nature" as something apart from human existence and its artifacts. For over 3000 years the pastoral mythos has reinforced the abstract opposition of city and "nature," by constructing an idealized middle landscape between them. It dominates our perception of "nature" and prevents us from building sustainable ecological environments because we don't see the glass and steel skyscraper as part of "nature," but in contrast to "nature." The machine is *in* a garden, not *of* a garden.

In *The Machine in the Garden,* Leo Marx outlines the pastoral ideal.

> It is generated by an urge to withdraw from civilization's growing power and complexity. What is attractive in pastoralism is the felicity represented by an image of a natural landscape, a terrain either unspoiled or, if cultivated, rural.[1]

The pastoral ideal rests in a harmonious middle ground between city and "nature." In Fig. 1.1 is a common representation of contemporary pastoral ideals, anachronistically being used by Komatsu to sell heavy earth moving equipment.

Marx also recognizes ideals to either side of pastoralism.[2] The utilitarian ideal places the locus of meaning in the city and identifies "nature" as a resource to be consumed. For the early Europeans America was a wilderness, a vast storehouse of "natural" wealth and a blank slate. And today land continues to be valued only in relation to the profit it brings. The primitivist perspective places the locus of meaning in "nature." "Nature" is good, cities are bad. The distinctions between the three perspectives are not always clear. More importantly, they frame the range of views, which once isolated cities from "nature," and continue to isolate cities from "nature."

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1 Leo Marx, *The Machine in the Garden* (New York: Oxford University Press, 1964), p. 9.

2 Leo Marx, "The American Ideology of Space," In *Denatured Visions, Landscape and Culture in the Twentieth Century,* ed. Stuart Wrede and William Howard Adams (New York: Museum of Modern Art, 1991), pp. 62-78.

Idealizations of "nature" are found in a variety of advertisements and a myriad of built environments. Pastoralism became a major influence in urban park design beginning with Frederick Law Olmstead in the 19th century. The garden city movement grew out of pastoral ideals both here and in Europe and strongly influenced the growth of contemporary suburbs. Symbolically, pastoralism is best represented today in the contemporary, suburban office park. Here we are literally confronted with Leo Marx's 'machine in the garden.'

Pastoralism has ancient roots in a world very different from the one we inhabit today. The wilderness which once encroached upon cities and was visited by shepherds has long since disappeared. Ecology and the study of planetary biogeochemical cycles teach us that we are a part of "nature." We cannot continue to interpret our world through the myths and ideational constructs which served us 3,000 years ago. We must begin to alter them and develop new metaphors which allow us to engage our world in more productive ways. To do this we must understand the origins, influence and essence of pastoralism.

The Origins of Pastoralism

The term pastoral comes to us from *pastor*, a Latin term which describes shepherds. It is also associated with spiritual guidance, an association which was given to us by ancient civilizations, especially the ancient Israelites. The herdsman's closeness to nature and removal from the city placed them closer to God. The pastoral ideal guided some of the earliest civilizations to inhabit Mesopotamia. In his review of ancient pastoral writings, David Halperin draws together a considerable body of work on the subject.[3] He explains how the ancient Israelites, in their general condemnation of cities as corrupt, differ from the Sumerians, the later Semitic inhabitants of Mesopotamia and the Egyptians, who valued the civilizing influence of cities. Both groups maintained a pastoral mythology, but it is the former group that was to have the greatest influence upon modern pastoralism.

The Israelites often gave religious significance to the shepherd, who, living outside of cities and near to nature was also seen to be closer to the divinity. Halperin relates a story from the Old Testament, which describes how God sends a priest, Samuel, to anoint a King from one of seven sons.

> And Samuel said to Jesse, "Are all your sons here?" And he said, "There remains yet the youngest, but behold, he is keeping the sheep." And Samuel said to Jesse, "Send and fetch for him; for we will not sit down till he comes here." And he sent, and brought him in. Now he was ruddy, and had beautiful eyes, and was handsome. And the Lord said, Arise anoint him; for this is he."[1 Sam. 16:11-12]

Samuel, upon the Lord's advice chose the shepherd child over his city brothers. There is "a suggestion that removal from society carries with it a comparative innocence or moral rectitude and that the kingship, which has been a corrupt urban institution modeled on that of Israel's heathen neighbors can be purified or spiritualized by drawing on more humble rural stock."[4]

The spatial symbolism which we discover in traditional pastoral representations and which has been incorporated into painting and landscape design was borrowed from literature and is most clearly defined in Virgil's *Eclogues*.

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[3] David M. Halperin, *Before Pastoral: Theocritus and the Ancient Tradition of Bucolic Poetry*, (New Haven: Yale University Press, 1983).

[4] Ibid., p. 97.

> Happy old man! You will stay here, between the rivers that you know so well, by springs that have their Nymphs, and find some cool spot underneath the trees. Time and again, as it has always done, the hedge there, leading from your neighbor's land, will have its willow-blossom rifled by Hyblaean bees and coax you with a gentle humming through the gates of sleep. On the other side, at the foot of the high rock, you will have the vine-dresser singing to the breezes; while all the time your dear full-throated pidgeons will be heard, and the turtle-dove high in the elm will never bring her cooing to an end.[5]

Here is the simple and pleasure-filled green pasture that was to become the romantic ideal of many 18th and 19th C. landscape paintings and English parks.

In the American experience pastoralism assumed a unique character which was shaped by a different physical and mental geography. "This early version of the American mental map, with its graphic opposition between an old, established civilization to the east and raw, unimproved nature to the west, provided the symbolic setting for the myth of national origins whose narrative core was a journey from east to west."[6] The country, itself, came to represent the pastoral ideal. In the early years of this country, 'nature' was a resource to be consumed and "made useful" by arriving Europeans.[7]

By the mid nineteenth century 'nature' became associated with an almost entirely opposed set of values.

> Nature, in this view, is identified with freedom, spontaneity, authenticity; to recover the natural is to escape from the unhappy consequences of monarchical, aristocratic, and ecclesiastical oppression that constitute the dark underside of civilization.[8]

The transcendental writings of Emerson and Thoreau, the transfer of English picturesque garden ideas and the romanticized nature of landscape painting contributed to, and reflected, these changed perceptions. Popular idealizations of 'nature,' led to a popularization of the rural cottage and contributed to the continued drawing power of the suburbs.

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5 Virgil, The Pastoral Poems, (New York: Penguin, 1949), p. 25.
6 Marx, "The American Ideology of Space," p. 64.
7 Ibid., p. 64.
8 Ibid., p. 66.

> Those who moved to the new suburbs were assured of an escape from the problems of poor health, social unrest, and vice associated with urban life. The private dwelling in a safe residential neighborhood would protect the wife and children from the dangers of the wicked city. ... Picturesque site planning and natural building materials evoked a return to nature, to a lost innocence and an earlier stability[9]

The agrarian ideal of Jefferson speaks more directly to pastoralism. Here the locus of meaning is not a romanticized nature, but an agrarian ideal. "Those who labor in the earth are the chosen people of God."[10]

The solitary dwelling in a 'natural' or domesticated agrarian landscape came to symbolize the "national home."[11] The American romance with independence became intricately woven with the pastoral ideal. 'Natural' and agrarian landscapes became a symbol for escape from the constraints and ills of the city, yet people needed to be near the cities. From these conditions the suburb arose. According to Gwendolyn Wright the ideal American, middle class home of the late 19th C. was a refuge from the city. A pastoral refuge sought by millions of American households. The pastoral ideal continues to be a strong force in America today and is deeply ingrained in the American psyche.

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9 Gwendolyn Wright, *Building the Dream* (New York: Pantheon, 1981), p. 96.

10 Thomas Jefferson, "Query 19. Manufactures," *Notes on the State of Virginia*, ed. William Peden (New York: Norton, 1972), p. 165.

11 Wright, *Building the Dream*, pp. 73-95.

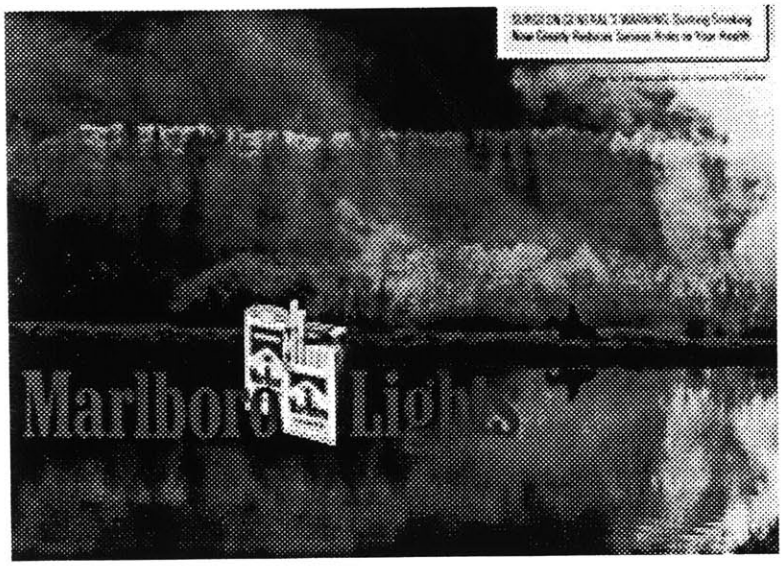
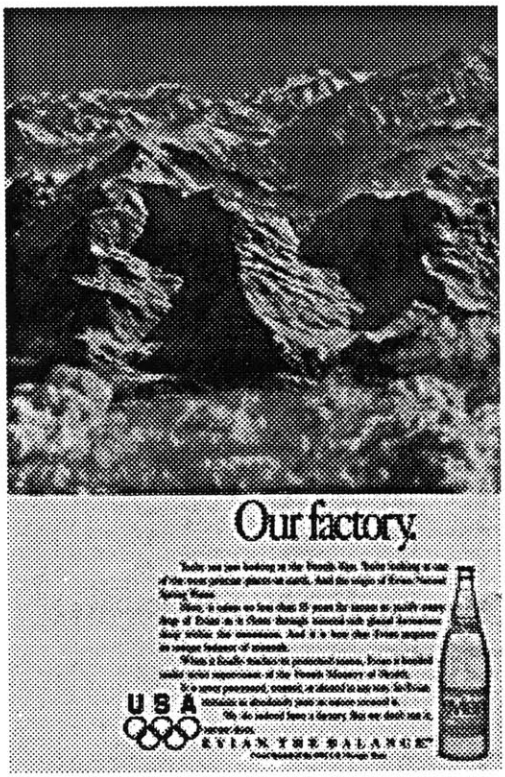


Fig. 1.2 Marlboro advertisement, *New Republic* (March 1, 1993).

Fig. 1.3 Evian Spring Water, advertisement, *Rolling Stone* (February 4, 1993).



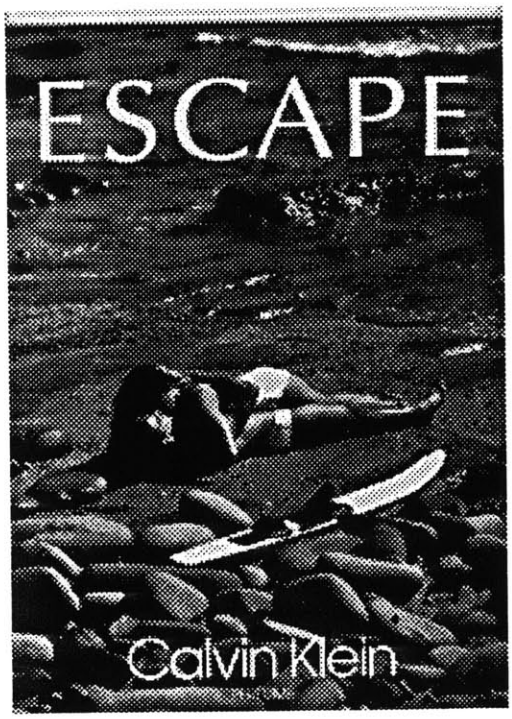


Fig. 1.4 Calvin Klein Perfume advertisement, New York Times Sunday Magazine (April 25, 1993)

Pastoralism Today

Our society continues to idealize "nature." Advertisements commonly appeal to a popular longing for the deep pleasant associations we hold for "natural" environments. The 'purity' of nature is used to sell cigarettes and spring water. The 'escape' to nature is used to sell perfume. Liquor advertisements often depict a natural landscape, also invoking ideas of nature as a place of escape and relaxation. And cars, the most environmentally destructive machines made by people are often pictured in "natural" settings. Advertisers and manufacturers are using these images and associations for a reason. There are qualities which are both important to people and associated with 'nature,' which are absent from our common built environments.

Pastoralism also idealizes both "nature" and "city," but does not place an overwhelming emphasis on either pole. Contemporary discussions of the Pastoral include distinctions between "simple", "complex", "urban" and "modern. The locus of meaning shifts with individual interpretations, but it is always concerned with an idealized "middle landscape" situated between antithetical opposites. Simple pastoralism joins the best of those opposites. The American dream of a house in the suburbs is inextricably linked to this pastoral idealization.

"Complex pastoralism" is a second and more developed form of pastoralism identified by Leo Marx. It is a form which is best symbolized by the image conjured by the title of his book, *The Machine in the Garden*. "Complex pastorals... register and in some sense come to grips with, the effective presence of the forces working against the realization of the pastoral motive."[12] It is an intellectualized pastoralism. Marx identifies the modern counter force as industrialization and gives numerous examples from literature and landscape painting, which express this dialectic. Most often the counter force appears as the image of a machine.

[12] Leo Marx, "Does Pastoralism Have a Future?," draft, later published in *The Pastoral Landscape* (1992), p. 214.

The "urban pastoralism" of James Machor deals in a more direct manner with social dimensions as it reaches toward a stronger synthesis of city and country.

> Viewing pastoralism as inadequate in itself, the urban-pastoral vision conceives of an alternate "middle" realm in which the city blends harmoniously with the countryside or contains within its own boundaries urbanity, complexity, and sophistication combined with the physical or social attributes of simple rusticity. ... At the base of the ideal lies an impulse to provide the urban dweller with some means to renew continually his elemental connection to his spontaneous, natural self while remaining a member of society, of the city, in a word of civilization.[13]

Machor's version of the myth moves us toward a more sustainable orientation, but there seems to be little evidence that it represents a significant collective vision.

Peter Rowe is also seeking a stronger synthesis. In his book, *Making a Middle Landscape,* simple pastoralism is joined with the modern technological orientation as he outlines a basis for design which he calls "modern pastoralism." His modern pastoralism is an elaboration of Leo Marx's complex pastoralism. Rowe is looking for ways to constructively engage the machine and the garden.

> On the one hand, we have the powerful image of Pynchon's printed circuit crisscrossing a valley landscape and, on the other, we have Thoreau's "primitive hut" out in the wilderness. By avoiding such extremes we can establish a more complex and inherently interesting equation between pastoralism and the modern technical temperament, one that can be used to critical advantage. The machine must be able to qualify the garden, and vice versa. It is the emergent dialectical relationship that is of interest, not simply the terms themselves.[14]

There is a deceptive appeal to these pastoral discourses. They seek to join city and nature. They engage antithetical opposites in metaphorical dialogue. They also maintain and reinforce the destructive ideology which distinguishes them in the first place.

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[13] James L. Machor, *Pastoral Cities, Urban Ideals and the Symbolic Landscape of America* (Madison, Wisconsin: University of Wisconsin Press, 1987), p. 14.

[14] Peter G. Rowe, *Making a Middle Landscape* (Cambridge: MIT Press, 1991), p. 250.

The Influence of Pastoralism

The Transfer of the Picturesque and Transcendentalism

The picturesque commodification of "nature" and the transcendentalist idealization of "nature," made it much easier to give form to pastoral ideals and contributed to a popular romanticism with "nature." By the end of the 19th century the American appetite for "nature" had led to numerous pastoral parks and cemeteries and was beginning to shape the suburb. The environments were made to look natural, but share no more than appearance with their "natural" mentor. The ideals that gave rise to these landscapes are even more prevalent today. Contemporary environmental concerns have spurred a cavalcade of concern and images. We now have eco-pastoralism. And we are no closer to addressing the essential ecological and social processes which sustain the built landscape.

The Picturesque

In Europe by 1800, 'nature' had become highly commodified. William Gilpin, Richard Knight and Uvedale Price among others had written a series of guides for popular consumption of 'picturesque' ideas. The main concern of the picturesque was according to John Dixon Hunt,

> ... how to process the unmediated wild world, how to control it or make it palatable for consumption by sanitizing it with art. Given different needs, the picturesque could invoke different styles of picture to format the raw materials of the natural scene. For the more timorous, Claude or a homely Dutch style would serve; stronger spirits could mediate via Ruisdael or Salvator Rosa; but whatever you did, nature out there was recycled for civilized use and consumption.[15]

This was the 'picturesque' brought to America, largely by A. J. Downing in his *Treatise on the Theory and Practice of Landscape Gardening as Adapted to America* of 1841. Initially many of Downings ideas were drawn from John Loudon who strongly emphasized that gardening was an art and as such, should not imitate nature.[16] Downing later changed his acceptance of these ideas and advocated that Americans should look to their indigenous landscape and vegetation for the source of their ideas. This change arose in part from economic constraints, American landholders at the time did not have the

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[15] John Dixon Hunt, *Gardens and the Picturesque* (Cambridge: MIT Press, 1992), p. 288.

[16] Melanie Louise Simo, *Loudon and the Landscape: from Country Seat to Metropolis, 1783-1843* (New Haven: Yale University Press, 1988), pp. 170-173.

wealth of their English counterparts, and in part from his fascination with the beauty and resources of the native American landscape.[17] Downing repackaged 'nature' to accord with the conditions of this landscape. It was a popular product, influencing many gardeners and landscape architects, including Frederick Law Olmstead.

The Transcendentalists

About the same time, Emerson, Thoreau and other transcendentalist writers were also coloring popular perceptions of 'nature.' Emerson left his work as a pastor, disillusioned with a lack of spiritualism in the reigning, "corpse-cold" rationalism of Unitarian theology. He brought his ministry and his views of "nature" as divine manifestation to the lecture circuit. For Emerson, 'nature' was a more pure manifestation of God's work, than man.

> Its serene order is inviolable by us. It is, therefore, to us, the present expositor of the divine mind. It is a fixed point whereby we may measure our departure. As we degenerate, the contrast between us and our house is more evident. We are as much strangers in nature as we are aliens from God. ... Yet this may show us what discord is between man and nature, for you cannot freely admire a noble landscape if laborers are digging in the field hard by.[18]

In Emerson's view, man was not a part of nature. Humanity was related to "nature" only through God, the creator of both. Through "nature" we had a direct line to God. "The greatest delight which the fields and woods minister is the suggestion of an occult relation between man and the vegetable."[19] This relationship is explored more fully by Thoreau.

At Walden Pond, Henry David Thoreau explores the role of natural facts and essential living in Emerson's transcendent "nature." Thoreau's relationship to Walden Pond is a metaphor for his relationship to "nature." "It is well to have some water in your neighborhood, to give buoyancy to and float the earth. One value even of the smallest well is, that when you look into it you see that the earth is not continent but insular. This is as important as that it keeps butter cool."[20] The pond has both utility and a transcendent value. It sustains him as a symbol of pure nature, even after he measures it with a cod line and a stone to a depth of 102 feet.

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[17] Judith K. Major, "A. J. Downing(1815-1852): Beyond the Treatise on Landscape Gardening," *The Architecture of Western Gardens*, ed. Monique Mosser and Georges Teyssot, (Cambridge: MIT Press, 1991), pp. 430-434.

[18] Ralph Waldo Emerson, "Nature," *Selected Writings*, Ed. Donald McQuade (New York: Random House, Modern Library, 1981), p. 36.

[19] Ibid., p. 7.

[20] Henry David Thoreau, *Walden and Civil Disobedience*, (New York: Harper & Row, 1965), p. 64.

For Thoreau natural facts and laws do not limit our appreciation of nature, but assist us in comprehending the larger form. "The particular laws are as our points of view, as, to the traveler, a mountain outline varies with every step, and it has an infinite number of profiles, though absolutely but one form."[21] Ultimately, the exploration and measurement of Walden Pond as an object of pure nature is for Thoreau a way to better understand and express himself.

Picturesque and simple pastoral ideas still dictate the form of most public gardens and parks. There is no concern with natural facts or the utility of nature and how they may lead to the fuller understandings expressed by Thoreau.

> But the gardens they [publishers of garden books] propose are all gardens through the window, gardens to be seen, sentimental gardens. Everything must be as variegated as possible, and nothing which we are to look at or sit among should be useful; the useful must be confined behind hedges, or in an allotment out of view of the house. The belief that what is edible isn't worth looking at is particularly rife among the makers of public spaces.[22]

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[21] Ibid., p. 216.

[22] Joseph Rykwert, "Il giardino del futuro fra estetico e tecnologia." *Rassegna*, No. 8 (October 1981), p. 5-12.

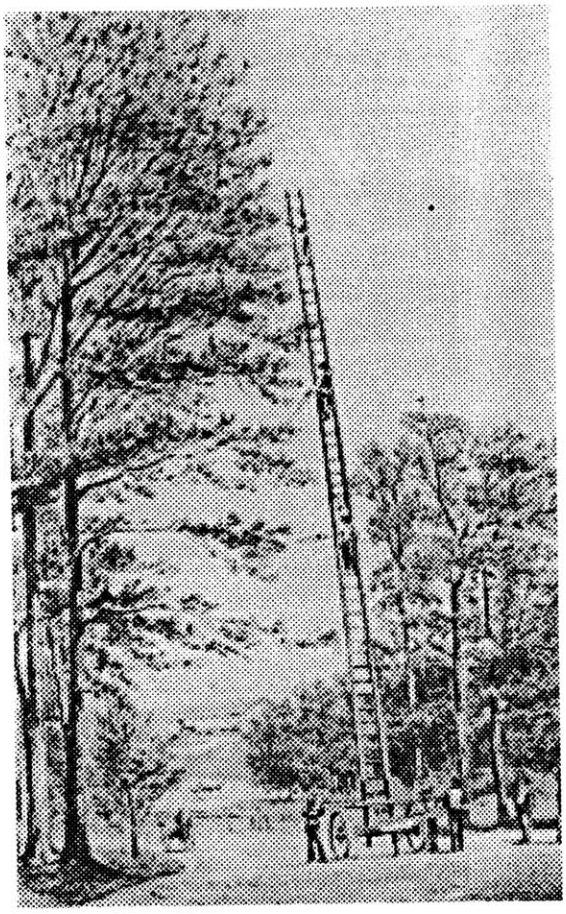

Fig. 1.5 Prospect Park, Brooklyn, Tree Trimming Machine, 1868, from Fein.

Park and City

Pastoral Urban Parks

Public urban parks initially emerged in 19th century European cities as a response to problems of health and sanitation from severe overcrowding. The early environmental prescription by the medical profession was "open space, fresh air and sunlight."[23]

American cities faced similar problems and calls for similar remedies. Frederick Law Olmstead was an early champion of the urban park and its capacity to address a number of problems unique to cities and towns. Part of Olmstead's prescription was pastoral scenery.

> The park should, as far as possible, complement the town. ... It should be the beauty of the fields, the meadow, the prairie, of the green pastures, and the still waters. What we want to gain is tranquillity and rest to the mind.[24]

While the parks may have represented the current transcendentalist conception of a healthy antidote to life in the city, they were seldom the scene of tranquillity and restfulness. "People misunderstood the function of the parks. The drives, rides, and walks became more important than the scenery, and the open greens were used for athletic games, the woods for picnicking, and the waters for rowing, sailing, or skating, according to the season."[25] The fixed unchanging image of picturesque "nature" in the pastoral park requires continual maintenance. It is a carefully manicured landscape where trees must be trimmed, brush cleared and grass cut. It is a landscape which was designed for viewing, reinforced with "Keep off the Grass" signs. It is not an ecologically or socially sustainable landscape.

By the turn of the century the popular transcendentalism that gave rise to the many large pastoral parks of the 19th century began to ebb. The American fascination with the Pastoral, however, remained and manifested itself in a growing popularity for the garden city and a suburban house.

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[23] Nicholas Green, *The Spectacle of Nature* (Manchester: Manchester University Press, 1990), p. 74.

[24] Frederick Law Olmstead, "Public Parks and the Enlargement of Towns," *Civilizing American Cities*, Ed. S.B. Sutton (Cambridge: MIT Press, 1971), p. 81.

[25] Galen Cranz, *The Politics of Park Design* (Cambridge: MIT Press, 1982), p. 15.

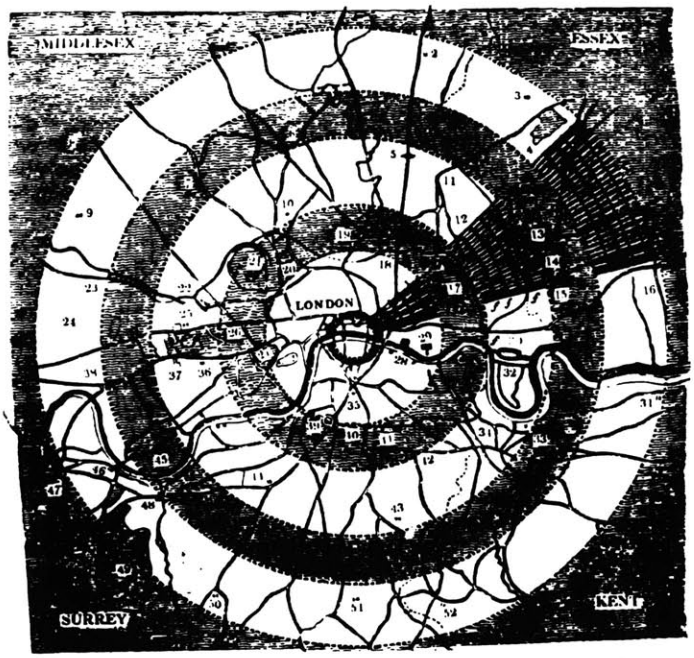

Fig. 1.7 J. C. Loudon, "Hints for Breathing Places for the Metropolis," 1829, from Simo.

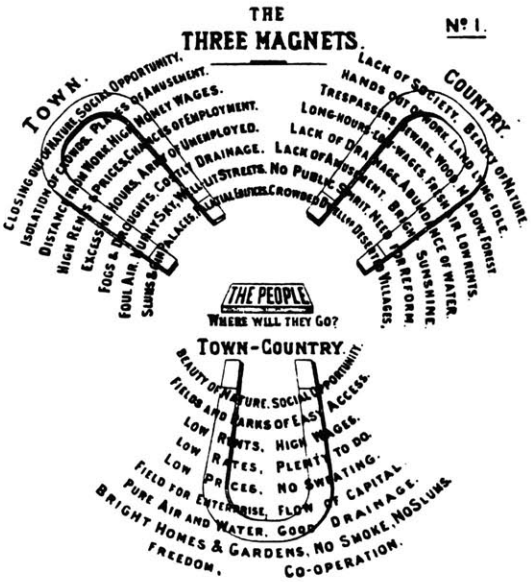

Fig. 1.8 Ebeneezer Howard, "The Three Magnets," 1898, from Howard.

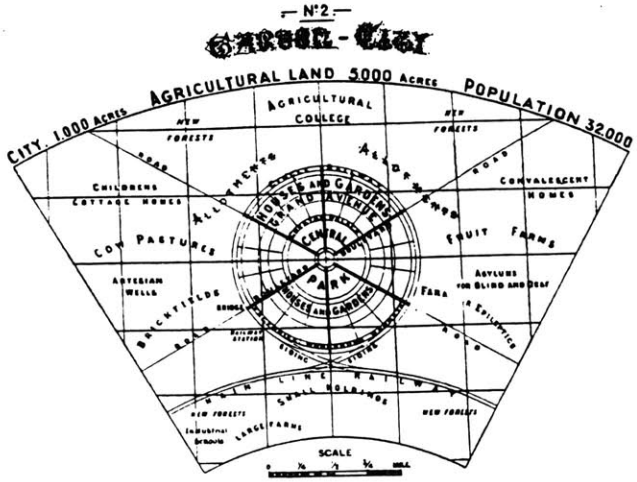

Fig. 1.9 "Garden City and Rural Belt," 1898, from Howard.

The Garden City

In 1829 John Claudius Loudon published a plan for greater London entitled, "Breathing Places for the Metropolis." His plan consisted of a series of alternating rural and city belts radiating in concentric rings from the center of London. Loudon was concerned with the expansion of the city and was one of the first to envision the need for preserving large open tracts of farm and park land in the path of rapidly expanding cities.

In contrast to Loudon's plan stood the much more controlled "garden city" of Ebeneezer Howard. Howard also based his proposal on a concentric city of alternating rural and city belts, but had developed his plan into a comprehensive and detailed plan for a series of new small linked cities of no more than 58,000 persons. Howard felt that if he could make a place which had the attractions of both town and country he would be vastly improving upon the possibilities open to his countrymen.

> There are in realty not only, as is so constantly assumed, two alternatives - town life and country life - but a third alternative, in which all the advantages of the most energetic and active town life, with all the beauty and delight of the country, may be secured in perfect combination; and the certainty of being able to live this life will be the magnet which will produce the effect for which we are all striving - the spontaneous movement of the people from our crowded cities to the bosom of our kindly mother earth, at once the source of life, of happiness, of wealth and of power.[26]

Howard's pastoral vision of the ideal environment has influenced a great many architects in both Europe and America.

America was fertile ground for European garden city ideas. Before these European ideas had reached America, Jefferson had designed an early garden city with a checkerboard of housing blocks and open greens, which reflected both, his concerns for a healthy city and his agrarian ideals. His plans for Jeffersonville, Indiana were meant to serve as an example for other American cities. By the end of the 19th century millions of Americans were seeking a pastoral vision not unlike Ebeneezer Howard's in the suburbs.

In 1935 Frank Lloyd Wright carried Howard's decentralized garden city concept to an extreme only the car could make possible. Broadacre City has no center. It is not even possible to distinguish urban from rural. Residential, civic, commercial and industrial

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[26] Ebeneezer Howard, *Garden Cities of To-morrow*, ed. F.J. Osborn (London: Faber and Faber, 1945), p. 46.

buildings are dispersed over the countryside. Wright gave form to the intense dislike and mistrust for cities of many Americans.

> This perpetual to and fro excites and robs him of the meditation and reflection that was once his as he lived and walked under clean sky among the green woods to which he was born companion. ... Native pastimes, with the native animals, streams, woods and fields, he has traded for the taint of carbon-monoxide, a rented aggregate of rented cells up-ended on hard pavements, "Paramounts," "Roxies," nightclubs and speakeasies. And for all this he lives in some cubicle among other cubicles under a landlord who himself probably lives above him, the apotheosis of rent in some form, in some penthouse. All are parasitic if not quite parasites.[27]

His answer is more space for people. "We are going to call this city for the individual Broadacre City because it is based upon the spacing of a minimum of an acre to the family."[28] Broadacre city is a manifestation of the American pastoral mythos, which sees the city as infernal, restless and inhumane, in contrast to "nature," which is calm, peaceful, healthy and virtuous. Wright did not build Broadacre City, but his ideals continue to be shared by millions of Americans moving to and living in the suburbs.

John Stilgoe gives us an additional interesting perspective on the detached suburban house. It is a miniature farmhouse.

> The front lawn, frequently fenced and always carefully mowed, assumes the role of the meadow, although the householder often destroys the grass clippings rather than curing them into hay. Behind the house lies the yard, again often enclosed, but serving as both farmyard and pasture. The backyard provides privacy, of course, and shelter from rough winds but most importantly offers an outdoor workplace. Chores from burning trash to changing automobile engine oil to splitting firewood require private space; the backyard and the descendant of the barn known as the garage or toolshed encourage the manipulation of objects[29]

As farmhouse, independent household, refuge from the city, rustic cottage or natural homestead, the suburban house is defined between city and nature. It is not possible to conceive of a place between two places that are not conceived of as apart. The pastoral ideal isolates city and nature.

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[27] Frank Lloyd Wright, *The Disappearing City*, 1932; facsim with Wright's corrections, (New York: Horizon Press, 1969), p. 13.

[28] Ibid., p. 41.

[29] John R. Stilgoe, *Common Landscape of America*, (New Haven: Yale University Press, 1983), p. 342.

Conceiving the City In Nature: A Necessary Step to Sustainable Design

Beyond Pastoralism

The creation of a sustainable landscape requires that we move beyond a pastoral ideal, which separates city and nature. We must develop an integrated way of seeing the city as nature.

The contemporary biogeophysical world is being degraded and its capability to support future generations is seriously in question. The signs were apparent to an American over 100 years ago. In 1864 George Marsh writes.

> There are parts of Asia Minor, of North Africa, of Greece, and even of Alpine Europe, where the operation of causes set in action by man has brought the face of the earth to a desolation almost as complete as that of the moon; ... The earth is fast becoming an unfit home for its noblest inhabitant, and another era of equal human crime and human improvidence, ... would reduce it to such a condition of impoverished productiveness, of shattered surface, of climatic excess, as to threaten the depravation, barbarism, and perhaps even extinction of the species.[30]

Marsh was a scholar, not a scientist, but he was an astute observer and his broad perspective enabled him to make connections others weren't. Today the predictions are no less dire, the only difference is they are now supported by scientific models and a great deal more evidence.

> During the 20 years since the first Earth Day, in 1970, the world lost nearly 200 million hectares of tree cover, an area roughly the size of the United States east of the Mississippi River. Deserts expanded by some 120 million hectares, claiming more land than is currently planted in crops in China. Thousands of plant and animal species with which we shared the planet in 1970 no longer exist. Over two decades, some 1.6 billion people were added to the world's population - more than inhabited the planet in 1900. And the world's farmers lost an estimated 480 billion tons of topsoil, roughly equivalent to the amount on India's cropland.[31]

We are continuing to destroy the life-support systems of this planet. The pastoral model which has determined so much of our built environment does not lead us out of this dilemma . We urgently need to develop sustainable design methodologies and a new metaphor which allows us to see cities as nature.

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[30] George Perkins Marsh, *Man and Nature* (Cambridge: Belknap Press of Harvard, 1965), p. 42-43.
[31] Worldwatch Institute, *State of the World*, (New York: Norton, 1991), p. 3.

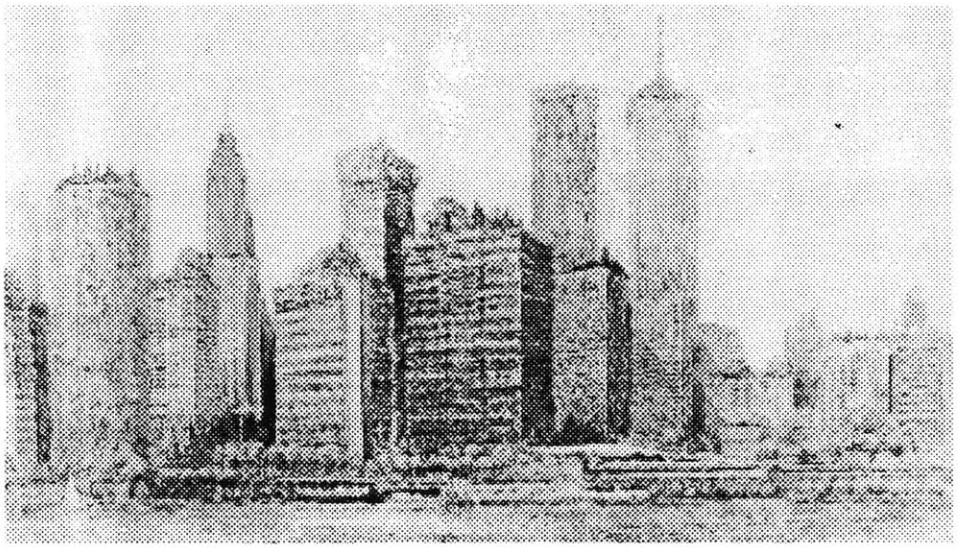


Fig. 1.11 "The Greening of Manhattan," SITE, *Architecture* (May 1991).

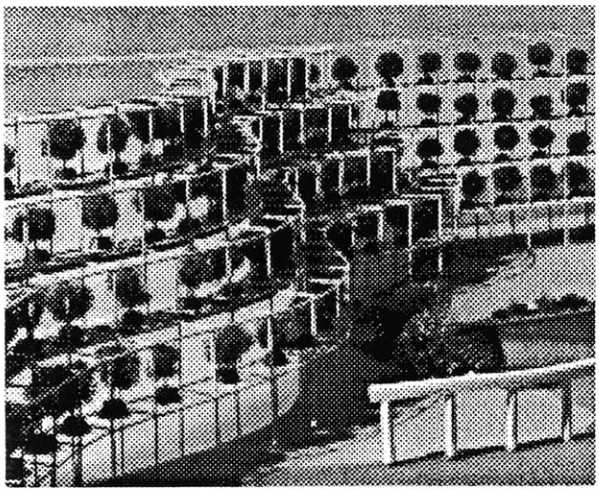
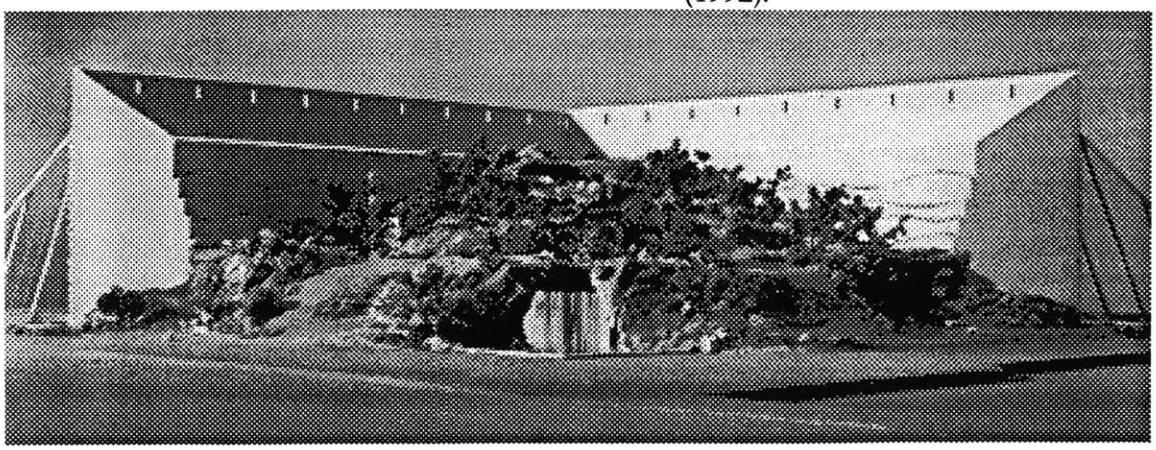


Fig. 1.12 Nishiyachiyo Town Center, Japan, Ambasz (1992).

Fig. 1.13 Mycal Cultural and Athletic Center, Japan, Ambasz (1992).



The need for a way to understand and positively influence the complex web of relationships which sustain organisms in a particular environment led to the development of a new science, ecology. Landscape architects were the first to adopt ecological design criteria and today planners and architects are also beginning to work from an ecological perspective. Unfortunately, much of this work either relies too heavily upon ecological science without addressing social, cultural and aesthetic issues or it continues to romanticize nature. In the first case we have a boring, but ecological environment, in the second we have eco-pastoralism.

Eco-pastoralism is simple pastoralism with an ecological appearance. Public concern with environmental degradation has directed many product designers and makers toward an image of ecological concern. Like the picturesque commodification of "nature," eco-pastoralism also depends upon images of "nature." "The Greening of Manhattan," by SITE typifies much of this work. Gardens and "green terrariums" are patched onto unchanged buildings. The work of Emilio Ambasz engages "nature" in a different way, but still reflects a conception that they are distinct.

When we take a closer look at building in a social context, the need for a new metaphor becomes increasingly apparent. Ecology is a science. It can instruct our search for a metaphor, but it is not a metaphor. A romanticized ecology, or eco-pastoralism, essentially leaves us in the same dead end as pastoralism. What we must develop is a way of interpreting our world, which places human society and its artifacts back in nature. The pastoral opposition of cities and nature, art and nature or humans and nature will lead not lead us to a sustainable environment. Sustainable landscapes are fully connected landscapes and can only be realized by addressing the myriad biogeophysical, social and individual human dynamics of sites, communities and participants in a balanced and holistic manner. What we need is a metaphor of integration.

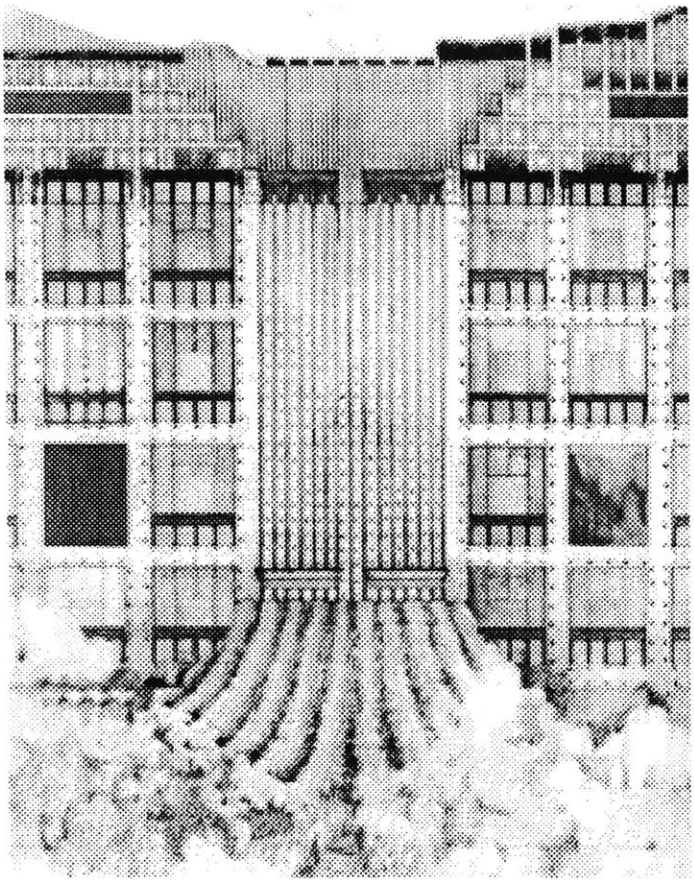


Fig. 1.14 Drawing, Barbara Stauffacher Solomon, from Solomon.

Fig. 1.15 Planting beds Museum of Modern Art, by Marx, fromEliovson.

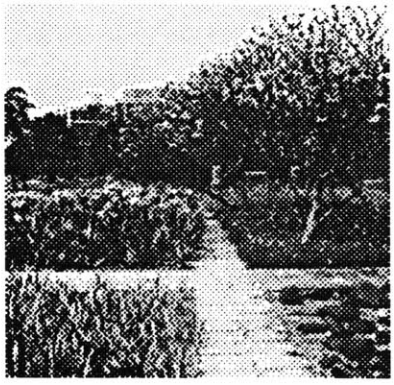
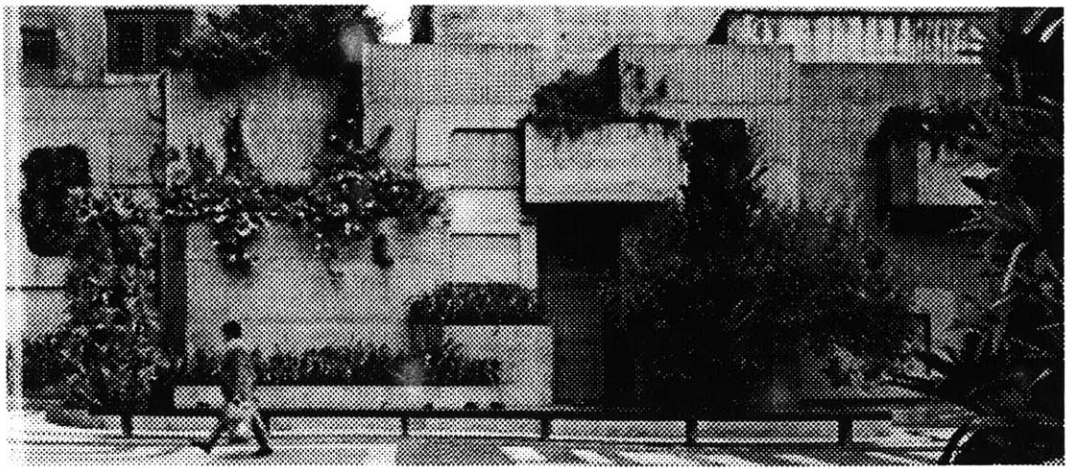


Fig. 1.16 Wall of Safra Bank, Rio de Janeiro, by Roberto Burle Marx, from Adams.



The City is Nature

> The city must be recognized as part of nature and designed accordingly. The city, the suburbs, and the countryside must be viewed as a single, evolving system within nature, as must every individual building and park within that whole. ... Nature in the city must be cultivated, like a garden, rather than ignored or subdued.[32]

Barbara Stauffacher Solomon explores similarities in patterns between the cultivated landscape and the urban landscape and suggests one way we can look at cities as gardens.

> Traditionally Western agrarians cultivated the land in simple geometric patterns. Rectangular fields were cut from the wilderness or marked by roads and rows of trees on the plains. Orchards were planted in orderly grids. Crops grew between straight furrows. The logic of the land and concern for cultivation determined patterns on the land. This work used planted materials with the same utilitarian logic and pride in performance needed in the traditional use of building materials; the result often was a landscape of collected splendor.[33]

The similarities in pattern give us a significant potential for integration between the two landscapes. This is what Solomon describes as, "a formal/agrarian view of making landscapes that is utilitarian and beautiful."[34] She explores this potential for integration most expressively in her drawings, which illustrate the merging of buildings and landscape in repetitive patterns (see Fig. 1.12).

The work of Roberto Burle Marx is also concerned with the formal use of plant materials. His approach is that of a painter.

> A Garden is a complex of aesthetic and plastic intentions; and the plant is, to a landscape artist, not only a plant - rare, unusual, ordinary, or doomed to disappearance - but it is also a color, a shape, a volume, or an arabesque in itself. It is the paint for the two dimensional picture I make of a garden on a drawing board in my atelier; it is the sculpture or arabesque in the garden.[35]

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[32] Anne W. Spirn, *The Granite Garden*, (New York: Basic Books, 1984), p. 5.

[33] Barbara Stauffacher Solomon, *Green Architecture and the Agrarian Garden*, (New York: Rizzoli, 1988), p. 87.

[34] Ibid., p. 105.

[35] Roberto Burle Marx, "A Garden Style in Brazil to Meet Contemporary Needs," *Landscape Architecture*, 44, No. 4 (July 1954), p. 200.

And an ecologist.

> A garden is a sort of education. You plant a young tree and you show something of its nature, its characteristic beauty. And you must adapt to surroundings. You know there's a tree in Brasilia that grows underground, only the branches coming above the soil. It has to be that way, to reach down twenty or thirty feet for the stored moisture in the dry season there.[36]

His work has been described as ecological painting[37], but this implies a concern primarily with the picturesque and does not adequately communicate Burle Marx's remarkable accomplishment. He has brought art and ecology together in a way which no longer distinguishes between the two. At the Museum of Modern Art in Rio de Janeiro, Marx artfully extends the disciplined geometry's of the building to the more organic and curvilinear forms of Flamengo Park through a series of planting beds. It is often difficult to distinguish between the garden and the museum.

At Mill Creek Canyon, Herbert Bayer has also brought art and ecology together in a remarkable work. The park is located in a valley which periodically floods. Bayer designed a series of land forms which temporarily contain the flood waters in a series of sculptural reservoirs. The water slowly soaks into the ground animating the park long after the rains have ceased. At other times the park is filled with people and the land forms support gatherings of people for large and small events.

Solomon, Marx and Bayer suggest integrated conceptions of nature which give us a far more productive and sustainable landscape than simple pastoralism. This paper suggests that community gardens serve a similar productive and sustainable role. Before outlining that role it is necessary to define "sustainable" more fully.

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[36] Roberto Burle Marx, quoted in Guy Playfair, "The Versatility of Burle Marx," *Architectural Review*, 136 (November 1964), p. 362.

[37] Fernando Aliata, "The Pictorial Technique of 'Ecological Painting': The Gardens of Robert Burle Marx," *The Architecture of Western Gardens*, pp. 519-521.

Fig. 1.17 Herbert Bayer, View of "Mill Creek Canyon Earthworks," from Beardsley.

Fig. 1.18 Herbert Bayer, View of "Mill Creek Canyon Earthworks," from Beardsley.

Two

Principles of Sustainable Design

The Framework of Sustainable Design

The Concept

Sustainable design is quite simply the design of environments which will support the continuation of something. In this case we are concerned with the design of environments which will be able to sustain the ecological systems, social fabrics and individual supports essential to humanity. Sustainable design has one goal, to ensure that our children and grandchildren inherit a world which will nurture their needs and dreams, at least as well, and hopefully better, than it nurtures ours.

The purpose of this chapter is to clarify the topic and provide a definition for sustainable design through the elaboration of three principles.

1) Create environments which sustain ecological systems. Ecosystems are open and dynamic processes sustained by a cyclical flow of quantifiable energy and materials. They provide biogeochemical supports to human life.
2) Create environments which sustain social fabrics and communities. Communities are groups of people with something in common. A sustainable community requires social mechanisms for education, group expression, political self determination and economic opportunity.
3) Create environments which sustain people. Personal well-being in body and mind is sustained by physical and non-physical supports for healing and rejuvenation, creative expression and the imagination.

The divisions are abstract, but they are important to us initially. They allow us to frame and approach our subject through concepts which are prevalent in most human societies. The first principle is grounded in the physical world and physical properties. The second principle explores the social world and cultural expressions. The third principle is often, the most neglected and difficult to address, in part because it seeks to sustain something which is intangible and different for each of us. It looks at our inner worlds.

Sustainable design values human life

In the past few years sustainable design, sustainable development and the idea of sustainability have received alot of attention. The reason is clear. The life support systems of our planet are in trouble, thus, we are in trouble. Many contributors to the discussion lose sight of the, we are in trouble. Ninety-five percent of the books, articles and symposia would not have occurred, if we were not in trouble. There are two lessons in this fact. The first is that, we are in trouble and we need to begin designing more sustainable environments immediately. The second is that, because we are in trouble, this issue is important.

Environmental ethics poses two questions.

> What sorts of things have moral standing? ...such that their continued existence or welfare is valuable in themselves? What are acceptable principles to invoke to help decide what are permissible tradeoffs in the many cases in which the lives or welfare of some things that possess moral standing conflict with the lives or welfare of other entities possessing moral standing?[1]

The answer of a growing number of ethicists and environmental philosophers is to give moral standing to snails, plants and rocks. They base their argument on the failure of traditional anthropocentric values.[2] If they had their way, people would begin weeding their gardens in the middle of the night for fear of being caught strangling a dandelion. This is not sustainable design.

Sustainable design is anthropocentric by definition and necessity. Sustainable design values that which is required to support human life, but the framework quickly becomes unworkable if rocks and dandelions are given values independent of their value to people. What is required is a framework for sustainable design, which gives us the tools to better measure the value of our environment, not as an alienated short term resource, but as an indefinite integrated part of a larger something, essential to humanity.

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1 Donald VanDeVeer and Christine Pierce, ed., *People, Penguins, and Plastic Trees, Basic Issues in Environmental Ethics* (Belmont, CA: Wadsworth, 1986), p. 17.

2 See Ibid., also Talbot Page, "Sustainability and the Problem of Valuation," *Ecological Economics*, Ed. Robert Costanza (New York: Columbia University Press, 1991), pp. 58-74., also Michael Tobias, ed., Deep Ecology (Avant Books, 1988)

Sustainable design reunites ecology and economics

It is strange how two words, ecology and economics, which share the same Greek route word, *oikos* - household, could have reached such divergent meanings. Economics took the Greek ending, *nomia* - management. The word, economy, came to us in the 16th century as, 'management of the household.' Ecology took the ending, *logy* - systematic study. The word, ecology, first appeared in the 19th century as oecologie, through translations of Haekel, and was used to describe the study of plant and animal habitats (households).[3]

It is becoming increasingly apparent that the two households must be reconnected. Herman E. Daly traces the contemporary economic valuation of nature in terms of land capital from the anthropocentric abstraction of Descarte's, "I think, therefore I am."

> It is evident that this Cartesian world view has provided the context and assumptional matrix for economic thought. For economic theory, value is to be found solely in the satisfaction of human desires. The subjective theory of value has totally replaced earlier "real" theories of value that took land or labor as the locus of value. Since, following Descartes, only humans possess subjectivity, it follows that only humans can be the locus of value. The rest of nature is viewed as land or improvement or product. Land represents all natural resources and includes all the living things supported by the land, except for the labor expended in raising them.[4]

The biogeophysical life-support systems of this world are invisible to economists who see land, as capital, with a market value determined by current human utility. Without an ecological revaluation of economic resources both systems may soon collapse. In 1991 Lester Brown pointed to the immense disparity between economic indicators and ecological indicators. He compared a number of optimistic economic indicators, particularly in relation to agriculture and population, with the ecological realities and limits.[5] Many more references can be made to the current inability of economics to address the value of ecological processes. It is a point that few dispute and the need for change is evident to many.

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[3] Raymond Williams, *Keywords* (New York: Oxford University Press, 1985), p. 110.

[4] Herman E. Daly and John B. Cobb, Jr., *For the Common Good, Redirecting the Economy toward Community, the Environment and a Sustainable Future* (Boston: Beacon Press, 1989), p. 107.

[5] Worldwatch Institute, 1991, p. 4.

Contemporary economics also fails to value social relationships and structures.

> The individualism of current economic theory is manifest in the purely self-interested behavior it generally assumes. It has no real place for fairness, malevolence, and benevolence, nor for the preservation of human life or any other moral concern. The world that economic theory normally pictures is one in which individuals all seek their own good and are indifferent to the success or failure of other individuals engaged in the same activity. There is no way to conceive of a collective good.[6]

When the international development world saw the recurring failure of economic development policies, they instituted "community development" programs. Though in some cases these programs were no different than the ones they replaced, they were tacit admission to the failure of a development policy based on economics.

The failure of economics to address ecological and social issues does not mean it has no role in sustainable design. While Mark Sagoff might be correct when he writes.

> That solution is to recognize that utopian capitalism is dead; that the concepts of resource and welfare economics, as a result, are largely obsolete and irrelevant; and that we must look to other concepts and cultural traditions to set priorities in solving environmental and social problems.[7]

The distinctions he suggests we use for setting priorities, "the pure from the polluted, the natural from the artificial, the noble from the mundane, the good from the bad, and the right from the wrong,"[8] are clearly untenable. We can avoid this ethical quagmire if we focus upon the concept of sustainability and simply define its requirements more closely.

Sustainable design is about people and for people. Many sectors of our society are beginning to address sustainable ideas and models have been put forth by ecologists, economists, social scientists, politicians, architects, planners, engineers, biologists and visionaries. The following brief survey begins to explore that range of thought.

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6 Daly, 1989, p. 159.
7 Mark Sagoff, *The Economy of the Earth* (New York: Cambridge University Press, 1988), p. 22.
8 Ibid.

The Context

A Historical Perspective

Subsistence societies give us an idea of the earliest manifestations of ecologically and socially sustainable design. A subsistence society exists, by definition, with very little excess means. The society instinctively works to minimize risks to itself. It is conservative to innovation. It works to diversify its resources. It takes from the land only what it requires. It makes decisions through a process of mutual consensus. These are lessons learned over many centuries of collective trials and errors and the evolved 'immune system' is critical to its survival.[9]

In Vitruvius we also find a model for sustainable design.

> "All these must be built with due reference to durability, convenience, and beauty. Durability will be assured when foundations are carried down to the solid ground and materials wisely and liberally selected; convenience, when the arrangement of the apartments is faultless and presents no hindrance to use, and when each class of building is assigned to its suitable and appropriate exposure; and beauty, when the appearance of the work is pleasing and in good taste, and when its members are in due proportion according to correct principles of symmetry"[10]

The Vitruvian principles, 'durability, convenience, and beauty,' outline a framework for proper building much like ours. Durability is concerned with the physical, convenience with the social and delight with the inner self. *The Ten Books* give advice in these three areas according to the needs and knowledge of the day. Vitruvius provides us with examples of climatic design, healthful city and building sites, a concept of utility, durable long-lasting materials and lots of common-sense.

Ecological Sustainability

Rapid urbanization and the genesis of ecology in the 19th century stimulated the development of ecological planning by the turn of the century. In Boston, Frederick Law Olmstead's design for the Back Bay Fens is often cited as an early example.

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[9] Majid Rahnema, "Subsistence Societies and their Immunization Systems," *Ideas and Action Bulletin*, No. 173 (Rome, Italy: Food and Agriculture Organization, United Nations, 1982), p. 21.

[10] Vitruvius, *The Ten Books on Architecture*, Bk. I, chap. iii.

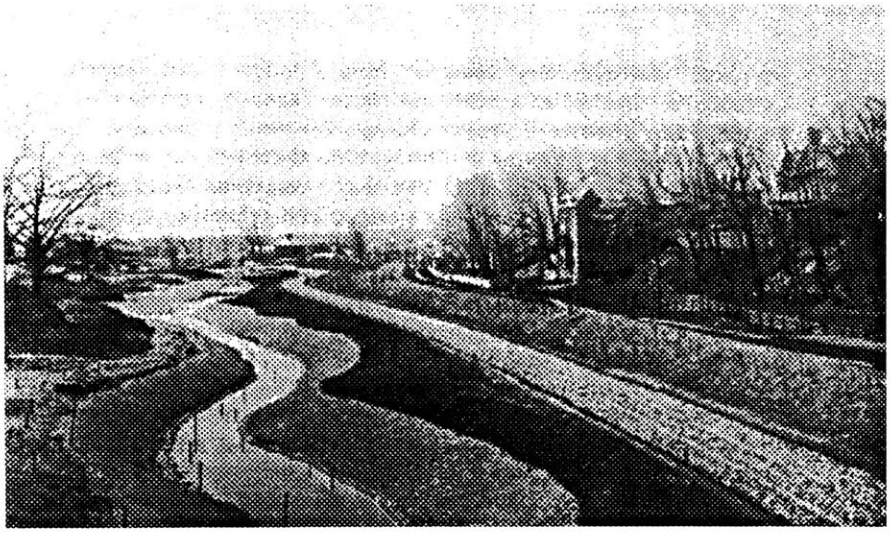

Fig. 2.1 The Riverway, Back Bay Fens, ca 1892, from Spirn (1984).

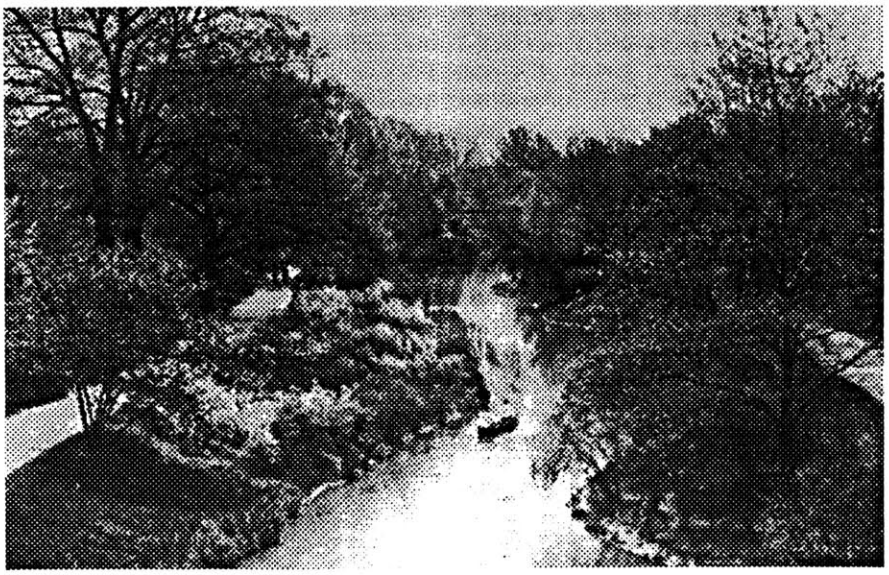

Fig. 2.2 The Riverway, Back Bay Fens, 30 years later, from Spirn (1984).

Olmstead writes, "The primary design of the scheme here shown is to abate existing nuisances, avoid threatened dangers and provide for the permanent, wholesome and seemly disposition of the drainage of the Muddy River Basin."[11] The 30 acre basin was designed to accommodate both tidal flows and flood waters and included the restoration of a former salt marsh.

Later, at the turn of the century, Charles Eliot proposed a comprehensive open space plan for Boston. It included.

> 1) Spaces on the ocean front; 2) As much as possible of the shores and islands of the bay; 3) The courses of the larger tidal estuaries...; 4) Two or three areas of wild forest on the outer rim of the inhabited area; 5) Numerous small squares, playgrounds and parks in the midst of the dense population.[12]

Eliot depended upon an elaborate landscape classification system for much of his work, 'which consistently included natural components, human attributes and aesthetic qualities.'[13] A decade later Warren Manning prepared a plan for Billerica, MA, which employed even more extensive landscape mapping techniques. "He produced maps of roads and cultural features, topography, small-lot subdivisions, soils, forest cover and existing and future reservations."[14] The intent of these mapping tools was to guide future development and resource use.

By the 30's ecological models began to influence landscape architects working at much smaller scales. Frank Waugh believed ecology could serve as, "an indispensable basis for the disposition of all vegetation."[15] He conducted research into plant communities, roadside ecology and freshwater ecology with his students at the Massachusetts Agricultural College.

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[11] Frederick Law Olmstead, "General Plan for the Santary Improvement of the Muddy River," 1881, quoted in Spirn (1984), p. 147.

[12] Charles Eliot, *Charles Eliot Landscape Architect* (Boston: Houghton Mifflin, 1902), quoted in Ervin Zube, "The Advance of Ecology," *Landscape Architecture* (March/April 1986), p. 62.

[13] Zube, p. 65.

[14] Zube, p. 66.

[15] Frank A. Waugh, "Ecology of the Roadside," *Landscape Architecture*, 21, No. 2 (January 1931), p. 80.

The publication of *American Plants for American Gardens,* in 1929 by Edith Roberts and Elsa Rehman also helped focus attention on ecology. Rehmann focuses her criticism upon the disturbances to natural plant communities and the questionable aesthetics of the English landscape park, suburban communities and artificial flower beds.[16]

In the 60's Ian McHarg made the most visible contribution to ecological planning with his landmark book, *Design With Nature.* The book comprehensively outlined an ecologically based method for landscape planning that continues as the model today.

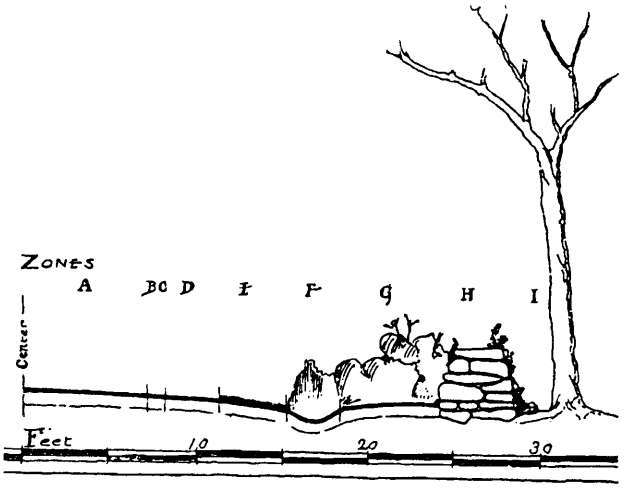

Fig. 2.3 Zonal distribution of vegetation at roadside, section, 1931, from Waugh.

A. Pavement or hard gravel.
B. Fractured edge 1-2.'
C. Junction of pavement with earth.
D. Earth shoulder.
E. Mowed verge 4.'
F. Gutter 3.'
G. Unmowable roadside 6.'
H. Wall or fence 4.'
I. Adjacent field.

[16] Elsa Rehmann, "An Ecological Approach," *Landscape Architecture,* 23, No. 4 (July 1933), p. 241.

Community and Individual Sustainability

Models of what constitutes an ideal and sustainable society have determined the form of settlements since the first subsistence societies. The web of human relations which characterize these societies, closely regulates all aspects of life. Made physical forms are direct expressions of this web and work to sustain it. A continued survey of ideal societies and attempts to realize them is not possible in the scope of this paper. Such a survey would probably begin with Plato's *The Republic*, and then diverge into two traditions. One would pass through Sir Thomas More's *Utopia*.

> Every home has not only a door into the street but a back door into the garden. What is more, folding doors, easily opened by hand and then closing of themselves, give admission to anyone. As a result, nothing is private property anywhere. Every ten years they actually exchange their homes by lot.[17]

The opposite tradition would pass through *The Prince*, by Machiavelli.

> It has been the custom of princes in order to be able to hold their state securely, to erect fortresses, as a bridle and bit to those who have designs against them, and in order to have a secure refuge against a sudden assault.[18]

Today, of course, the traditions are not so sharply defined, but they are useful in characterizing the extremes.

A history of environments which sustain our inner selves would include both of the above and a third, for which, there is again no room. It would be a history of religion and religious artifacts, of art and of psychology.

Contemporary Models - Sustainable Development

In some senses we seem to have come full circle. Many contemporary models for sustainability reflect a connectedness and relatedness the western world has not seen since Aristotle and Plato. Several important publications frame the current discussion on sustainable development.

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[17] St. Thomas More, *Utopia*, ed., Edward Surtz S.J. (New Haven: Yale University, 1964), p. 65.

[18] Niccolo Machiavelli, *The Prince*, Trans. Luigi Ricci (New York: Oxford University Press, 1935), p. 108.

In 1987 the World Commission on Environment and Development published *Our Common Future.* The report was influential in bringing environmental issues to the development table and gave us the most commonly quoted definition of sustainability. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[19]

The two key concepts identified by the report were "needs" and "limitations." The essential first step is to meet the basic needs of the world's poor. The report suggests that this can be accomplished through economic growth, increasing productivity and ensuring equitable opportunities for all. Limitations upon development must ensure that the life supporting capacity of natural systems not be impaired. For renewable resources it becomes important to define and not exceed "maximum sustainable yield" limits. The report recognizes the "criticality" of specific non-renewable resources and suggests that rates of depletion take into account the availability of alternative technologies and the likelihood of future substitutes.

Another important international document, *The World Conservation Strategy,* is critical of economic development and emphasizes conservation. "If the object of development is to provide for social and economic welfare, the object of conservation is to ensure Earth's capacity to sustain development and to support life."[20] The report identifies three objectives and the requirements necessary to conserve living resources; the maintenance of essential ecological processes and life support systems, the preservation of genetic diversity and the sustainable utilization of species and ecosystems.

The two documents characterize the two predominant international approaches to sustainability and their sometimes opposed methods. The poorer and economically underdeveloped countries see economic development and equity as the first step to sustainability. The second group represents the interests of the wealthy industrialized west. Calls for the conservation of resources deflect attention from huge inequities in resource consumption and protect the status quo. The same conflict is represented in many current models for the sustainable design of our cities and landscapes.

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[19] World Commision on Environment and Development. *Our Common Future.* (Oxford: Oxford University Press, 1987), p. 43.

[20] *World Conservation Strategy: Living Resource Conservation for Sustainable Development.* Morges, Switzerland: IUCN, UNEP, & WWF, 1980.

Contemporary Models - Sustainable Design

Contemporary models of ecologically sustainable design can be divided almost as neatly as the design professions with a few exceptions. Architects focus upon energy and resource conservation, air quality and non toxic environments. Planners and landscape architects focus upon resource conservation through land use planning and improvements to infrastructure. Land use planning largely involves overlaying soils, vegetation, hydrologic data and topography to locate sites and uses which optimally repair or minimally damage existing ecological processes.

The Center for Maximum Potential Building Systems in Laredo, Texas notably integrates landscape and building concerns. They have realized their model in a demonstration project, Blueprint Farm, designed "through a matrix of overlapping factors such as geological formations, climatic conditions, vegetation patterns, building precedents, waste streams, and useful technological innovations, beginning always from a global perspective and working toward a micro, project-specific level."[21] The farm, a model of sustainable design incorporates cooling wind towers, wind turbines, waste treatment, recycled and local building materials and shaded gardens (it is in the desert).

The New Alchemy Institute, an east coast predecessor, organized in 1970, also grew out of concerns with the existing ecological and social course of society. The goals of the New Alchemists were articulated in the 1971 publication of "A Modest Proposal," by John Todd, one of the founders. "The New Alchemists have begun studies to shape the skills needed to establish modern, relatively self-contained communities which capture their own power, grow their own foods and utilize their wastes."[22] A decade later, the Institute's farm on Cape Cod had grown into a thriving community, which had realized that goal. Greenhouses supported year-round fish tanks, bio-aquatic waste water treatment barrels and vegetable gardens. Today the physical Institute is no longer there, but its example continues to inspire sustainable designers.

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[21] Ray Don Tilley, "Blueprint for Survival," *Architecture* (May 1991), p. 65.

[22] John Todd, quoted in Kate Eldred, "Promise Rediscovered: New Alchemy's First Twenty Years," *New Alchemy Quarterly* No. 37 (Fall 1989), p. 6.

This spring, the AIA "Building Connections" video teleconference on sustainable design showcased several buildings.[23] They included the National Audobon Headquarters (NAH) in NY, the NMB bank building in Amsterdam, the Rocky Mountain Institute (RMI) in CO and the Way Station of Frederick, MD. Each of these buildings are exemplary in energy conservation. The RMI and NAH buildings incorporate waste treatment systems and the NAH building incorporates many non-toxic materials. There are many more examples of good energy conserving buildings. Unfortunately, the fertile example set by Blueprint Farm and New Alchemy are absent from the vast majority of these buildings. We need to explore more ways to link buildings and landscape systems, architects and landscape architects.

Participatory design gives us the best model for the sustainable design of communities. Community participation in design became popular in the 70's as a response to the devastation caused by urban renewal programs of the 60's. It is still a tool employed primarily by planners. Randy Hester provides a comprehensive participatory planning method through user needs checklists.[24] The checklists provide a means for residents to communicate their needs and desires to planners and architects.

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[23] American Institute of Architects, "Building Connections," a 3 part teleconference series (1993).

[24] Randolph T. Hester, *Planning Neighborhood Space With People* (New York: Van Nostrand Reinhold, 1984).

Scales

Sustainability must be considered at a number of different scales. At one end of the scale is the biosphere which envelopes our planet, at the other end is the organism itself. The focus of this paper is sustainable community open space and in order to simplify and reasonably address the issues, I have identified three primary scales. These scales are directly expressed in the governing principles which address the sustainable environments for ecosystems, communities and individuals.

Ecological Scale

Domesticated urban ecosystems commonly differ from non-human influenced ecosystems in two important respects. They require large amounts of highly concentrated energy and they draw these energy and material resources from around the world. A thorough analysis of the material and energy flows which sustain our large fuel-powered urban-industrial ecosystem would extend to nearly every corner of our planet. It would include the energy expended in wars to maintain oil pipelines and the death of coral polyps in the Pacific from choking silt, washing out of mines and deforested hillsides. We do not have the tools to undertake such a thorough analysis. We do not need to. There is a clear consensus that the maintenance of existing energy and material use patterns will lead to continued environmental deterioration.

The most sustainable direction is to begin to localize resource and energy requirements. Given the complex requirements of our urban industrial ecosystem it would be impractical to expect that all the requirements of a large city could be met within a region, however many could be met.

Community Scale

Human communities vary in scale from the planetary to the familial. The United Nations and other international organizations purportedly serve the common interests of this planet's five and a half billion residents. In the Southern Highlands of Papua New Guinea communities often contained less than 10 members, related by clan and physically consisting of several houses and a garden at the edge of a forest clearing.[25]

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[25] George Loupis, *Traditional Architecture of the Central Highlands of Papua New Guinea* (Lae, PNG: Papua New Guinea Institute of Technology, 1984), p. 19.

For the purpose of sustainable design, I believe the most useful concept is the more common association of community with a neighborhood. In Principle two this concept is defined more closely.

Individual Scale

Our consideration of the individual might be problematic to some sociologists who would argue that the individual cannot be considered apart from the social context which defines them. The fact is that the individual does exist in our society, even if it is as a biological, economic, political or psychological abstraction. I am not implying that it is possible to sustain people as autonomous egos apart from the social and physical world of which we are a part. The concept of the individual is just an abstraction like community and ecosystem which enables us to frame some additional thoughts.

One could easily come to the conclusion that sustainability is a very complex concept. This is precisely the argument of those interested in maintaining the status quo. It is not complex. It simply asks that we leave the world a better place than we find it. A sustainable human environment must do three things. It must sustain ecosystems, human communities and people.

Principle One:
Create Environments which Sustain Ecosystems
The Ecosystem

Principle one focuses upon our contemporary urban industrial ecosystem. The enormous amount of energy required to support this ecosystem and its current destructiveness has led some to suggest we abandon the model as inherently unsustainable. This is neither practical, nor tenable, and only leads backward. There are many opportunities for sustainable design to both, reduce this energy imbalance and halt environmental deterioration. The first step is to develop a clear understanding of the ecosystem and its component energy and material cycles.

Ecosystem is a term that was first used in 1935 by an English botanist, Sir Arthur Tansley to demonstrate how the living world is tied to the non living world.[26] Ecosystems became organized conceptual units with interdependent biotic and abiotic components. The term gives us a useful and practical model which can begin to inform and test design interventions. Ecosystems are never closed or entirely balanced systems. As ecosystem components work toward equilibrium, inputs, outputs and the external environment often work against equilibrium.

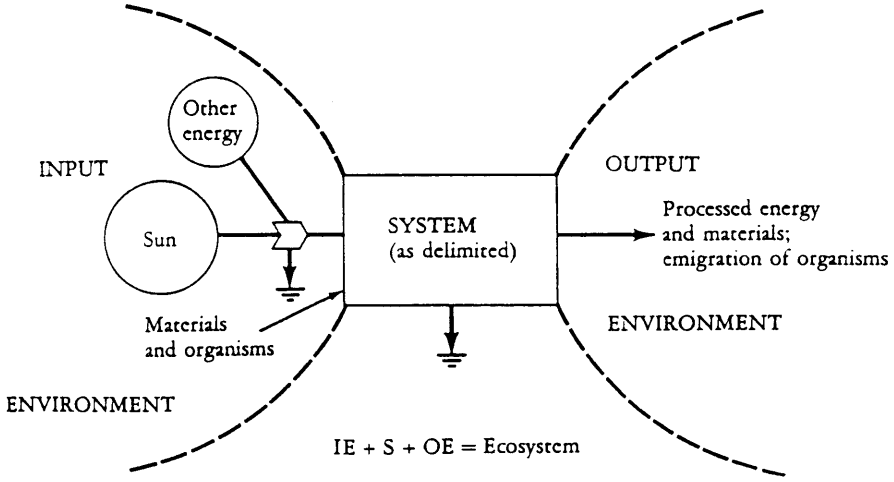

Fig. 2.4. Model of an ecosystem, from E. Odum, (1989).

[26] Donald Worster, *Nature's Economy, A History of Ecological Ideas* (New York: Cambridge University Press), pp. 301-305.

The most important input is energy and its primary source is the sun. Energy moves through the system in a variety of forms, as do nutrients, other materials and organisms. Within the system there are biotic and abiotic components. Biotic components are usually subdivided into food producers - autotrophs and food consumers - heterotrophs. The abiotic components are energy and the nutrients present in the three material media, air, water and soil.

The physical relationships between the components are best understood in terms of the linear flow of energy. Autotrophs fix solar energy and concentrate it in food or plant matter through photosynthesis. Heterotrophs consume this plant matter and utilize its component energy through respiration. As energy moves through the system it is both, slowly dissipated and transformed into more highly ordered forms.

Energy Cycles

> If one were asked to pick out a single common denominator of life on earth, that is, something that is absolutely essential and involved in every action large or small, the answer would have to be energy ... We should start teaching energetics in the first grade.[27]

An understanding of energy cycles is essential to sustainable design. The movement, transformation and storage of energy governs the form of our physical world. The behavior of energy can be described in two laws of thermodynamics.

The first law is a statement of energy conservation. Energy cannot be created or destroyed. In a plant, light energy is transformed to food energy and heat energy. If we were able to measure this process in a closed system we would find that the amount of energy contained in the new plant material equals the amount of light energy minus the heat energy dissipated. The second law of thermodynamics relates more information about this process. Sometimes referred to as the entropy law, the second law states that energy, left to itself, will tend toward increasing disorder. Entropy is a measure of disorder. If we return to the example of the plant, we see that a percentage of the energy was dispersed as heat energy and is no longer in a usable form. A percentage of the energy contained in food is also lost when it is consumed by heterotrophs through respiration. This energy is allocated to the maintenance of body tissues or is again dispersed as heat energy. We can summarize the one way movement of energy through an ecosystem according to the laws of thermodynamics. These laws show us how energy is conserved, but also dispersed in unusable forms as it moves through the system. This necessitates a constant inflow of new energy.

The capability of ecosystems to self-organize and maintain highly organized, low entropy states sometimes seems in contradiction to the second law. Ilya Prigogine's work in non-equilibrium thermodynamics demonstrates how ecosystems contain dissipative structures which effectively rid the system of entropy, but which must be maintained by a continuous inflow of energy and matter.[28]

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[27] Eugene P. Odum, *Ecology and our Endangered Life-Support System*, (Sunderland, MA: Sinauer, 1989), p. 67.

[28] Ilya Prigogine, Gregoroire Nicolis and Agnes Babloyantz, "Thermodynamics of Evolution." *Physics Today* (November 1972), pp. 23-28.

The urban industrial ecosystem which we have created can only be sustained by extremely large and concentrated energy inputs. Food is manufactured in energy intensive agro-ecosystems and transported by ship, rail and truck to inner city dwellers. Our structures embody large amounts of energy in manufacture, construction and maintenance. The highly ordered functions of cities are maintained by large sanitation crews, police forces, fire fighting squads, metropolitan transit systems and commercial establishments for product distribution. These institutions all act to reduce entropy. Without them cities would not be able to maintain their complex, highly ordered structures. The entropy reducing actions of these agents also require large amounts of energy. The major sources of energy are currently non-renewable fossil fuels. This is not a sustainable condition.

The first priority of ecologically sustainable design must be to ensure that energy requirements can continue to be met in the future. This necessitates one of two directions. Demand is decreased until renewable energy resources can accommodate all energy requirements or nonrenewable energy sources are replaced with renewable energy resources. It is a very simple equation with two choices.

In ecological systems energy is embodied in food. Energy moves through the system as food. It is transformed from a dispersed form, high in entropy, such as sunlight, to a concentrated form, low in entropy, the fabric of our cities. In a sustainable ecological system, linear energy flows drive circular nutrient flows. Materials are continually recycled. The concept of waste is unique to our urban industrial ecosystems. It is also unsustainable.

Material Cycles - Air

Ecosystems are continuously cycling several atmospheric chemicals. Photosynthesis requires carbon dioxide and produces oxygen. Respiration requires oxygen and returns carbon dioxide. Atmospheric nitrogen is fixed by soil microbes and made available to plants, which then release nitrogen back to the atmosphere upon later decay. The atmosphere is also host to air moisture moving through the hydrologic cycle and influences the amount of solar radiation which reaches the surface of the earth.

Contemporary urban industrial ecosystems introduce large amounts of dangerous chemical and particulate contaminates into the atmosphere. The U. S. federal government has established air quality standards for six major pollutants; sulfur dioxide, nitrous oxides, carbon monoxide, volatile organic compounds, lead and total suspended particulates. From 1970-1990 there were significant decreases in two of these pollutants, lead and particulates. Despite motor vehicle emission controls, cars still account for more than 3/4 of carbon monoxide emissions and about 50% of hydrocarbon and nitrous oxide emissions.[29]

Sulfur dioxides and nitrous oxides both form dilute acids in water vapor. Acid rain is destroying plant and animal life, as well as buildings. Nitrous dioxide also reacts with unburned hydrocarbons (both are prevalent in car exhaust) to form a dangerous photochemical smog.[30] Carbon monoxide is a deadly poison in high concentrations and can build up in areas with high volumes of automobile traffic and stagnant air.

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[29] Council on Environmental Quality, *Environmental Quality*, 22nd Annual Report (Washington D.C.: G.P.O., 1992)

[30] E. Odum, p. 120.

Our urban industrial ecosystems are changing local and global climates. Atmospheric levels of carbon dioxide have been steadily rising since the first measurements were made.[31] Hypotheses range from increased storm activity to dramatic changes in global weather patterns. Decreasing levels of atmospheric ozone are leading to increased levels of ultraviolet radiation and a significantly increased risk of skin cancer and eye cataracts. The EPA estimates that current levels of ozone depletion will lead to 200, 000 additional skin cancer fatalities over the next five decades in the U.S. alone.[32]

The contemporary urban industrial ecosystem will clearly not be able to maintain itself given the current level of interference with ecological processes in the atmosphere. We must reduce the introduction of toxins and work toward balancing global CO_2 emissions.

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[31] *Environmental Quality*, Table 43.

[32] William K. Reilly, "Statement on Ozone Depletion," Washington DC: U.S. E.P.A., April 4, 1991.

Material Cycles - Water

Within organisms, water is an essential component of photosynthetic and respiratory processes. It is also a vehicle for the transfer of nutrients essential to growth. Outside organisms, water plays an equally important role in the hydrologic cycle. The hydrologic cycle is responsible for the flow of many materials and organisms essential to the proper functioning of ecosystems. The power required to move all this water through the hydrologic cycle of evaporation, convection, condensation, precipitation and runoff is large, approximately 23% of the solar radiation reaching the Earth's surface.[33]

Contemporary urban industrial ecosystems adversely impact water based ecological processes essential to their own continued well-being. They introduce toxins into water systems, which destroy organisms. They create imbalances in nutrient availability, stimulating or inhibiting growth in uncontrollable ways. They reduce local water aquifers and lower ground water tables.

Agriculture is the major source of freshwater pollution. Pesticides, fertilizers and soil erosion from current agricultural practices are responsible for over 50% of the pollution entering our lakes and streams.[34] The siltation and nutrient enrichment from agricultural runoff creates severe local imbalances in aquatic ecological systems. The second major source of pollution in rivers and estuaries is storm sewer runoff. Many municipal sewage treatment plants cannot cope with storm waters. During these periods groundwater runoff and sewage are allowed to enter rivers and estuaries untreated.

Many urban environments cannot satisfy their water requirements locally. Water is often piped long distances and local aquifers are depleted in order to satisfy demand. Seldom are the ecological consequences to the hydrologic cycle considered.

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[33] M. King Hubbert, "The Energy Resources of the Earth," *Scientific American*, 225, No. 225 (September 1971), p. 62.

[34] *Environmental Quality*, p. 187.

Material Cycles - Soil

> A profound truth has escaped us. Soil is a placenta or matrix, a living organism which is larger than the life it supports, a tough elastic membrane which has given rise to many life forms...[35]

Soil supports, not only the preparation and storage of nutrients for plant use, but also the plant itself. Microbes and bacteria within soil are essential in the conversion of nutrients. Eighty percent of our atmosphere is nitrogen, useless to plants until fixed by microbes as ammonia, nitrite and nitrate. Bacteria assist in the breakdown of dead plant matter to provide nourishment for new growth.

Our urban industrial ecosystem depends upon an agroecosystem to satisfy its highly specialized functions. Agroecosystems enhance the productivity of the above cycles by supplementing solar energies with additional energy inputs. The additional energy is concentrated in processed fertilizers, pesticides and fuels which are deployed to increase productivity. The concentration of these activities in areas remote from cities requires additional energy expenditures in transport and food processing. The majority of the organic waste from subsequent urban consumption does not return to the agroecosystem. This is not a sustainable situation. It is supported by non-renewable fuels and the intensification of production is leading to soil degradation through erosion and depletion of nutrient reservoirs.

Soil is often a reservoir for toxins as well as nutrients. The government has identified over 35,000 manufactured chemicals which are, either known to be, or are, potentially hazardous to human health.[36]

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[35] Wes Jackson, *New Roots For Agriculture* (Lincoln, Nebraska: University of Nebraska Press, 1985), p. 10.
[36] EPA

Principle Two:
Create Environments which Sustain Communities

The Community

A community is a group of people with something in common. When we describe a community, we generally, also associate a shared set of physical, social, cultural, political and economic conditions. I am using the word community instead of neighborhood, because I believe these associations are important to our purpose. A neighborhood exists within a community, and often has a more physical connotation.

If a neighborhood helps define a community, what is a neighborhood? Suzanne Keller gives us a useful definition. "Local areas that have physical boundaries, social networks, concentrated use of area facilities, and special emotional and symbolic connotations for their inhabitants are considered neighborhoods."[37] This definition comes close to describing the larger framework of community we are reaching toward. An important addition to this description is Milton Kotler's political perspective. He defines the neighborhood, "as a political settlement of small territory and familiar association, whose absolute property is its capacity for deliberative democracy."[38] Together the two definitions give us a good general definition of a community.

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[37] Suzanne Keller, *The Urban Neighborhood: A Sociological Perspective* (New York: Random House, 1968), p. 156.

[38] Milton Kotler, *Neighborhood Government, The Local Foundations of Politcal Life* (Indianapolis: Bobbs-Merrill Company, 1969), p. 2.

Cultural Expression and Group Identification

Communities fulfill our need for group identification and support opportunities for cultural expression. Social groups are themselves forms of cultural expression and they work to reinforce their identity through a shared set of beliefs, customs, and material manifestations.

Cultural expression and group identification have always strongly influenced the form of buildings and settlements. The historical evidence suggests that anthropologists and sociologists are much more aware of this than architects and planners. Amos Rapoport outlines the variety of factors which play a role in house form.

> The environment sought reflects many socio-cultural forces, including religious beliefs, family and clan structure, social organization, way of gaining a livelihood, and social relations between individuals. This is why solutions are much more varied than biological needs, technical devices, and climatic conditions.[39]

He also provides us with several general principles for the design of environments which will be supportive of cultural needs and lead toward a congruence of lifestyle and built environment.

(a) Those elements most important to the cultural system must receive most support and be helped to last longest, so that peripheral elements are replaced first. Thus the cultural core must be identified.
(b) Those activities which have important latent and symbolic functions, and are critical to the culture, should be stressed and supported.
(c) The spatial organization of settlements, neighborhoods, and dwellings should be related to social organization and structure, space and time use, meanings and the organization and control of communication and interaction.[40]

Rapoport argues that culture-supportive environments are particulary important during periods of rapid culture change, because they provide a safe and familiar base from which to operate. Familiar settings 'reduce the need to totally restructure cognitive schemata, thereby reducing stress.'[41]

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[39] Amos Rapoport, *House Form and Culture* (Englewood Cliffs, NJ: Prentice Hall, 1969), p. 47.
[40] Amos Rapoport, "Cross Cultural Aspects of Environmental Design," *Human Behavior and Environment*, Ed. Irwin Altman, Amos Rapoport and Joachim F. Wohlwill, Vol 4 in *Environment and Culture* (New York: Plenum Press, 1980), p. 32.
[41] Ibid. p. 35.

A supportive setting is often first established as a territory. "Territorial behavior narrows the range of encounters in various spaces, in order to create predictable environments with an accompanying sense of order and security."[42] In densely populated urban areas territories are especially important to groups and individuals. They are both refuges and important expressions of identity.

[42] Sidney N. Brower, "Territory in Urban Settings," *Human Behavior and Environment*, p.

Engendering Political and Economic Equity

Michael Harrington's book, *The Other America*, introduced America to the debilitating physical and psychological effects of poverty in 1963. Poverty, however, does not debilitate as harshly as racial discrimination. A black American does not have the same political and economic opportunities as a white American. Mel King writes.

> Reversing the negative self image of people of color and restructuring the boundary lines and service agencies to genuinely assist Black community development depends on the reorganization of human and economic resources. Without the power to command the use of resources, it is impossible to change the structure and psychology of the inner city.[43]

The basic human needs of a large number of urban poor are not being met. In 1991 35.7 million Americans lived below the official government poverty level. This translates to 14.2% of all Americans. Both the number and percentage of poor have increased in recent years. Poverty is not broad based, it is concentrated in racial groups, which have consistently been targets of discrimination. 32.7% of black Americans and 28.7% of Hispanic Americans live in poverty, while only 9.4% of white Americans are poor.[44]

Despite the advances of the civil rights movement, existing power structures continue to favor the white American male. Institutionalized discrimination continues to deny large segments of our population the power to make decisions for their communities. Self determination and self government are essential to the formation of sustainable communities. Significant strides have been made by minority communities in correcting social and political injustices, but in many cases, 'the "whites only" signs have been replaced by economic barriers.'[45]

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[43] Mel King, *Chain of Change, Struggles for Black Community Development* (Boston; South End Press, 1981), Introd.

[44] U.S. Dept. of Commerce, Bureau of the Census, *Poverty in the United States: 1991*, Series P-60, No. 181. The 1991 poverty level for a family of four is defined as an annual income of $13,924 or less.

[45] Randolph T. Hester, Jr., "Participatory Design and Environmental Justice: Pas de Deux or Time to Change Partners?" *The Journal of Architectural and Planning Research*. 4 No. 4 (1987), p. 291.

Education

Education is the single greatest resource of a community. Healthy sustainable communities are in a process of continual transformation as they adapt to changes in the conditions which define them. Educational resources enable a community to adapt to change, maintain continuity and transfer wisdom from generation to generation. Through education, a community both grows, and sustains itself.

The foundation of education lies in values. This is a lesson we find in Plato, in the Bible, in the teachings of Lao Tsu and in all major teachings. Education is the transfer of values. A community will not be able to sustain itself without a common base of values. Our contemporary communities have lost an essential ability to adapt the values of our fathers and grandfathers to changing circumstance and have therefore discarded all values. "There is one thing a professor can be absolutely certain of: almost every student entering the university believes, or says he believes, that truth is relative."[46]

This relativism has manifested itself in the built world. The criticisms of Heidegger, Karl Marx, Mumford, Norberg Schultz and Alexander, among many, point directly to the confusion which characterizes our built environment. Marshall Berman defines this condition in his characterization of modernity.

> There is a mode of vital experience - experience of space and time, of the self and others, of life's possibilities and perils - that is shared all over the world today. I will call this body of experience "modernity." To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth transformation of ourselves and the world - and at the same time, that threatens to destroy everything we have, everything we know, everything we are. ...it pours us into a maelstrom of perpetual disintegration and renewal, of struggle and contradiction, of ambiguity and anguish. To be modern is to be part of a universe in which, as Marx said, "all that is solid melts into air."[47]

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[46] Allan Bloom, *The Closing of the American Mind* (New York: Simon & Shuster, 1987), p. 25.
[47] Marshall Berman, *All that is Solid Melts Into Air* (New York; Penguin, 1988), p. 15.

Does modernism, the 'troubled and fluctuating aesthetic response to conditions of modernity,'[48] have a role in the design of sustainable communities? It can, but there is a value attached to sustainable design. Sustainable design values human life. That is essential and at the core of each of the principles. Without this value at least, we are all doomed.

Environments which sustain communities all reinforce this singular value of sustainable design.

[48] David Harvey, *The Condition of Postmodernity* (Cambridge; Blackwell, 1990), p. 99.

Principle Three:
Create Environments which Sustain People

Environments for Well-being and Rejuvenation

My heart leaps up when I behold
A rainbow in the sky
-William Wordsworth, 1807

Human well-being and health is sustained by more than biological and social supports. There is an important, sustaining, psychological relationship between an individual and the physical world. Evidence of this relationship and how it works to sustain us can be found in many places. A book in progress by Sam Bass Warner on restorative gardens gives numerous examples of how gardens have been used therapeutically through the ages. The intention of the restorative garden, "is to encourage relaxed sociability among companions, or to promote relaxation and contemplation for the solitary visitor. For the sick of body or troubled in spirit the same garden is to relax and to soothe and thereby encourage the body and the mind to restore themselves."[49]

The design of therapeutic evironments should address both the symbolic qualities of the environment and the capacity of that environment to facilitate the therapeutic process. Sandra and David Canter give the example of the Victorian 'lunatic asylum.' "These large austere buildings, separated from the community, set in their park lands epitomize the monolithic institutional processes," which treated the insane as prisoner.[50] The capacity of an environment to facilitate psychological healing is strongly related to its symbolic quality.

Harold Searles explores this relationship in his book, *The Nonhuman Environment In Normal Development and in Schizophrenia.* 'Nonhuman environment' is defined as, 'the totality of man's environment, with the exception of other human beings.' He is critical of the majority of human development writings, including Jung, Freud and followers, for a perspective which is confined to 'intrapersonal' and 'interpersonal' processes.

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[49] Sam Bass Warner Jr., *Restorative Gardens: Recovering Some Human Wisdom for Modern Design,* Draft of unpublished manuscript, August 1992.

[50] Sandra and David Canter, ed., *Designing for Therapeutic Environments* (New York: John Wiley & Sons, 1979), pp. 4-5.

> The nonhuman environment, far from being of little or no account to human personality development, constitutes one of the most basically important ingredients of human psychological existence. It is my conviction that there is within the human individual a sense, whether at a conscious or unconscious level, of relatedness to his nonhuman environment, that this relatedness is one of the transcendentally important facts of human living.[51]

Many of Searle's examples are also drawn from the 'natural' world.

Rachel and Stephen Kaplan have conducted significant research into restorative experiences. They have identified four factors, important to the achievement of a restorative experience; being away, fascination, extent and compatibility.[52] Being away gives us a different environment. Fascination involves us in that environment. Extent ensures that there is enough to absorb our interest and imagination. Compatibility requires that the environment not be completely alien or so far outside of our experience that we must struggle to adapt.

Quiet is important to a restful environment. Cities are noisy places. The environmental noise of a street with heavy automobile traffic commonly exceeds 100 decibels (dB).[53] Outdoor areas should maintain noise levels below 55 decibels (dB). Sustained noise above 40dB will impair normal conversation and noise levels above 35dB will impair sleep and study.[54]

The design of environments which sustain psychological well-being requires certain physical supports. A sustainable environment can replace modern prescriptions for health in pill doses and nature getaways, through the conscious provision of these supports. We can learn what these supports are through a simple attention to what makes people well.

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[51] Harold F. Searles, *The Nonhuman Environment in Normal Development and in Schizophrenia* (New York: International Universities Press, 1960), p. 6.

[52] Rachel Kaplan and Stephen Kaplan, "Restorative Experience: The Healing Power of Nature," *The Meaning of Gardens*, Ed. Mark Francis and Randolph T. Hester (Cambridge: MIT Press, 1990), pp. 241-242.

[53] Malcolm S. Weinstein, *Health in the City, Environmental and Behavioral Influences* (New York: Pergamon Press, 1980), p. 33.

[54] Kevin Lynch and Gary Hack, *Site Planning*, 3rd ed. (Cambridge: MIT Press, 1984), p. 60.

Environments for the Imagination

Kafka's Castle stands above the world
like a last bastille
of the Mystery of Existence
Its blind approaches baffle us
Steep paths
plunge nowhere from it
Roads radiate into air
like the labyrinth wires
of a telephone central
thru which all calls are
infinitely untraceable
Up there
it is heavenly weather
Souls dance undressed
together
and like loiterers
on the fringes of a fair
we ogle the unobtainable
imagined mystery
Yet away on the far side
like the stage door of a circus tent
is a wide wide vent in the battlements
where even elephants
waltz thru

Lawrence Ferlinghetti, 1958
"A Coney Island of the Mind"

Human well-being requires room for the imagination. What kind of environment will sustain our imagination? It is a room with a space our mind can occupy.

> In leaving something unsaid the beholder is given a chance to complete the idea and thus a great masterpiece irresistibly rivets your attention until you seem to become actually a part of it. A vacuum is there for you to enter and fill up to the full measure of your aesthetic emotion.[55]

This space can take many forms.

The form may be symbolic, recognizable to all the members of a community with shared values and experiences. Symbols put us in touch with our inner selves, our

[55] Okakura-Kakuzo, *The Book of Tea* (New York: Fox Duffield & Co., 1906), p. 61.

archetypes and our collective myths. They are essential mediators between the conscious and the unconscious.[56]

> Primitive man has an imperative need to assimilate all outer sense experience to inner psychic events. It is not enough for the primitive to see the sun rise and set; this external observation must at the same time be a psychic happening: the sun in its course must represent the fate of a god or hero who in the last analysis dwells nowhere except in the soul of man.[57]

The myth, as symbol, allowed primitive man to be in contact with his own inner psychic self, not directly, but through the activities of projected gods and the 'mythologized processes of nature.'

The form may be unstructured, engendering an informal setting where participants shape and reshape both the environment and their relationship to it. This is the essence of the adventure playground. An adventure playground is not the fixed amorphous plastic shapes, half-buried tires, stacked immovable timbers and swinging ropes we now find as standard playground fixtures.

> "An adventure playground is an area where children and young people can do most of the things they want to do ... Children, the world over, have a passion to build houses and dens where they can live their own private lives. For this they must have an ample supply of timber, nails, hammers, and saws, and even potentially dangerous tools like pickaxes and chisels. they want to dig deep holes, down to Australia perhaps, to tunnel through the earth and to make caves to creep into."[58]

The important quality here is the engagement of the child's imagination through an unstructured environment for play.[59]

Sustainable design must provide room for the imagination. From the beginning Vitruvius identified delight as a necessary condition of good building. Delight takes as many forms as our imagination and is sometimes as fleeting as a cloud.

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[56] Jolande Jacobi, *Complex, Archetype, Symbol in the Psychology of C.G. Jung*, Trans. Ralph Manheim (New York: Pantheon Books, 1959), p. 98.

[57] Carl G. Jung, *The Archetypes and the collective Unconscious*, Trans. R.F.C. Hull (Princeton University Press, 1969),p. 6.

[58] Lady Allen, "Adventure Playgrounds," *Small Urban Spaces, The Philosophy, Design, Sociology and Politics ofVest Pocket Parks and Other Small Urban Open Spaces*, Ed. Whitney North Seymour Jr. (New York: New York University Press, 1969), p. 93.

[59] See also Paul Wolf, "The Adventure Playground as a Therapeutic Environment," in Canter and Canter, pp. 87-114.

Environments for Creative Expression

> If you ask, "Why is Thekla's construction taking such a long time?" the inhabitants continue hoisting sacks, lowering leaded strings, moving long brushes up and down, as they answer, "So the destruction cannot begin." And if asked whether they fear that, once the scaffoldings are removed, the city may begin to crumble and fall to pieces, they add hastily in a whisper, "Not only the city."
>
> Italo Calvino, *Invisible Cities*

Creative expression is more than making art. It is our attempt to make sense of our world and it is a process of making a place our own. Each of us does this in different ways. A glance inside a dozen or more homes can quickly convey the variety of ways people express themselves. We are most comfortable in the place we call home, in part because it is 'ours.' We have made it into a place which reflects us. More important than the place is the process of creative expression.

City dwellers are often constrained in their ability to creatively shape their environment. Apartments are small, often rented and there are few outdoor spaces which can be shaped. The opportunity to creatively manipulate one's land is an important attraction to suburban residents.

> Manipulation produces many spatial effects; arrangements of plaster gnomes, carpet-like lawns, geometrically ordered organic vegetable gardens all objectify manipulation strongly characterized by tradition, example, and hesitant innovation, although now strongly affected by semiprofessional do-it-yourself guidebooks and infrequent professional advice."[60]

The expanding field of art therapy demonstrates the importance of creative expression as a tool for knowing and understanding. Dance, drama, music, language arts, media arts and mixtures of several are commonly employed by therapists. The engagement and development of our individual creative potential is seen as essential to normal and healthy human development.[61] The creative encounter is a period of heightened consciousness, a disruption to the normal self-world relationship. We become "immersed, fascinated and absorbed in the present, in the current situation, in the here-

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[60] John R. Stilgoe, *Common Landscape of America* (New Haven: Yale University Press, 1983), p. 343.

[61] See Judith Aron Rubin, ed., *Approaches to Art Therapy, Theory and Technique* (New York: Brunner/Mazel, 1987), also

now, with the matter in hand."[62] Through these disruptions we come to better know ourselves and our world and realize potentials within us we normally might not.

Environments which sustain individuals must provide room for the imagination and creative expression. When the intentions of the designer dominate the work there is nothing left for the user to claim. There is no room for participation, adaptation or growth.

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[62] Abraham Maslow, *"The Creative Attitude," Therapy and the Arts, Tool of Consciousness*, Ed. Walt Anderson (New York: Harper and Row, 1977), p. 16.

An Integrated Model

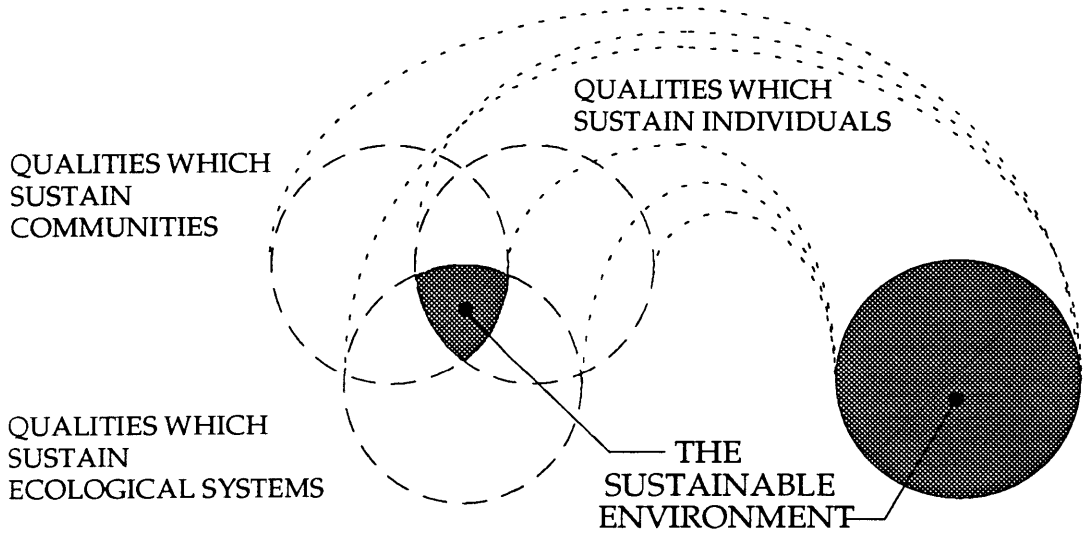

Fig. 2.5 Integration of three principles in sustainable environment.

Sustainable design requires a response to each of the principles. The principles are strongly interrelated and support each other in synergistic ways. Many new fields developing in the sciences express these connections. Unfortunately, the new cultural ecologists, human ecologists, ecological psychologists and sociobiologists, to name just a few, confuse, more than clarify, the essential connections. The structure and form of human society is very different from that of animal communities. Ecology can instruct us in the sustainable design of the energy and material flows which structure our built environment. It cannot be applied to cultural and political expressions or the design of environments which sustain human, psychological well-being. As these new sciences define their own academic territory, somewhere between the two original fields, they also erect boundaries. This leads to a further separation of the original fields and compartmentalization of knowledge, the very thing the new field was intended to counter.

Our world is made more complex the more we dissect and compartmentalize knowledge. Sustainable design is complex only to the extent one refuses to make connections.

Three

The Community Garden Context and Method of Evaluation

Community Gardens

History

Community gardens move us beyond pastoral idealizations and toward sustainable environments. The community gardens, being tended in American cities today, are different from the victory gardens of WW II, the allotment gardens of England and the schwebergartens of Germany. They are an outgrowth of community activism and self-help initiatives made possible by the momentum of the civil rights movement and the physical and social neglect of inner city neighborhoods.[1] In this respect contemporary community gardens can be distinguished from their historical antecedents.

In 18th century England industrialization led to massive changes in both rural villages and urban centers. Common lands which had supported village residents were fenced off and many of the poor and landless found themselves without the means to provide food for their families. Cities quickly became crowded with tenements which displaced former backyard and kitchen gardens. In villages, wealthy landowners and charitable groups made it possible for the impoverished to lease strictly regulated, small garden plots. In cities, gardeners took the initiative, banding together and renting small plots along urban peripheries. As cities grew they were forced to seek land further out, or more often, lost the garden space altogether.

In the United States, Warner traces the birth of community gardening to the economic depression of 1893-97. Detroit's mayor, noticing the depressed circumstances, asked that 600 acres of vacant land at the edge of the city be plowed. 945 families were given seed potatoes and instructions to plant half of their allotment in potatoes.[2] The war gardens of the first and second world wars also took advantage of vacant city lands, and in some cases, even park lands. In Boston the Fenway gardens were established in 1942 on seven and a half acres of Parks Department land. In 1944, 20 million victory gardeners produced 44 percent of the fresh vegetables in the United States.[3]

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1 Sam Bass Warner, *To Dwell is to Garden* (Boston: Northeastern University Press, 1987), p. 20.
2 Ibid., p.18.
3 Ibid., p.19.

In Boston, modern community gardening formally began with the "Massachusetts Gardening and Farm Act of 1974." The act, sponsored by Mel King made it possible for gardeners and farmers to grow vegetables on vacant public land at no cost. On the vacant lands made available to gardeners, it was sometimes difficult to even find the impoverished soil between the building rubble and garbage. The gardeners persisted and soon turned empty lots into productive gardens. They began to form coalitions to address common problems.

One of these coalitions became the Boston Urban Gardeners (BUG). BUG was originally created in December 1976 by a group of garden organizers who saw the need for an organization to coordinate resources and promote community gardening. The group has grown through the years and today provides a number of different services to the gardening community. They assist groups in gaining access to land, in community organizing and in negotiating the funding and approval process. They offer design and construction assistance with the layout of new sites, horticultural assistance and educational opportunities. Today they are Boston Urban Gardeners at the Community Farm, and maintain an office in Jamaica Plains.

There are over 100 formally recognized community gardens in Boston and many of them have been tended for over 15 years. A history of community gardening in Boston was written by Sam Bass Warner in 1987. Entitled, *To Dwell is to Garden*, it provides an excellent overview of many of the gardens and how they came into being. This exploration draws on many of Warner's observations as it connects community gardens to sustainable design and opportunities to realize productive neighborhood open spaces beyond pastoralism.

The Contemporary Community Garden

> Urban agriculture is land reclamation, it is revegetation, it is food and fiber production, it is community development in the most basic sense. Perhaps most important we see in community gardening the seeds of community control - of resources and of the quality of city life.[4]

Community gardens stand in sharp contrast to the static, formally designed, public landscape of pastoral metaphor which has dominated urban open space planning since the mid 19th century. The contemporary community garden is more than a vegetable patch. Vegetable gardening is still the primary activity of most community gardeners, but they also tend herbs, flowers, shrubs and fruit trees. More established or spacious gardens often include areas for sitting, socializing and children's play. Neighborhood community gardens are the most common type, but there are also school gardens, senior or public housing gardens and special population sites.

Community gardeners identified the following motivations behind their participation, in a 1985 survey by The National Gardening Association.[5]

Better tasting/more nutritious food	42%
To save money	39%
For exercise	36%
Therapy	33%
Education	32%
Social Interaction, Neighborhood improvement & Family activity	14%

In 1985 New York City had 1001 community gardens.[6] Across the country, community gardens continue to increase in numbers. A 1992 survey of 24 cities across the country reported 523 new community gardens in the last two years alone, a 29% increase.[7] In Boston the rate of new garden creation has slowed significantly and efforts appear to be directed more toward the improvement and protection of the over 100 existing gardens.

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4 *City Gardener's Guide*, (Boston: Boston Urban Gardener's), preface.

5 National Gardening Association. *Special Report on Community Gardening in the U.S.* (Burlington, VT: N.G.A., 1985).

6 Tom Fox, Ian Koeppel and Susan Kellam, *Struggle for Space, The greening of N.Y.C. 1970-1984* (New York; Neighborhood Open Space Coalition, 1985), p. 91.

7 American Community Gardening Association (A.C.G.A.), "National Community Gardening Survey," (Philadelphia, PA: A.C.G.A., 1992).

The protection of community garden spaces is a primary concern of many gardeners. Community gardens are usually created on vacant or underdeveloped parcels of land. The neighborhood groups formed to manage the gardens do not have the resources to buy the land and depend upon temporary leases or understandings with the owners. In many cases the land is owned by a city. One national estimate found that only 7% of community gardens were secure and could be considered permanent.[8] The danger to these gardens is amplified when we look at the lack of diversity in funding sources. Of the 35 organizations participating in the 1992 survey, 24 reported over 50% of their funding came from the federal government.[9] The majority of this money arrives in the form of Community Development Block Grants.

Boston is more fortunate than most cities with 51 permanent community gardens.[10] This can be attributed to the maturity of the community gardening movement and the concerted efforts of a number of nonprofit organizations and city agencies. The Public Facilities Department assists neighborhood groups through the Grassroots Program, which makes federal money available for community garden improvements.

The physical garden is only part of the story. The process of making a garden is a community building process. It brings people together and demonstrates a way that neighborhood people take control and begin to build environments which sustain themselves, their physical environment and their community.

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[8] A.C.G.A., *Survey.*

[9] Ibid.

[10] Ibid. 'Permanent' is defined as "having 10 year lease, owned by land trust, or having other legal agreement that assures over 10 years of protection

Urban Agriculture

The development of agriculture made permanent settlements possible. With improvements in agriculture, cities grew. After decades of strong increases in agricultural productivity we are beginning to see a leveling in the output of world croplands. There is a strengthening prospect that existing world croplands will not be able to meet increasing food demands.

From 1950-1984 growth in world grain production averaged 3 percent. From 1984-92 it averaged .7 percent. Similar decreases in the growth of soybean and meat production have also been documented. More frightening is the decline in world fish catches. From 1950-1988 the world fish catch grew at an annual rate of 4 percent. From 1988-1992 this annual rate averaged a negative .8 percent.[11] Marine biologists at the FAO believe we have exceeded the maximum sustainable yield of the ocean.[12] While food production begins to level, world population continues to increase at alarming rates, further degrading existing croplands and ecological systems which are essential to continued food production. Clearly this is not a sustainable situation.

Urban agriculture is one solution. It is a solution many urban poor have turned to as food prices soar. In the developing world urban agriculture is already an essential source of food for many households. In Lusaka more than half of the households in low-income areas grow their own food. In Dar es Salaam and Nairobi studies also demonstrate the importance of urban gardens to large segments of the urban poor.[13] In Mexico City many low-income residents of crowded courtyard tenements use the roof and upper stories for plants and chickens. These roofs are also used for sleeping, circulation and laundry.[14] The multiple functions of these rooftops demonstrate how urban agriculture is possible even in small intensively used spaces. The limited resources of urban poor often require that they maximize the utility of what is available to them. These are important lessons for the sustainable design of our cities.

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[11] Worldwatch Institute, 1993, pp. 11-14.

[12] Ibid., p. 12.

[13] Jorge E. Hardoy and David Satterthwaite, *Squatter Citizen, Life in the Urban Third World* (London: Earthscan Publications, 1989), p. 256.

[14] Jose Luis Cortes, *Urban Dwelling Environments Case Study: Mexico City* (Cambridge: MIT M.Arch. Thesis, 1974).

The economic viability of community gardens was documented in 1980 by Judith Joan Wagner in a thesis, *The Economic Development Potential of Urban Agriculture at the Community Scale.* Wagner studies the economic benefits to households and documents the economic feasibility of urban agriculture at the household level and in several business case studies.[15] The three case studies, a large-scale composting facility, a commercial greenhouse and vegetable garden and a landscaping business, all demonstrate viable economic opportunities.

Today the average 15 foot by 15 foot community garden plot provides about $500 worth of food. A number of gardeners I spoke with had larger gardens and were able to produce a years supply of vegetables. As world agroecosystems reach production limits and food costs begin to more accurately reflect the costs of the energy required to produce and transport food, as well as the cost in ecological system degradation, urban agriculture will play an increasingly role in providing food for our cities. We need to recognize this fact today, if we are to plan for tomorrow. Existing urban community gardens can inform this process.

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[15] Judith Joan Wagner, *The Economic Development Potential of Urban Agriculture at the Community Scale* (Cambridge: MIT Thesis, 1980).

Evaluating for Sustainability

Method

I have chosen to evaluate the extent to which existing community gardens are sustainable for several reasons. The gardens clearly embody a number of sustainable design qualities. They address these qualities across a range which exists in no other common artifact of our urban environment. An evaluation of the gardens in the Dudley Street neighborhood will begin to reveal not only the specific qualities manifest or not manifest in the gardens, but will also begin to suggest a process each of us can use to test other proposed or existing environments for sustainable qualities.

A test for the range of qualities which comprise sustainable design must utilize several methods and rely upon many indicators. Three principal research methods were employed; site observations by myself and others, interviews and informal conversations with gardeners and people involved in the garden creation process and the review of a large body of secondary data. The methods were chosen to provide both qualitative and quantitative information. The use of several methods enables data to be triangulated from different sources and checked for consistency.

The evaluation relies upon a set of indicators to measure the different components of sustainable design. Ecological indicators reflect the regenerative processes of ecosystems and the cycling of energy, water, nutrients and organisms through those systems. Community indicators measure the capability of environments and the processes they engender to sustain human society. They evaluate the extent to which these environments and processes are able to educate, to manifest cultural and group expressions and to contribute toward political and economic equity. Personal indicators reflect the extent to which environments can heal and restore well-being to body and mind. They assess the physical and non-physical supports for the imagination and the engendering of creativity.

Indicators of Ecological Sustainability

The capacity of an environment to function as an ecosystem or as a component in a larger ecosystem can be measured quantifiably. All ecosystems have energy and material requirements. Ecological indicators measure the extent to which these requirements are being met. Indicators of ecological sustainability measure the extent to which these requirements can continue to be met.

Ecological indicators are distinct from indicators of ecological sustainability. A dying plant is an ecological indicator. A vacant lot with dying vegetation indicates a disruption in the energy and material flows which were previously sustaining that plant. The disruption may have been caused by any one of innumerable causes. Competition from nearby plants for nutrients, the introduction of air, water or soil pollutants, shading by a newly built structure or adjacent plants, lack of rain, air temperature changes, etc. The dying plant may be in the midst of an ecologically sustainable environment, for change is an integral part of every ecological system. On the other hand, an immaculately maintained, lush green, golf course or a luxuriant field of corn may contain numerous negative indicators of ecological sustainability.

Indicators of ecological sustainability are found through mathematical modeling of energy and material flows. Eugene Odum characterizes the two prevalent modeling approaches as "compartmental system" and "experimental components." The first emphasizes the quantity of energy and materials in ecosystem compartments with a system of fairly simple differential equations and relies upon observational data. The latter approach focuses more on interactions and system equations and relies on experimental data from isolated processes. Compartmental approaches are used primarily for descriptions and summary of data. Experimental approaches are used for predictions of system reactions to disturbance and manipulation. Both are integrated in large-scale modeling of whole ecosystems.[16]

[16] Eugene P. Odum, *Fundamentals of Ecology*, 3rd ed. (Philadelphia: W. B. Saunders, 1971), pp. 285-292.

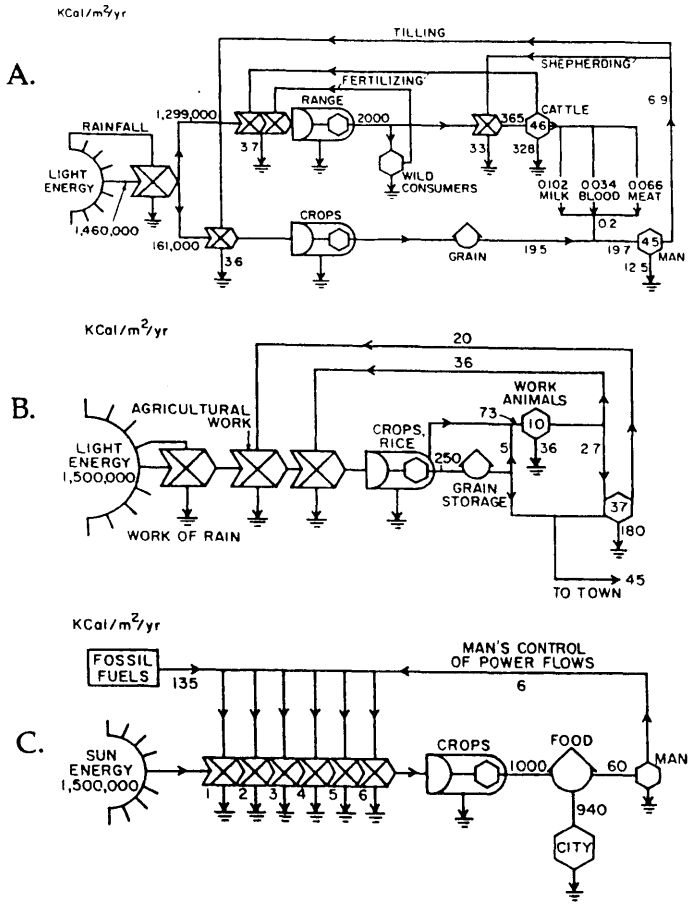

Fig. 3.1. Examples of compartmental models derived from electrical analog circuit models. A. Energy circuit for a tribal cattle system in Uganda. B. Energy circuit for monsoon agriculture in India. C. Energy circuit for fuel subsidized industrial agriculture. In E. Odum (1971), Fig. 10-7.

John Lyle demonstrates how designers may apply the same method to model a variety of environments. He has simplified the symbolic language we see in the earlier examples of H.T. Odum's work according to the following legend

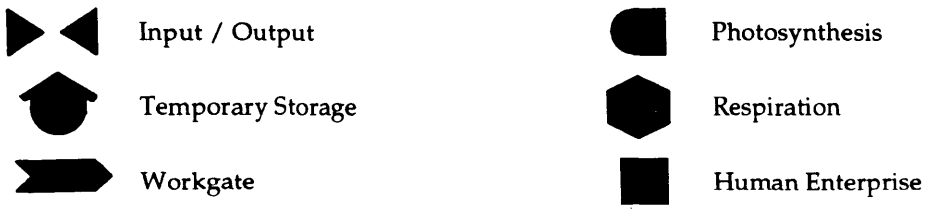

Fig. 3.2 Symbols

The following model shows the method applied to the Integral Urban House in Berkeley by Lyle. The diagram gives us energy sources, quantities, associations and transformations.

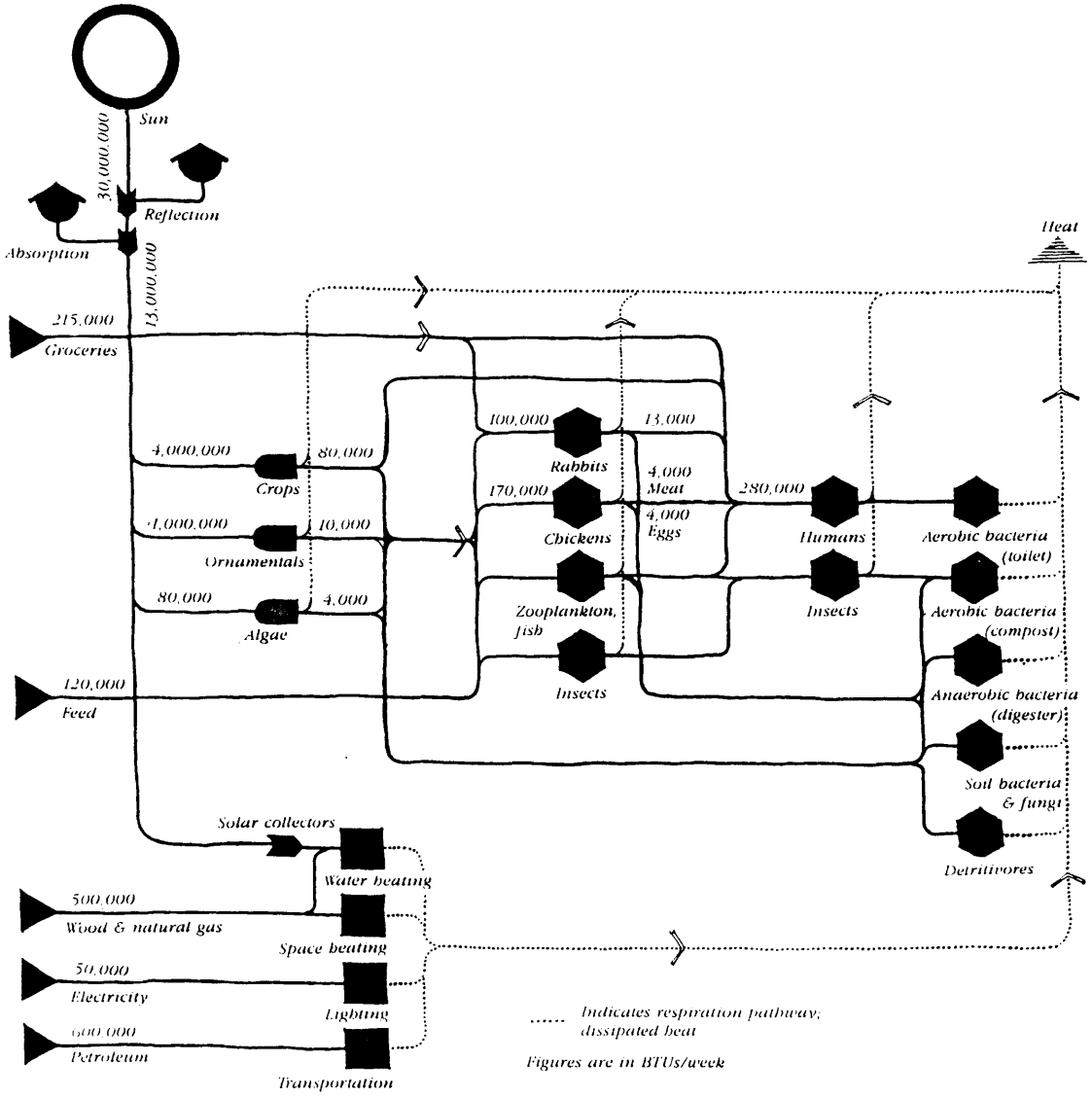

Fig. 3.3. Energy flow diagram for Integral Urban House. In Lyle (1985)

An accurate modeling of energy flows through the intricate pathways of urban industrial ecosystems is long and complicated. Lyle demonstrates a simplified method which can easily be applied by designers seeking to minimize the input of nonrenewable energy sources and maximize the input of renewable sources.

Energy flow models can indicate energy sustainability, but we must also be concerned with the conservation of materials and organisms, which are essential to the maintenance of ecological life-support systems and the buildup of toxic substances, which are detrimental. Good models for ascertaining long term material and organism movements and the impact of toxins do not exist. Much of this work remains to be done. Resource mapping does occur at the regional scale.

Many ecological planners use broad area resource maps to approximate the suitability of particular land areas to various uses. Land-suitability analysis became a widespread tool for planners, largely through the work of Ian McHarg. The method overlays geology, physiography, hydrology, soils, plants, and aesthetic features to determine the optimal land use for any one area. This method has been most useful, to date, at the regional planning level where it can direct future development away from areas critical to regional ecosystems and optimize material resources.

Resource mapping has not yet been applied at the neighborhood scale. Most people do not want others to know what is in their garbage, how often they flush the toilet or how many cans of Raid they emptied into the attic. Yet this is the scale we need to work at if we are going to achieve ecological sustainability. Indications of ecological sustainability can only be drawn from comprehensive energy and material flow models. Indicators of a sustainable ecological system measure the probability that the system can ensure the regeneration of essential components.

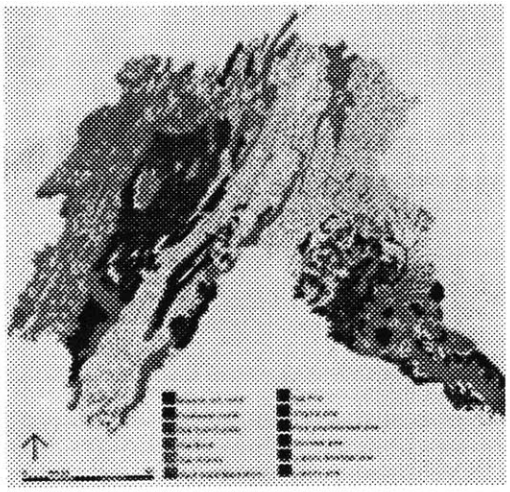

Fig. 3.4 Plant Associations

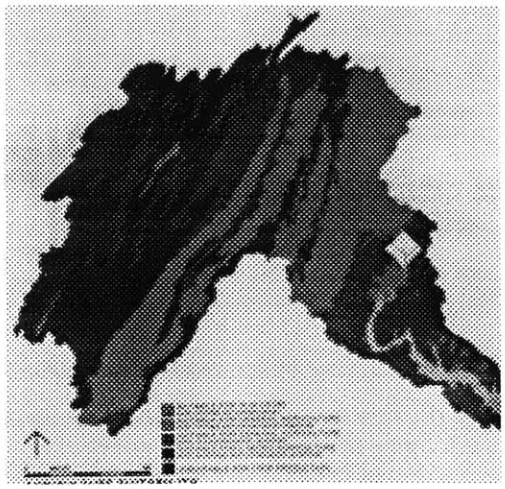

Fig. 3.5 Agricultural Suitability

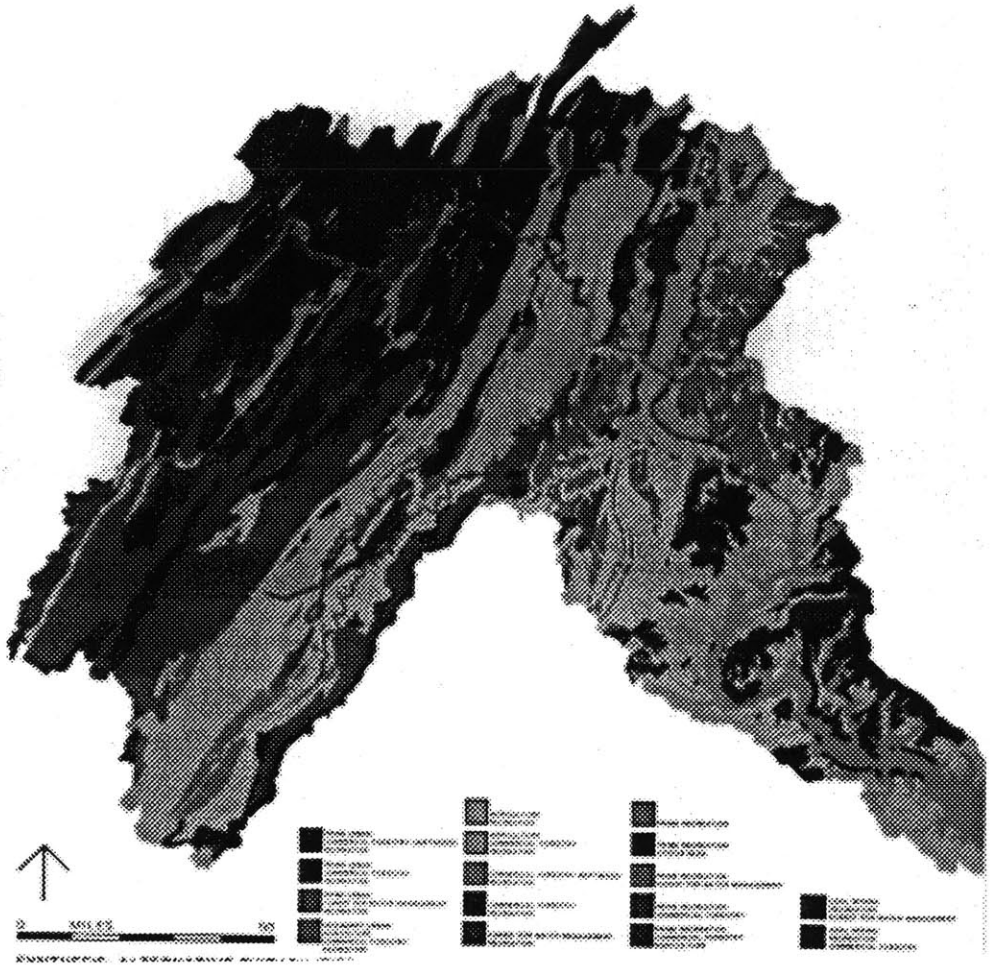

Fig. 3.6 Potomac River Basin, Synthesis: Alternative Suitabilities, from McHarg (1969).

Indicators of Community Sustainability

Indicators of community sustainability, like ecological sustainability, tell us about future potential. Communities and the social fabric which defines them, however, cannot be modeled in the same way as an ecosystem. It is important to avoid terms like human ecology or cultural ecology, which confuse the field by applying ecological system theory to human societies. Human societies are significantly different from the animal and plant communities studied by ecologists.

Earlier, we defined a community as a 'local area with a physical boundary, social network, concentrated use of area facilities, and special emotional and symbolic connotations for its inhabitants with a capacity for self-determination.' We also emphasized the importance of self determination. Without self-determination a community will not have the capacity to sustain itself. The community may choose not to sustain itself, but it should have that choice.

The foremost indicator of a community-determined design process is full and active participation by the community. Donald McAllister describes this as a useful, but often impractical goal.

> Fully active and direct citizen input to the evaluation process is a useful goal, but it is more like an ideal to strive toward than a standard that we can expect to achieve regularly. Active citizen involvement throughout the in-design and post-design evaluation process seems reachable mainly in situations where the problem being addressed by planning is relatively non-technical and the affected population is not too large.[17]

His qualification however, leads us to a better understanding of community sustainability. He suggests that we cannot expect good community participation in situations which are beyond the technical grasp of the people in that community. He is right, but there is a far more important conclusion from this simple fact. We should not be designing environments which are beyond the technical grasp of the communities they serve, if we expect the community to make that environment theirs and sustain it.

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[17] Donald M. McAllister, *Evaluation in Environmental Planning, Assessing Environmental, Social, Economic, and Political Tradeoffs* (Cambridge: MIT Press, 1980), p. 252.

When the experts leave and the community does not understand what was left behind, we clearly do not have a sustainable condition. The most blatant evidence of this is in the multitude of international development failures which litter the third world.

Amos Rapoport's principles for the design of environments which will be supportive of cultural needs rely upon the identification of a "cultural core." He provides the following list of elements central to this core.

1) Characteristics such as ethnicity, language, and religion. 2) Family and kinship structures and child rearing practices. 3) Residence patterns, land divisions, landowning and tenure systems. 4) Food habits. 5) Ritual and symbolic systems. 6) Ways of establishing and indicating status and social identity. 7) Manners and nonverbal communication. 8) Cognitive schemata 9) Privacy, density and territoriality. 10) Home range behavior and networks. 11) Various institutions such as ways of working, cooperating, trading.[18]

Who can give these to designers better than the people themselves?

Throughout our cities we can point to numerous built environments which indicate that communities are not being sustained. They are obvious to us because they are neglected, they are not being cared for or they are vacant of people. Indicators of neglect are most visible in large housing projects, many of which are today standing scarred and half empty. Neglect is also visible in urban parks, playgrounds and plazas, designed on drawing boards by people who never entered the neighborhoods in which they were built, or if they did, they never asked the question, "What do you want?"

Randy Hester outlines a useful path for designers seeking to incorporate user needs and wants into the design process. "By thinking of an outdoor space close to home and then listing all the reasons why one goes there and what would make one go there more often, an idea of the factors important to one's use of that space emerges."[19] The user/needs checklist he describes provides the most useful set of indicators a designer can employ in designing for sustainable communities.

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[18] Rapoport, p. 33.
[19] Hester (1985), p. 57.

Indicators of Individual Sustainability

The capacity of an environment to sustain inner well-being relies very much on sustainable environments for communities and ecosystems, but requires something more. It is a quality which is extremely difficult to define. It is also a quality which is different to each of us, on one level, and the same to each of us on another level. How can one evaluate the potential of an environment to sustain inner well-being? What are the indicators?

The United Nations Development Program's, Human Development Index measures the quality of human life with three quantitative indicators. The index combines longevity, as measured by life expectancy at birth, educational attainment, as measured by adult literacy and years of schooling, and income, as measured by per capita Gross Domestic Product. These indicators have been adopted by IUCN, UNEP and WWF[20] in *Caring for the Earth, A Strategy for Sustainable Living* (1991). By these measures, the villagers of Lau, a small coastal village on New Britain Island, Papua New Guinea, would be the most miserable people on this planet. I know these people, I worked and lived with them for over two years. They are among the happiest, strongest and healthiest people I know.

We need some different indicators. I suggest that there is only one way we can know if an environment is sustaining a people's inner-being. We must get to know the people. If current planning and design practice does not give us that opportunity we must change our practices, if we want to build a sustainable world.

[20] IUCN - World Conservation Union, UNEP - United Nations Environment Program, WWF - World Wide Fund for Nature

Four

The Gardens of Dudley Street Neighborhood

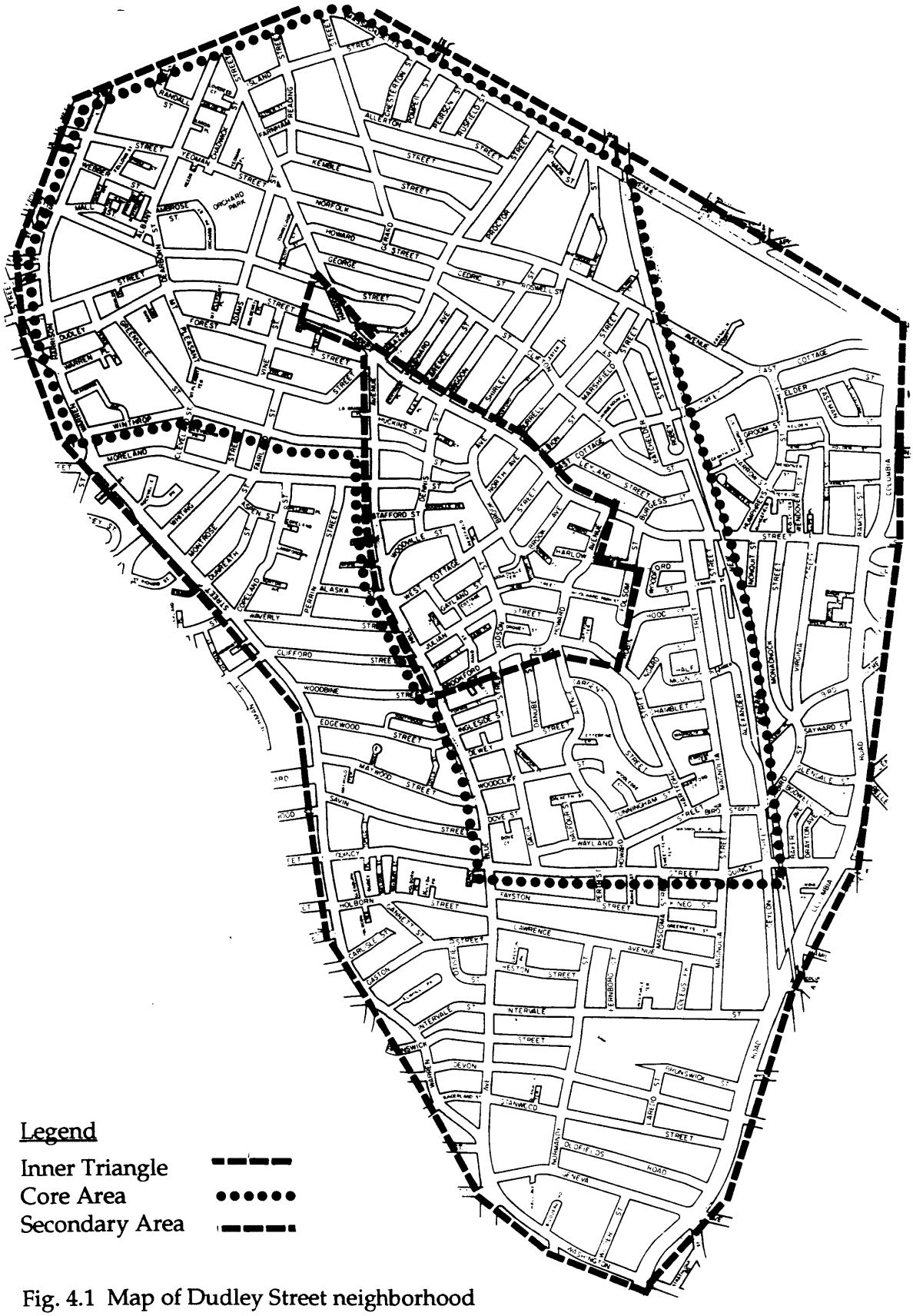

Fig. 4.1 Map of Dudley Street neighborhood

The Neighborhood

The Dudley Street Neighborhood is located in Boston and takes its name from Dudley Street, a central artery which runs from Dudley Square on the western edge of the neighborhood to Upham's Corner on the eastern edge. The neighborhood boundary which appears on the map was defined by the city's Neighborhood Development and Employment Agency, now the Public Facilities Department. The boundary is intended to encompass the largely residential area lying between three commercial cores, Dudley Square, Upham's Corner and Grove Hall. The core and inner triangle boundaries identify areas which have been prioritized by the city and neighborhood groups for development. There are over 1300 vacant lots in the one and a half square mile core area and 50 percent of the 60 acres in the central triangle is abandoned land.

The area circumscribed by these boundaries joins part of Roxbury to part of North Dorchester and is only a shadow of the neighborhood which existed in the 50's. Beginning in the 60's disinvestment, urban renewal, "white flight" and job losses led to a massive decline in population. From 1950-1970 the population of Roxbury, which includes the majority of Dudley Street neighborhood, declined 42 percent.[1] It is the poorest neighborhood in Boston with a median income one-half of the median income of the city taken as a whole.[2]

In 1984 a group of neighborhood residents, business people, agencies and churches formed The Dudley Street Neighborhood Initiative (DSNI). The organization has been very successful in rebuilding a divided community and representing the needs and desires of a large portion of residents. In 1987 they put together a comprehensive plan for redeveloping their neighborhood and in 1988 they successfully petitioned the city for control of 15 acres of abandoned city land in the heart of their neighborhood. They became the first nonprofit group in the country to receive the power of eminent domain.

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[1] Wagner, Table III-I.

[2] Norman Boucher, "The Death and Life of Dudley, A Lesson in Urban Economics," *The Boston Globe Magazine*, (April 8, 1990).

The 14,500 residents of Dudley Street neighborhood reflect a diverse background. The community is 40 percent African American, 30 percent Latino and 20 percent Cape Verdian. The concerns of neighborhood residents are, for the most part, the concerns of many inner city poor, jobs, adequate housing, drugs, crime, and street cleanliness.[3]

The physical neighborhood includes residential, commercial and industrial areas. Commercial activity is concentrated in the three peripheral cores of Dudley Square, Upham's Corner and Grove Hall, along Dudley Street and along Blue Hill Avenue. The north and northeastern part of the neighborhood is primarily industrial. The rest of the neighborhood is largely residential. In some residential areas over 50 percent of the lots are vacant, while other areas have virtually no vacant land and look like many other Boston neighborhoods.

Bicycling along Dudley Street today, one is struck by the amount of vacant land and number of abandoned buildings. Plans are underway to change all this. The plan put together by DNSI and neighborhood residents in 1987, calls for the construction or rehabilitation of 500 new units of housing, two community centers, neighborhood parks and playgrounds. It also seeks to rebuild the neighborhood economic base with the stimulation of small business and retail development. Last month construction began on the first units of new housing.

Rebuilding a neighborhood takes time. Dudley Street and many other economically depressed, inner city neighborhoods will continue to have large amounts of vacant land for a while. This land presents a special set of opportunities and problems and should be considered as part of an extended network of city and neighborhood open spaces as plans are made for both interim and long term sustainable use.

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3 "A Survey of Attitudes Towards Development in Roxbury," conducted by Bell Associates for Boston Redevelopment Authority, March 6, 1985. These concerns were confirmed in the conversations I held with neighborhood people during Spring 1993.

The Open Space Network

Today the Parks and Recreation Department maintains an inventory of open spaces within the City of Boston.[4] They include parks, playgrounds, community gardens, public squares or malls, recreation centers, urban wilds and cemeteries. The Dudley Street Neighborhood contains examples of each. On the following pages are a map and several tables which locate and describe the variety of open spaces to be found in the neighborhood.

"Open space" is a term which came into usage in the 1960's to describe a variety of urban, park and park-like spaces. A useful description is provided by Galen Cranz.

> 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. Second, they were not built up but left open. They were bits and pieces of the city saved from the usual fate of urban land. ... Third open spaces were fluid. There was a fluidity at their perimeters, so that park flowed into city and city into park.[5]

Open spaces characterize something different from traditional city parks and recreation areas. They are small in scale, serve the needs of neighborhoods, are well suited as playlots and pocket parks and are an integral part of the city. They soon came to be viewed as a network, which "could include conceptual, temporary and accidental openings, plazas, pedestrian walks, urban waterfronts and bicycle paths."[6]

The neighborhood also contains another form of open space which is endemic to many economically depressed urban areas. This is the open space of vacant, neglected and abandoned land. In Dudley Street neighborhood the land is often the site of illegal dumping and in summer the high vegetation is seen as an unkempt nuisance. During the past few summers youth crews and city trucks were enlisted to cut the high brush and remove some of the dumped garbage. DNSI is currently considering a neighborhood composting program which could productively utilize the brush cut from vacant lands.

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[4] Boston: Dept. of Parks and Recreation. "Open Space Plan," (1987, 1992).
[5] Cranz, p. 138.
[6] Ibid., p. 144.

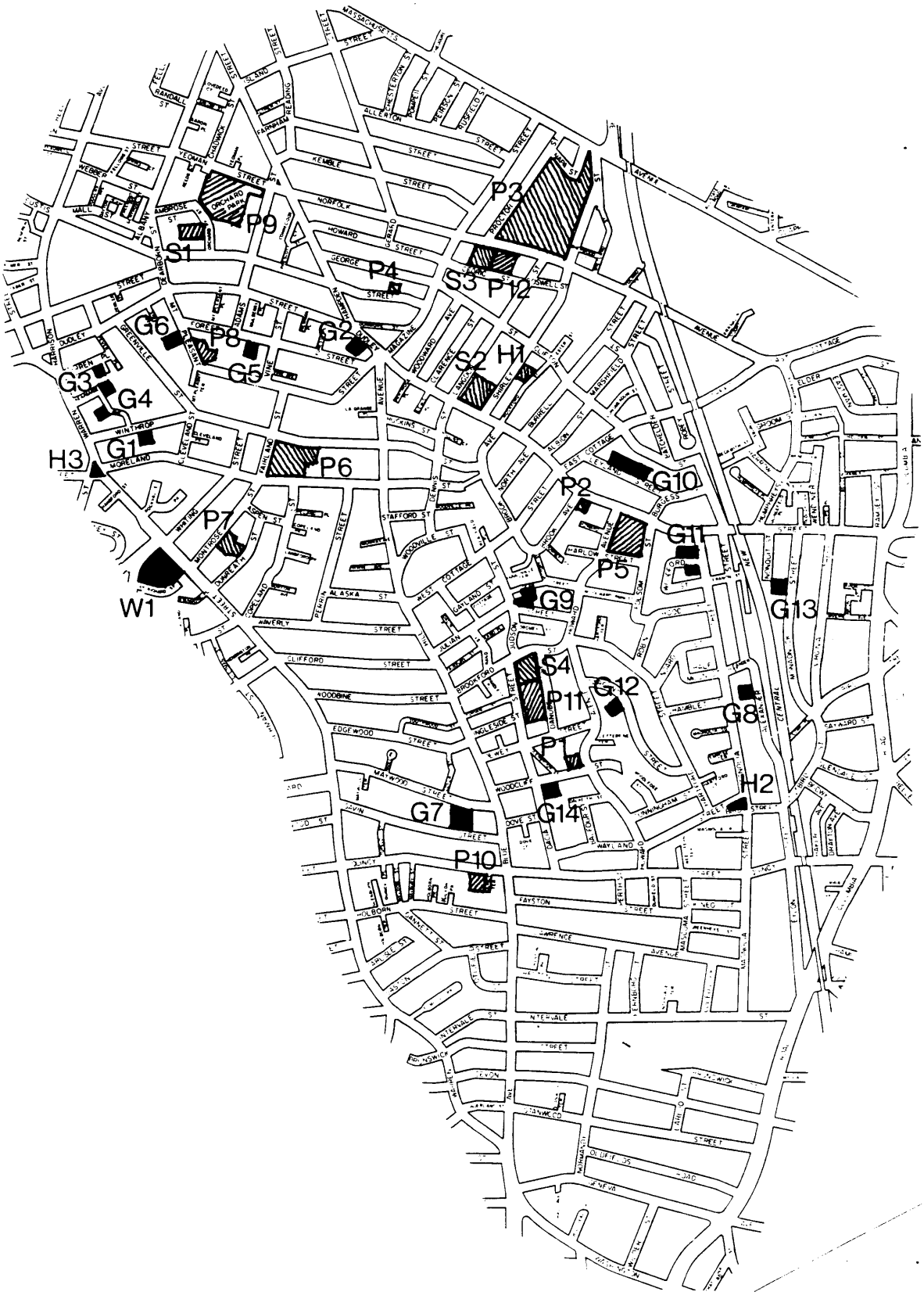


Fig. 4.2 Map of primary neighborhood Open Spaces (See tables for information).

Table of Neighborhood Open Spaces

Map Key #	Parks OS #	Name	Owner	Land Uses
G 1	76 R	4-H Busybodies Garden	BNAF	Flowers, Shrubs
G 2	86 R	Jardin de la Alianza Hispana	BNAF	Flowers, Shrubs, Play Area
G 3	91 R	Phyllis Wheatly Garden	City	Vegetables, Flowers
G 4	92 R	Phyllis Wheatly Garden	Private	Vegetables, Flowers
G 5	93 R	Roxbury Land Trust Garden	Private	Vegetables, Flowers
G 6	94 R	Roxbury Land Trust Garden	City	Vegetables, Flowers
G 7	97 R	Savin Maywood Garden	BNAF	Vegetables, Flowers
G 8	30 ND	Alexander St. Garden	Private	Flowers, Shrubs, Playarea
G 9		Julian Judson Dean Garden	BNAF	Vegetables, Flowers
G 10		Leyland St. Garden	BNAF	Vegetables, Flowers
G 11	31 ND	Magnolia & Woodford Garden	City	Vegetables, Flowers
G 12		Sargent St. Garden		Vegetables, Flowers
G 13	34 ND	Virginia-Monadnock Garden	DGP	Flowers, Play Area
G 14		Dacia / Woodcliff Garden	BNAF	Vegetables, Flowers
W 1	75 R	Urban Wild Warren Gardens	BRA	Oak woods, rock outcroppings
S 1	48 R	Dearborn School Playground	City Schools	School playground
S 2	51 R	Emerson School Playground	City Schools	School playground
S 3	56 R	Mason School Playground	City Schools	School playground
S 4	59 R	Winthrop School Playground	City Schools	School playground

Map Key #	Parks OS #	Name	Owner	Land Uses
P 1	1 R	Beauford Play Area	City Parks	Playground
P 2		Borinquen Plaza		
P 3	6 R	Clifford Playground	City Parks	Playground, Baseball, Basketball, Softball, Tennis, Sitting
P 4	11 R	Eustiss St. Play Area	City Parks	Basketball, Sitting
P 5	14 R	Hannon Playground	City Parks	Playground, Sitting, Basketball, Softball
P 6	17 R	Howes Playground	City Parks	Playground, Sitting
P 7	25 R	Little Scobie Playground	City Parks	Playground, Basketball, Sitting
P 8	27 R	Mt. Pleasant Play Area	City Parks	Playground, Basketball, Sitting
P 9	28 R	Orchard Park	City Parks	Playground, Basketball, Little League Field, Handball, Sitting
P 10	30 R	Quincy St. Play Area	City Parks	Playground, Basketball, Sitting
P 11	37 R	Winthrop Playground		Playground, Basketball, Tennis,
P 12	61 R	Mason Pool	City Parks	Pool
H 1		Shirley Eustiss House		historical interest
		Vacant lands	varies	
		Parking lots	Private (typically)	Car Parking
H 2	40 R	Denton Square	City Parks	Traffic island
H 3	43 R	Warren Square	City Parks	Traffic island

Fig. 4.3 View of Jardin de la Amistad (courtesy of Boston Urban Gardeners).

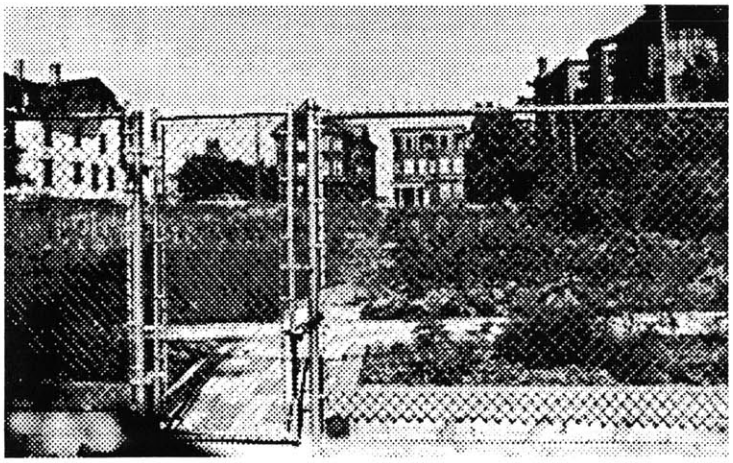


Fig. 4.4 View of Savin Maywood garden from Savin St. (Courtesy of Boston Urban Gardeners).

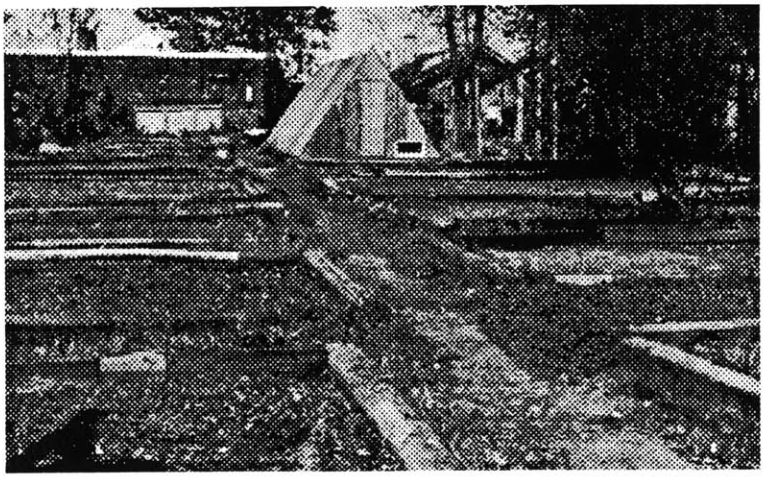


Fig. 4.5 View of Phyllis Wheately School garden (May 1993).

The Gardens

In the course of this investigation I came to know several gardens and their gardeners in greater detail. They include a range of garden types throughout the neighborhood. I observed the gardens, talked to gardeners, went to community meetings, talked to many people involved in the garden creation process and surveyed available secondary data.

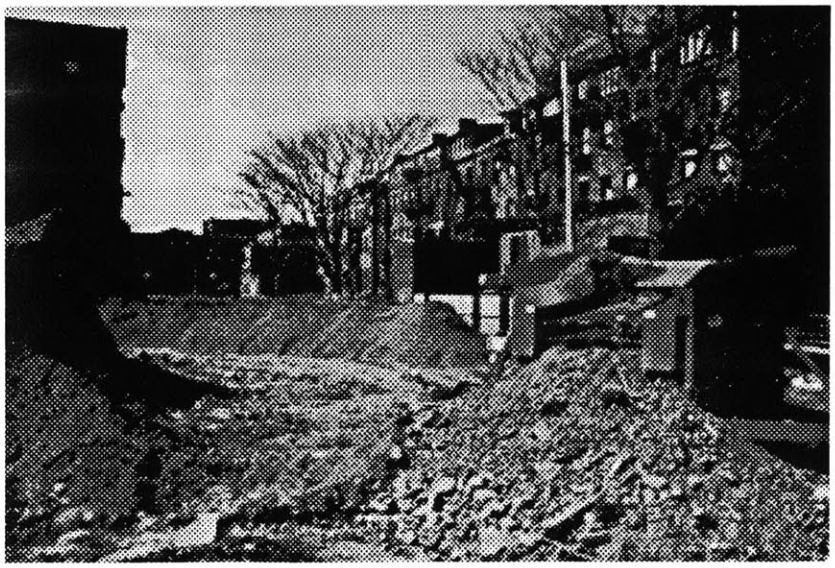
The Leyland Street garden has existed for fifteen years and is currently undergoing a major renovation. The Phyllis Wheatley garden is a school garden with a summer gardening program that has now existed for thirteen years. The Jardin de la Amistad is on Dudley Street, beside the Alianza Hispana, which cares for the play and sitting areas and manages the vegetable and flower plots. The Dacia-Woodcliff garden was just built last year and includes raised planting beds for senior citizens and those in wheelchairs. The Magnolia & Woodford garden began four or five years ago and is considerably more informal and less secure than the other gardens. The Savin Maywood garden started in 1974 and has undergone a series of improvements. There are altogether, 14 officially recognized community gardens in the Dudley Street neighborhood. There are also "guerrilla gardens" and many private kitchen gardens.

The gardens in general are less formal and tidy than the gardens in the adjacent South End, where it seems every square foot has been optimized. Plot sizes are also larger and the majority of materials used for fences, sheds and garden furniture is secondhand. But a Dudley Street neighborhood garden which might look slightly ramshackle in the tidy South End is in every case an improvement to its current neighborhood. The community gardens of the Dudley Street neighborhood tell a story. They tell us a story about people trying to survive with next to nothing and people trying to make their neighborhood a better place. We can learn from these efforts. We can learn about sustainability and about a productive urban environment which includes "nature" in the city. The following pages evaluate the sustainable potential of community gardens and explore opportunities to increase this potential.

Fig. 4.6 View of improved garden site on left and derelict land to right at Magnolia Woodford garden (May 1993).

Fig. 4.7 Detail of fence at Magnolia Woodford garden (April 1993).

Fig. 4.8 Garden soil sifting operation at South End garden (May 1993).



Making a Garden

> And so came the realization that, although community gardening may be two hundred years old, the politics of American community gardeners is new. The recent American community gardening movement is propelled by groups of neighbors who organize themselves to clear or secure their own land and to maintain their garden parcels. It is a politics of self-help and local empowerment, not a politics of charity or reform for the poor.[7]

Many community gardens begin as squatter's gardens, made by people who need to grow vegetables to feed themselves and their families. Over the years the gardeners considerably improve the land with minimal resources. They build fences and sheds from salvaged materials. They improve the soil with compost and improvised tools. They make the land productive and bring an order to the landscape. They organize themselves into groups to maximize their resources and protect their gardens.

It takes a lot of work to turn a rubble strewn lot with impoverished soil into a fertile vegetable producing garden. The first two photographs of the Magnolia Woodford squatter's garden show how community gardens often begin. The third photograph shows the extent to which more permanent gardens are improved. Pictured is a soil sifting machine in the midst of a garden.

Today many of these squatter's gardens are being improved and given a more permanent status. The creation of a permanent community garden is a complex process with a large number of participants. In the Dudley Street neighborhood, a community garden may involve, neighborhood residents, the gardeners, DSNI, BUG, Boston Greenspace Alliance (BGA), the Public Facilities Department (PFD), the Parks and Recreation Department (PRD) and the landowner. The landowner could be a private individual, a community group, a non-profit organization (the Boston Natural Areas Fund owns 6 community gardens in the neighborhood) or the city.

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[7] Sam Bass Warner, *To Dwell is to Garden*, (Boston: Northeastern University Press, 1987), p. xiii.

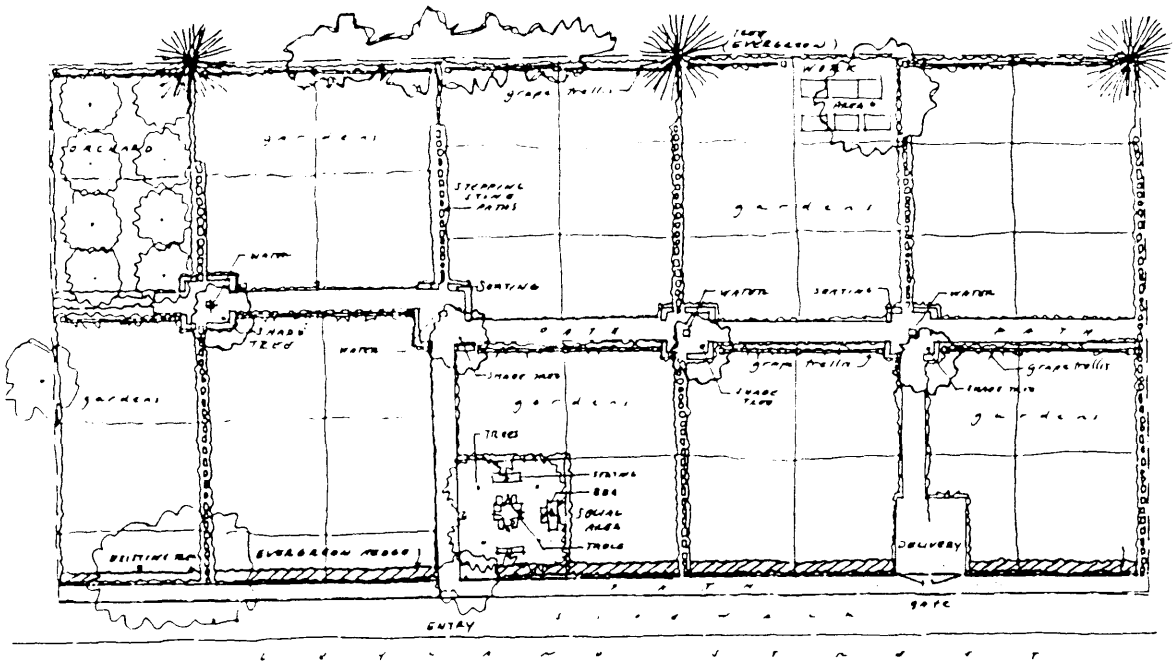

Fig. 4.9 Leyland Street Community Garden, Schematic design drawing, 1993, BUG.

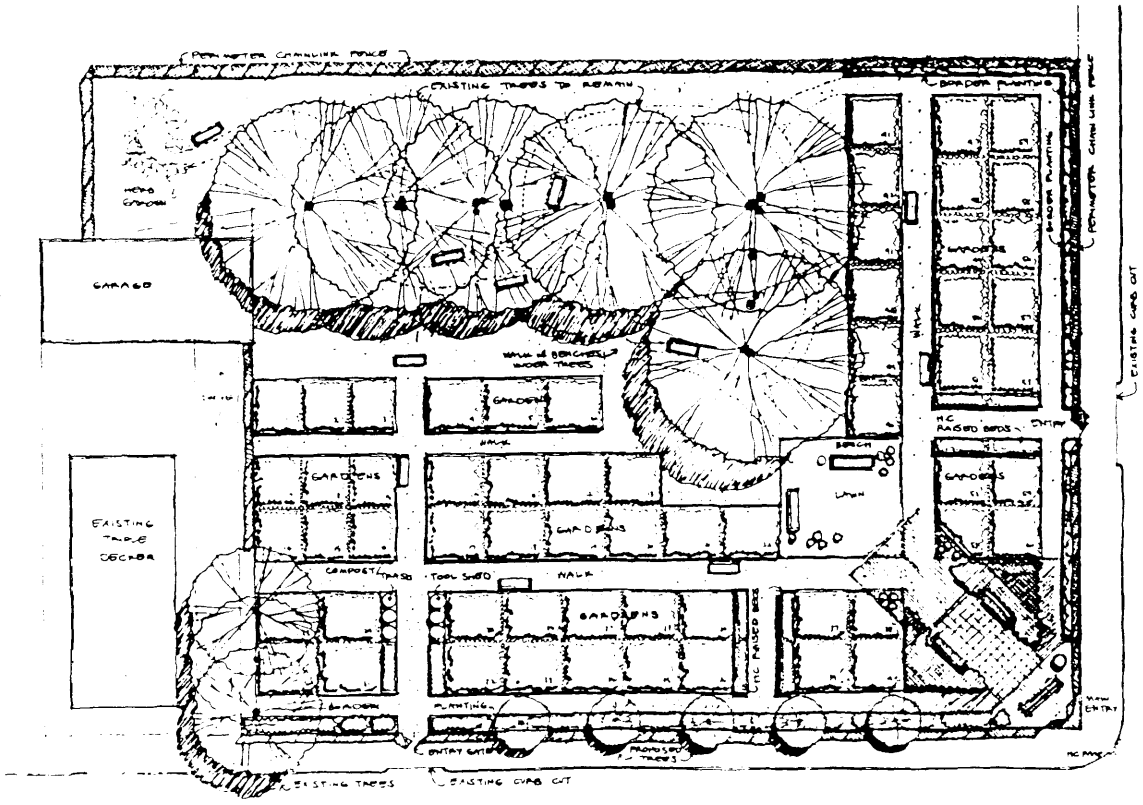

Fig. 4.10 Dacia Woodcliff Community Garden, Schematic design drawing, 1992, BUG.

The community meeting I attended for planning improvements to the Leyland St. garden was being facilitated by the garden's owner Boston Natural Areas Fund (BNAF). Boston Natural Areas Fund original mandate was the protection and preservation of 143 sites of natural and environmental significance identified in a 1976 report, "Boston Urban Wilds: A Natural Area Conservation Plan." In 1982 BNAF became involved with community gardens and has since purchased 27 gardens throughout the city, in an effort to ensure their permanence as sites for gardening. The $70,000 budget for improvements was being provided by the Grass Roots Program of the Public Facilities Department.

The site planning and participatory design for the garden was under the direction of a landscape architect, Michael Immel, from BUG. The meeting was in a neighborhood church near the garden and Michael arrived with a role of large, clearly illustrated diagrammatic plans. The drawings highlighted how the concerns of the gardeners in a previous meeting had been incorporated into the new design. The meeting began without a translator (there usually is one), but soon a passerby was brought in and the two gardeners who had missed a good part of the discussion because they didn't speak English joined in. Michael had also brought a large rough model of the garden, which was especially interesting to two children at the meeting. By the end of the meeting it was decided to make a space for a shed again, plant grapes and raise the fence to prevent kids from cutting through the garden. Construction was scheduled to be completed by June, just in time for the gardeners to plant.

Fig. 4.11 Terraced condition at Phyllis Wheately School Garden (May 1993).

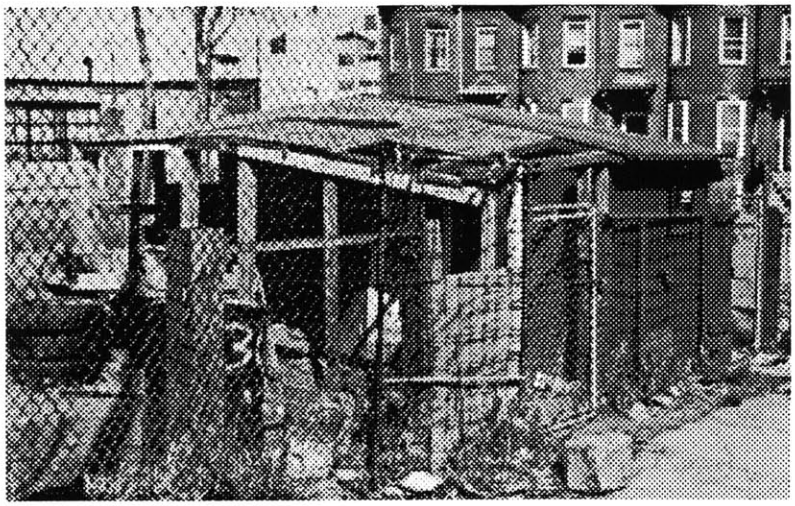

Fig. 4.12 Shed of secondhand and recycled materials at Magnolia Woodford garden (April 1993).

Fig 4.13 Scarecrow at Leyland Street garden (photo courtesy of Boston Urban Gardener's).

As Environments Which Sustain Ecosystems

Community gardens work to sustain urban industrial ecosystems in several ways. They produce food in the city. They absorb storm waters and rain waters. They moderate temperature. They improve the soil. They are often initially constructed from recycled or salvaged materials.

Energy Cycles

The production of food in the city eliminates the energy expenditure required to transport the food to the city. Massachusetts receives approximately 30 percent of its food produce from California.[8] California produce is competitive in Massachusetts, only because of immense subsidies provided by the American taxpayer. Energy subsidies include the bill for the Central Valley Project, the national highway system, the price of gasoline and no consideration of the energy costs involved in ecological system reparations. Fresh, year-round produce can be grown in city greenhouses and community gardens for a fraction of current energy expenditures.

Gardens are energy reservoirs. Plants convert solar energy into plant and food matter. The caloric energy stored in vegetables and fruits sustains people. The nutrients and chemical components of plants are returned to the soil and used by future plants. In contrast much of our built environment embodies energy which does not contribute to sustainable ecological systems and contains materials which are not recycled.

> A single mature tree transpiring 100 gallons of water per day provides the cooling equivalent of five average room air conditioners operating at 8,000 BTU/hr running 12 hours per day.[9]

In contrast to trees, vegetable gardens do not significantly cool daytime temperatures. They are far more useful at night. Gardens and grasslands have low thermal masses, which allows them to rapidly lose daytime heat gains to the night sky. Cooler air quickly moves in and helps dissipate heat from surrounding built up areas, which absorb large quantities of heat during the day.

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[8] Wagner, p.

[9] *Urban Forestry* (San Francisco: Global Cities Project, Center for the Study of Law and Politics, 1991), p. 5.

Air

It is difficult to accurately quantify the contribution of trees and green spaces to city air quality. Available data provides widely divergent figures. It has been claimed that one tree can provide a years supply of oxygen for ten people[10] and that it requires three acres of woods to absorb the carbon dioxide exuded by four people in breathing, cooking and heating.[11] Vegetables, berry bushes and fruit trees certainly can't begin to match the oxygenating capacity of a large tree.

The gardens help to maintain good air quality in other ways. They can facilitate air movement in concert with other open spaces and buildings. This both moderates the temperature of the adjacent buildings and provides a channel for fresh air. Bordering vegetation can filter dust out of the air. This is especially important in areas with high lead soil concentrations because lead is transported in dust.

Water

Garden spaces capture rain waters, and return the water to subterranean water tables instead of overburdened sewage treatment plants. During the growing season, vegetables will often require additional water from the city supply. As of today many gardens are not charged by the Boston Water Commission for the water they use. No one is quite sure whether the situation will remain this way. Water rates in Boston are among the highest in the nation and the gardeners have escaped the bills to date, only through the strong lobbying of several organizations.

Agricultural runoff is the major source of water pollution in this country. Community gardeners do not for the most part, employ chemical fertilizers or pesticides. Soil erosion, however can result in water siltation. The Savin Maywood garden, which sits on gently sloping land, does lose some soil. At the Phyllis Wheately garden, the sloping land has been terraced behind large timbers to prevent soil erosion.

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[10] Aloys Bernatzky, "Ecological principles in town planning: the impact of vegetation on the quality of life in the city," *Environment and Health: A Holistic Approach*, Ed. Robert Krieps (Aldershot, England: Avebury, 1989), p. 144.

[11] Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961), p. 91.

Soil

One of the major ecological contributions of community gardens has been in soil improvement. Gardeners remove a large amount of building rubble, metal, glass, plastics and even abandoned cars from their gardens. They improve the nutrient base of the soil with compost. Several gardens had compost areas where they piled leaves, cuttings and other organic site debris, which was then mulched into the soil. In past years the gardens have occasionally received compost from the Parks and Recreation department. The department maintains a large compost operation outside the city for leaves and cuttings from park operations. None of the gardens I visited in the Dudley Street neighborhood composted kitchen scraps.

Soil quality varied from garden to garden. All the gardens have been tested for lead contamination. An inspection of the test results on file at BUG showed that all the gardens had low or negligible lead levels.

Under the Grass Roots Program which is providing money for the Leyland Street garden, all the soil in the garden will be sifted to a depth of about a foot. This process is pictured in another garden on the previous page. The sifting operation is a significant, but temporary disturbance to the local ecology. It is made necessary because of the extent to which urban soils have been mistreated.

Fig 4.14 Cooking chickens at Magnolia Woodford garden (April 1993).

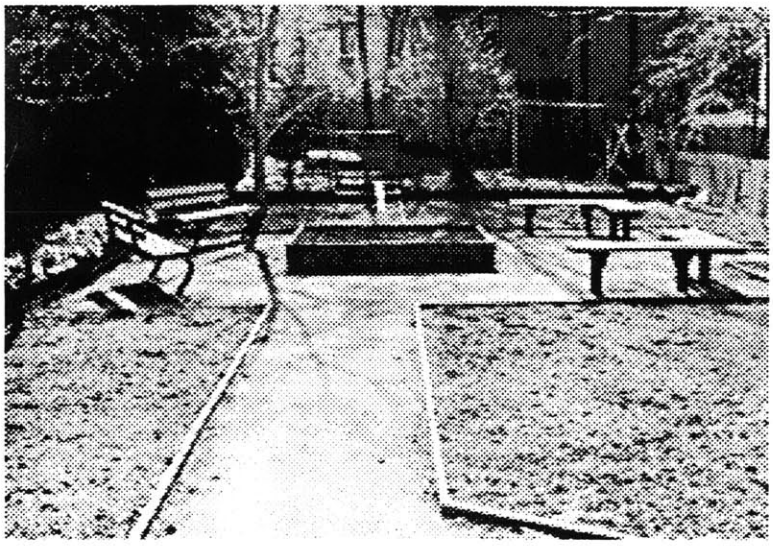

Fig 4.15 Sitting area at Jardin de la Amistad (April 1993).

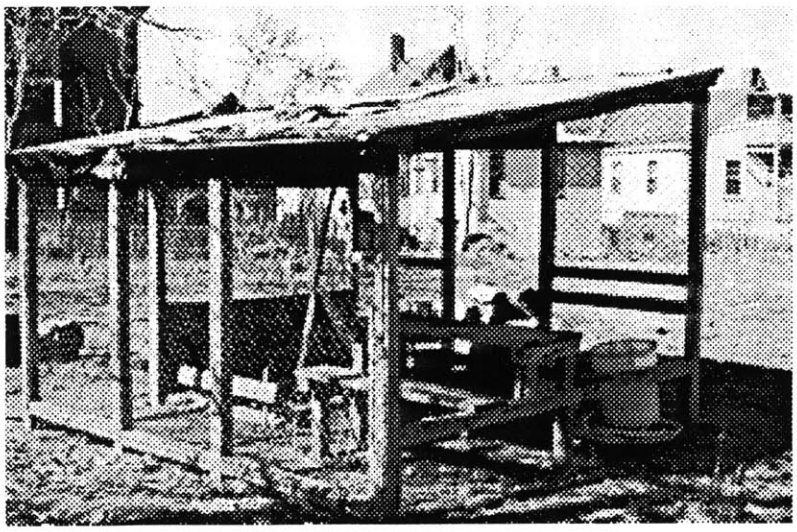

Fig 4.16 Open shed with picnic table at Leyland Street garden (April 1993).

> Like I was telling you before, alot of people will come down here after work and they give their garden maybe half an hour. It's very good mental therapy. It's good for their minds; it's good for their heads. People walk down, they talk. We talk about each other's troubles, and everybody goes home smiling.[12]

Meeting Places

Community gardens are gathering places for members of the community. Community meeting places reinforce the social fabric by providing opportunities for social interactions. They often include sitting areas, sometimes with adjacent shelter from the rain. The open shed at the Leyland Street garden has burnt down or fallen down several times in the last fifteen years. Each time it was rebuilt by the gardeners.

Alex Johnson was sitting outside in the garden with some of his friends from the Cardinal Medeiros Manor across the street and some neighborhood people the Saturday afternoon I dropped by. He was happy to share some stories with me about the Dacia Woodcliff garden which had its first harvest last year. I asked him what he felt was the most important thing about the garden. He told me it was "a place for meeting and sharing." There were some people that wanted to put in more garden plots, but he was against this. He wanted to ensure there was enough space left under the trees in the rear of the garden for barbecues and picnics. "They come here with their families and they need the room."

Sunday afternoon there were a group of people gathered about the shed at the Magnolia Woodford garden. There were 4 chickens turning on a spit above a bed of charcoal. Jaime informed me that this was the way they did it in Puerto Rico and that he had once cooked a whole pig in the garden in the same way. While we waited for the chicken to cook, I met a large number of relatives.

[12] James Hall, quoted in Warner (1987), p. 58.

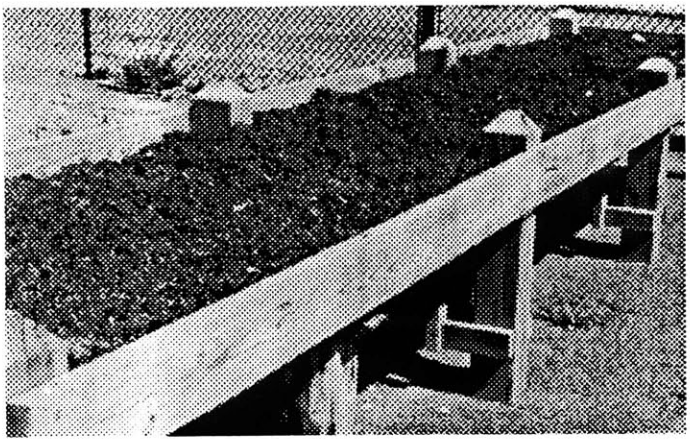

Fig 4.17 Raised planting bed at Dacia Woodcliff garden for handicapped (May 1993).

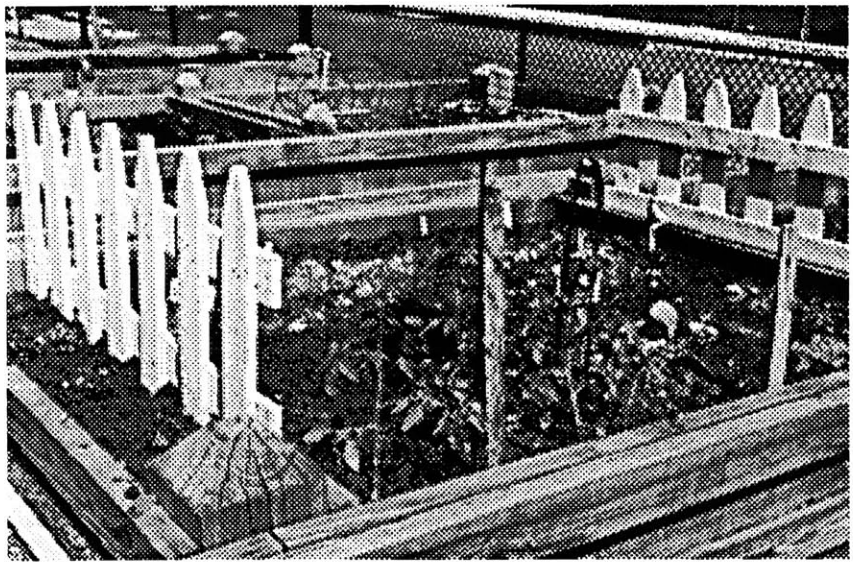

Fig. 4.18 Raised bed at Dacia Woodcliff garden with personalized picket fence (May 1993).

Special Communities

The Dacia Woodcliff garden contains special raised planting beds which cater to the needs of elderly gardeners from the adjacent Cardinal Medeiros Manor. One was designed to allow a person in a wheelchair to slide underneath. Others are raised to make gardening easier for those with back troubles. The raised gardens at the Dacia Woodcliff garden were the first gardens I saw planted this spring.

Sometimes a wheelchair gardener can garden from his chair with special tools. At the Savin Maywood garden there is a flat plot with a smooth path all the way around, which was set aside for a man in a wheelchair who wanted a garden. He uses a hoe with a handle which enables him to garden from his chair.

Community Building

The making of a community garden is a community building process. The gardens may be initiated by one person or a small group, but the making and continued maintenance of community gardens requires the concerted effort of a group of people. Gardeners form groups to exchange resources and protect the gardens.

Sam Bass Warner describes how a Charlestown garden provided such a physical improvement in the neighborhood , it stimulated the improvement of adjacent lands and increased its own value. In 1985 the Boston Redevelopment Authority, which owns the land, saw the neighborhood improvements as an opportunity to sell the garden land to a developer. The gardeners organized to protect the land and the garden is still there.[13]

Alex Johnson pointed out to me some neighborhood improvements the Dacia Woodcliff garden has stimulated. When it was a weed covered rubble strewn lot, the adjacent neighbors neglected their yards. The afternoon I was there he pointed to three neighbors who had cleaned up their yards and were now using the outdoor spaces.

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[13] Warner, 1987, pp.3-4.

Economic Importance

According to Marie Barrow, Luis and a number of other gardeners I talked with the garden vegetables helped them make ends meet. Marie told me she froze a large part of her vegetables and when we talked in mid April, she was still eating last years harvest. The average 15 foot by 15 foot community garden plot grows about $500 in vegetables. For a more in depth look at the economic contribution of community gardens see Wagner (1980).

Education

Community gardens are outdoor classrooms. Younger children often play a role in planting, maintenance and harvesting. The Phyllis Wheately School has had a summer gardening program for the past 13 years. Last summer 25 students from grades 6-8 tended the gardens. They receive a small stipend of $7 and get to keep the vegetables they grow. According to Robert Forbes, a garden project supervisor, "The biggest problem kids have today is self-image and self-worth." The garden work makes the students "believe they have self worth and that they can make the world a better place."[14]

At the Magnolia Woodford garden Jaime was trying to get his nephews to work with him in the garden. He wanted them to know the value of work and he was concerned that they may grow up without knowing how the food they ate came out of the soil. He was also sure that one of them had a green thumb because his brother did and he was devising a plan to discover who it might be. Each would be given a small piece of the garden to look after. Time would tell.

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[14] Robert Forbes, quoted in Todd Burroughs, "A Down to Earth Education," *Boston Globe*, 5 August 1988.

As Environments Which Sustain People

"We plant hope, We grow neighbors."
insignia, Boston Urban Gardeners, 1993.

The community gardens of Dudley Street neighborhood sustain their gardeners as they move the neighborhood toward sustaining ecological systems and communities. They also sustain individuals in important psychological ways. The best empirical evidence may be smiles. It is difficult to learn directly from gardeners the exact reasons they garden. Some talk about the economics and some talk about sharing stories with friends. But there is nearly always a smile, at least among the faces I visited with.

Community gardens provide a number of the elements referred to by the Kaplans as part of the restorative experience. They provide an environment which is different, varied, changing and absorbing. It is an environment gardeners are familiar with, but which is new with each passing day. Gardens are environments of wonder and fascination, filled with spaces for the imagination. They can be quiet refuges or places of festivity and sharing. They can be many things.

The most important is that they are made and shaped by the gardeners. They give people an opportunity to express themselves as members of a group and as individuals. When a person participates in the shaping of an environment, they become a part of that environment. They will work to sustain it as it sustains them.

Five

Opportunities

Opportunities for Gardens

Ecological Systems

The Ecosystem

Ecosystems are maintained by a diverse array of biological components. Our urban industrial ecosystem supplants many of these components with machinery and processes which are fed with large amounts of nonrenewable fossil fuels. This is an unsustainable condition. Opportunities exist to replace these fossil fuel intensive and polluting operations with the lessons we learn from ecological systems. Sustainable ecological systems give us a model for the design of sustainable urban industrial ecosystems.

A place should also be made in the city for the maintenance of small patches of pre-urban and pre-agricultural ecological systems. The Wisconsin-Madison Arboretum has demonstrated that it is possible to restore the vegetative components of specific, previously existing ecological systems on small pieces of land.[1] Urban wilds present us with an opportunity to accomplish this in the city. The existence of small pockets of biodiversity in self-contained and sustaining ecological systems provides us with a biological storehouse and important monitors of urban energy, air, water and soil conditions. They also provide laboratories and classrooms for the instruction of future generations in basic ecology. Boston Natural Areas Fund is agressively pursuing the preservation of urban wilds in Boston, but more than half of the 143 wilds identified in 1976 remain threatened and 30 percent of the original 2033 acres have been lost to development.

Community gardens embody components of sustainable ecological systems and move urban industrial ecosystems closer to a sustaining state. The evaluation of these components suggests that additional opportunities exist in the gardens and in other built environments.

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[1] William R. Jordan III, "Ecological Restoration, Reflections on a Half Century of Experience at the University of Wisconsin-Madison Arboretum," *Biodiversity*, Ed. E.O. Wilson (Washington, D.C.: National Academy Press, 1988), pp. 311-316.

Energy Cycles

The design of sustainable ecological systems must begin with an understanding of the role of energy; how it is transformed and how it is stored. Food is embodied energy. During a recent talk at the Harvard Graduate School of Design, William McDonough emphasized how we may be able to fashion a more productive and sustainable ecological relationship with our built environment by looking at its materials as food. He asks the question, "Who consumes our buildings?"[2] We can begin with a simpler question, "Who eats our apple cores, banana peels and egg shells?"

DNSI is currently exploring a neighborhood composting program which would utilize the brush cleared from vacant lots. This could be combined with neighborhood collection of food scraps and yard waste. A well designed neighborhood program, as opposed to city collection and processing, reduces the amount of energy required to transport waste and the resultant compost (if the city began a fullscale composting operation).

The energy efficiency and productive value of community gardens stands in sharp contrast to the energy consuming and non-productive, idealized nature of the pastoral park. Community gardens give us community tended edible landscapes mainained on solar currency. Pastoral parks are maintained by legions of taxpayer subsidized, fossil fuel gobbling lawnmowers, pesticides, fertilizers, chippers, choppers, rakers and aerators. And they are not even edible.

Air

A comprehensive analysis of the oxygen producing and carbon dioxide absorbing potential of urban vegetation would give us important information for the design of environments which can contribute to the proper maintenance of air cycles. However, we do not need vegetation code mandates to tell us that urban air quality is often detrimental to our health. The federal government has been measuring the quantity of poisons pouring into our atmosphere for decades.

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[2] William McDonough, lecture, Harvard Graduate School of Design, April 20, 1993.

Community gardens enhance air quality primarily through the facilitation of air movement. Opportunities to enhance the movement of air through open spaces exist in the integrated consideration of all neighborhood open spaces. This is explored further in a later section on open space networks.

Water

The design of sustainable urban industrial ecosystems requires that we begin to work with the planetary hydrologic cycle. Much of the rainfall which falls on cities serves only to clean streets and roofs, while water is often piped from distant areas to water gardens and fill fountains.

Community gardens give us an opportunity to capture and productively utilize rainwater falling on the city. Gardens which are adjacent to guttered buildings could easily utilize rainwater for crops, instead of relying upon the city supply. A first easy step would be to construct reservoirs. Above ground tanks could be filled from surrounding roofs, or below ground cisterns could collect ground water runoff. Water from below ground tanks could be pumped to higher tanks by simple windmills and the above ground tanks would feed water to the gardens through hoses by gravity.

Soil

If we begin to view the soil as a living placenta as Wes Jackson suggests, we can better understand its role in sustaining ecosystems. Healthy soil is host to a myriad number of living organisms which work together to sustain larger and more complex life forms. Urban soils are typically impoverished.

One of the major concerns of the many people involved in community gardening in Boston is lead-contaminated soil. Lead-based paint was commonly used up to 1950 to clad the exterior of houses. Soil-lead tests on some vacant house lots can sometimes clearly outline the perimeter of the previous house, just by the concentration of lead in the soil. The majority of gardens I visited had been tested for lead contamination. The higher danger exists in the untested vacant lots which are used by children for play and sometimes contain informal squatter gardens.

The most common method for the removal of lead-contaminated soil is to simply remove the soil. This is often not practical because of the cost involved, the dust raised during the operation can lead to the contamination of adjacent land and in the end you still have to do something with the soil. Other methods include, 1) burying the contaminated soil in place, 2) removing the soil, cleaning it on site and returning it to the ground, 3) removing the lead without disturbing the soil and 4) permanently binding the lead below the soil surface.[3]

In the section on energy we looked at an opportunity for the neighborhood composting of household waste. The compost provided by such a program could then be used to improve the soils of community gardens. It is a very simple, much talked about idea. Why aren't we doing it?

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[3] Robert W. Elias, "Soil-lead Abatement Overview: Alternatives to Soil Replacement," *Lead in Soil: Issues and Guidelines*, Ed. Brian E. Davies and Bobby G. Wixson (Northwood: Science Reviews Limited, 1988), pp. 301-305.

Community

> There are today hundreds and thousands of public employees, politicians, planners and theorists who have deep vested interest in maintaining the dike of 'national organization' against what they allege is the chaos of community control. The prospect of neighborhood government must be made to seem less threatening to these many dependents of centralization.[4]

Community gardens demonstrate the positive and sustaining role of community-based neighborhood initiatives. They are not prescriptions for community development, but illustrations of how a community which sees a need and is given an opportunity to act, can often provide better solutions than professional problem solvers. Opportunities for the creation of sustainable communities exist in giving neighborhoods and people the chance to realize their needs and wants. There is a role for both national and local organizations in this process. They should be viewed as complementary, not antagonistic.

Professional architects and planners may be able to envision opportunities that the neighborhood cannot, but the lessons of urban renewal demonstrate the importance of working with neighborhoods, not replacing them. The important criteria should be the extent to which a community accepts the proposed change and can make it their own.

One of the difficulties with outdoor gardens in a temperate climate is that they are covered with snow and completely empty for a good part of the year. Garden activities could be extended around the year with some simple glass enclosures. It is possible to design greenhouses which do not require anything more than solar energies for heating. Separate greenhouses may also be used for commercial gardens. At some point they could incorporate bio-aquatic waste water treatment systems.

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[4] Peter L. Berger and Richard J. Neuhaus, *To Empower People, The Role of Mediating Structures in Public Policy* (Washington, D.C.: American Enterprise Institute, 1977), p. 16.

Randy Hester has conducted a significant amount of research into neighborhood open spaces and has identified a number of recurring patterns in user needs. The following list summarizes, in order of importance, the aspects of neighborhood space, which most influence people's use of that space.

> People one wants to do an activity with or without.
> Settings for the activity one wants to do.
> "Relatedness" through interaction with the natural environment.
> Safety.
> Aesthetic appeal.
> Convenience.
> Psychological comfort.
> Physical comfort.
> Symbolic ownership.
> Policy on use.
> Cost[5]

His research suggests that the emphasis of architects and planners upon the physical artifact, often ignores the primary reason people use outdoor spaces. People use spaces becaue other people are there. If we give people an opportunity to participate in the expression and creation of the built environment, they will tell us what sustains them.

Some people question the value of maintaining distinctive cultural settings. Rapoport suggests two points may be made in defense. The first is aesthetic. The second

> Throughout history many cultures have disappeared for various reasons. One of these is that they took a "wrong turning," made the wrong choices. What are the implications of a single, homogenized world culture, particularly if it should have taken the "wrong turning?"[6]

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[5] Hester (1985), p. 58.
[6] Rapoport (1980), p. 42.

Individuals

> Our village life would stagnate if it were not for the unexplored forests and meadows which surround it. We need the tonic of wildness, -to wade sometimes in marshes where the bittern and the meadow hen lurk, and hear the booming of the snipe; to smell the whispering sedge where only some wilder and more solitary fowl builds her nest, and the mink crawls with its belly close to the ground. At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be infinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of nature. We must be refreshed by the sight of inexhaustable vigor, vast and titanic features, the wilderness with its living and decaying trees, the thundercloud, and the rain which lasts three weeks and produces freshets. We need to witness our own limits transgressed, and some life pasturing freely where we never wander.[7]

In this passage by Thoreau from *Walden Pond* we return to Searles conviction of a transcendent relationship between people and their nonhuman environment. More evidence of this important connection exists in the profusion of advertising images which employ natural images and landscapes and in the research of the Kaplans into the restorative experience. Is there a way to design our built environment in ways which can incorporate the essential qualities which draw people to "nature." Community gardens suggest that there are ways.

"We must be refreshed by the sight of inexhaustible vigor," writes Thoreau. I know of no more vigorous place on this planet, than the streets of New York City, yet this is not the vigor referred to by Thoreau and this is not a refreshing place for many people. Thoreau refers to another form of vigor. A productive vigor, measured not in economic abstractions, but in the sustainable regenerative processes of ecological systems. This is the vigor which is absent from our cities and which tantalizes us in advertisements.

We must learn to bring this vigor to our cities. We can learn from both sustainable ecological systems and communities.

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[7] Thoreau, p. 235.

Open Space Networks

Neighborhood open spaces play an important role in sustaining ecological systems, communities and people. Community gardens are only one form of open space. When the gardens are considered in conjunction with other neighborhood open spaces, opportunities for sustainable design are significantly extended.

Ecological Systems

For three decades Stuttgart, Germany has been working to realize a city wide plan to improve air circulation by building air corridors. Planners and engineers discovered the role of adjacent hillside ravines in channeling cool night air down into the city. A strategy was devised to prevent development in these areas and augment the circulation by extending the low-lying vegetation covered channels into the city. Hot air rises from the buildings at night drawing cool air down the specially designed air corridors and into the city.

The converse of this can be applied in windy areas. Vegetation can be used to shelter outdoor spaces from winds, extending the comfort zone of some sunny protected areas by several months.

In Sacramento, CA a utility company is planting 28,000 trees in an ambitious tree planting program designed to control peak loads in its service area.[8] The program is one of the first of its kind in the country.

The coordination of open space initiatives in a city also make possible the establishment of wildlife corridors. This is not to suggest that rabbits and deer should be encouraged into gardens, but the contemporary urban industrial ecosystem inhibits biological diversity in dangerous and unsustainable ways.

Today's cities, for the most part, still reflect 17th C. land laws which treat land as a civil liberty and not a social resource.[9] Community gardens demonstrate ways we can begin to change these antiquated views.

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[8] *Urban Forestry*, p. 64.

[9] Sam Bass Warner, *The Urban Wilderness* (New York: Harper & Row, 1972.), p. 15.

Recent initiatives and literature on urban open space reflects an increasing concern with connections. Interest in this area first arose through the studies of "urban ecologists" addressing the interactions between people and their built environment. Jane Jacobs' classic, *The Death and Life of Great American Cities*, appeared in 1961. In Kevin Lynch's, *Theory of Good City Form*, and Christopher Alexander's, *A Pattern Language*, we see recommendations for socially sustaining neighborhood open spaces which stress connections.

The City of Boston, Parks and Recreation Department recognizing the importance of open space coordination, calls for the creation of a body to oversee all open space and coordinate it in such a way as to maximize the benefits for "the community-at-large." They would like to be this body and "integrate cemeteries, urban wilds, streetscapes, community gardens, public housing open spaces, and major school campuses into mainstream parks operations and programming."[10]

[10] City of Boston, Dept. of Parks and Recreation, "Open Space Plan," 1992 (Draft).

Fig. 4.19 Patterns, Magnolia Woodford garden (April 1993).

Fig. 4.20 Patterns, Phyllis Wheately School garden (April 1993).

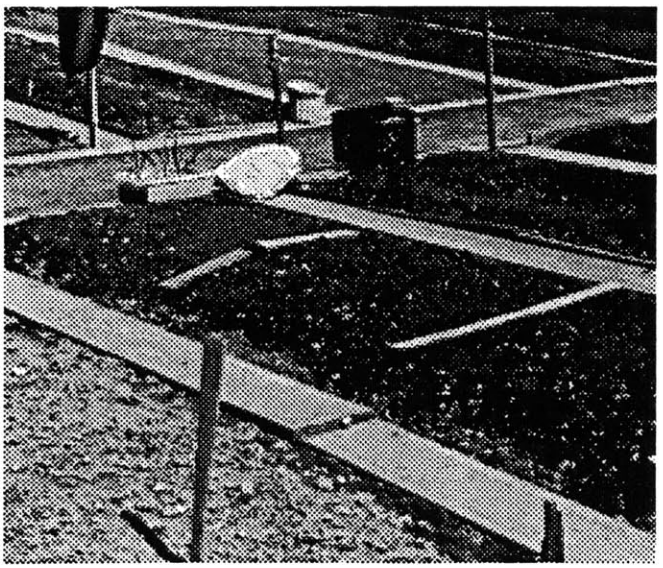

Fig 4.21 Patterns in South end garden (May 1993).

A Beginning and a Metaphor

In the photographs are patterns made in the land. They can be looked at as patterns or as the promise of new life. In three months time these views will be entirely transformed. Today they are a row of stalks, a grid of garden plots and furrows in the ground. Tomorrow there will be food to eat, a harvest to celebrate and wonder to share. They are deliberate patterns made with knowledge of the sun, the wind, the rain and the soil. They are guided by a community joined in a common purpose. They frame the expressions of individuals. They are like the very first patterns made by people in the land.

Community gardens give us patterns for building, which stand in complete contrast to the destructive, life-taking patterns of contemporary buildings. They are life-sustaining. They are a metaphor for a new way of building. Metaphors are not to be taken literally. They represent something else. We do not have the technology to build buildings out of living plants. We can build buildings like gardens.

Plants convert solar energy into forms of energy which are useful to people. Plants are recycled, their material components are used to nourish succeeding generations of plants. Plants change form and express the wonder of life in ways which are both comprehensible and mysterious. The cycles of plants are reassuring and understood, but we are left with room for our imagination to explore. Living plants give designers a palette of infinite variety, texture, shape, color, form and light.

We cultivate plants in gardens, we efficiently order the vegetables, creatively arrange the flowers, feed the soil, water the young plants and prune shrubs and fruit bearing trees. Gardeners care for gardens in ways we have not yet learned to care for buildings. The care-taking is an expression of how people make a place their own. And sustain it as it sustains them.

When we can see our cities in "nature." We will build gardens. They will not be beside, or in, or around, or on top of buildings. The buildings will be gardens.

Bibliography

Adams, William Howard. *Roberto Burle Marx, The Unnatural Art of the Garden.* New York: Museum of Modern Art, 1991.

Alpers, Paul. "What is Pastoral?" *Critical Inquiry* 8 (Spring 1982), pp. 437-460.

Alicea, Jose Antonio. *Dancing with the City: The Dudley Street Neighborhood Initiative and Land Control in Roxbury.* Cambridge; MIT Thesis, 1991.

Ambasz, Emilio. *Inventions, The Reality of the Ideal.* New York: Rizzoli, 1992.

American Community Gardening Association. "National Community Gardening Survey." Philadelphia, PA: A.C.G.A., 1992.

Andela, Gerry. "The Public Park in the Netherlands." *Journal of Garden History,* 1, No. 4, pp. 367-392.

Bamberger, Michael. *Monitoring and Evaluating Urban Development Programs.* Washington, D.C.: World Bank Technical Paper no. 53, May 1986.

Banham, Reyner. *Theory and Design in the First Machine Age.* 2nd ed. New York: Praeger, 1967.

Beardsley, John. *Earthworks and Beyond, Contemporary Art in the Landscape.* New York: Abbeville Press, 1984.

Behne, Adolph. "Art, Handicraft and Technology," (1922). *Oppositions,* No. 22 (Fall 1980), pp. 96-104.

Berger, Peter L. and Richard J. Neuhaus. *To Empower People, The Role of Mediating Structures in Public Policy.* Washington, D.C.: American Enterprise Institute, 1977.

Berman, Marshall. *All that is Solid Melts Into Air.* New York; Penguin, 1988.

Boston: Dept. of Parks and Recreation. "Open Space Plan," 1992 (Draft).

_____. "Open Space Plan," 1987.

Boston Natural Areas Fund. *Boston Urban Wilds Report.* Boston: BNAF, 1990.

Boston Urban Gardeners. *A Handbook of Community Gardening.* ed. Susan Naimark. New York: Charles Scribner's Sons, 1982.

_____. *City Gardener's Guide.* Boston: Boston Urban Gardeners, early 80's?. Pamphlet on practical aspects of gardening, with resource lists.

Brinchmann, Knute Thomas. *The East Austin Housing Science Center*: Towards a More Environmentally Accountable Design Approach. Cambridge: MIT Thesis 1991.

Brown, Lester R. and Jodi L. Jacobson. *The Future of Urbanization: Facing the Ecological and Economic Constraints.* Washington, DC: Worldwatch Institute, May 1987.

_____. *Building a Sustainable Society.* New York: Norton, 1981.

Burle Marx, Roberto. "A Garden Style in Brazil to Meet Contemporary Needs." *Landscape Architecture*, 44, No. 4 (July 1954), p. 200-08.

Cembalest, Robin. "The Ecological Art Explosion." *Art News*, (Summer 1991), pp. 96-105.

Conrad, Ulrich, ed. *Programs and Manifestoes on 20th Century Architecture.* trans. Michael Bullock. Cambridge: MIT Press, 1970.

Council on Environmental Quality. *Environmental Quality*, 22nd Annual Report. Washington D.C.: G.P.O., March 1992.

Cranz, Galen. *The Politics of Park Design, A History of Urban Parks in America.* Cambridge: MIT Press, 1982.

Creasy, Rosalind. *The Complete Book of Edible Landscaping.* San Francisco: Sierra Club, 1982.

Crouch, David and Colin Ward. *The Allotment: Its Landscape and Culture.* London: Faber, 1988.

Daly, Herman E. and John B. Cobb, Jr. *For the Common Good, Redirecting the Economy toward Community, the Environment and a Sustainable Future.* Boston: Beacon Press, 1989.

De Michelis, Marco. "The Red and the Green. Park and City in Weimar Germany." *Lotus 30.*

Dutton, R. A. and A. D. Bradshaw. *Land Reclamation in Cities.* London: Her Majesty's Stationary Office, 1982.

Elias, Robert W.. "Soil-lead Abatement Overview: Alternatives to Soil Replacement." *Lead in Soil: Issues and Guidelines.* Ed. Brian E. Davies and Bobby G. Wixson. Northwood: Science Reviews Limited, 1988.

Eliovson, Sima. *The Gardens of Roberto Burle Marx.* Portland: Sagapress, Inc., 1991.

Emerson, Ralph Waldo. *Selected Writings.* Ed. Donald McQuade. New York: Random House, Modern Library, 1981.

Fein, Albert. *Frederick Law Olmstead and the American Environmental Tradition.* New York: George Braziller, 1972.

Fishman, Robert. *Urban Utopias in the Twentieth Century: Ebeneezer Howard, Frank Lloyd Wright and Le Corbusier.* Cambridge: MIT Press, 1982.

Fox, Tom, Ian Koeppel and Susan Kellam. *Struggle for Space, The greening of N.Y.C. 1970-1984.* New York; Neighborhood Open Space Coalition, 1985.

Francis, Mark and Randolph T. Hester, ed.. *The Meaning of Gardens.* Cambridge: MIT Press, 1990.

_____. *Community Open Spaces: Greening Neighborhoods through Community Action and Land Conservation.* Washington, D.C.: Island Press, 1984.

Glowen, Ron. "Mill Creek Park." *Arts and Architecture,* 2, No. 1 (1983).

Gordon, David, ed. *Green Cities, Ecologically Sound Approaches to Urban Space.* Montreal: Black Rose, 1990.

Green, Nicholas. *The Spectacle of Nature.* Manchester: Manchester University Press, 1990.

Groenig, Gert and Joachim Wolschke-Bulmahn. "Changes in the Philosophy of Garden Architecture in the 20th Century and their Impact upon the Social and Spatial Environment." *Journal of Garden History,* 9, no. 2, (1989), pp. 53-70.

Hackett, Brian. *Landscape Reclamation Practice.* Surrey, England: I.P.C. Business Press, 1977.

Halperin, David M. *Before Pastoral: Theocritus and the Ancient Tradition of Bucolic Poetry.* New Haven: Yale University Press, 1983.

Harvey, David. *The Condition of Postmodernity.* Cambridge; Blackwell, 1990.

Harvey, W. Alexander. *The Model Village and its Cottages.* London: B. T. Batsford, 1906.

Heidegger, Martin. *Poetry, Language, Thought.* trans. Albert Hofstadter. New York: Harper and Row, 1971.

_____ "The Question Concerning Technology." *Basic Writings*. New York: Harper and Rowe, 1977.

Hester, Randolph T. Jr. "Process Can Be Style, Participation and Conservation in Landscape Architecture." *Landscape Architecture*, (May 1983) pp. 49-55.

_____. "Participatory Design and Environmental Justice: Pas de Deux or Time to Change Partners?" *The Journal of Architectural and Planning Research*. 4 No. 4 (1987), pp. 289-299.

_____. *Planning Neighborhood Space With People*. New York: Van Nostrand Reinhold, 1984.

Hough, Michael. "Metro Homestead." *Landscape Architecture*, (January 1983) pp. 54-58.

_____. *City Form and Natural Process*. London: Croom Helm, 1984.

_____. "Nature and the City." *Landscape Architecture*, (September 1989) pp. 41-43.

Howard, Ebeneezer. *Garden Cities of To-morrow*. ed. F.J. Osborn. London: Faber and Faber, 1945.

Human Behavior and Environment. Ed. Irwin Altman, Amos Rapoport and Joachim F. Wohlwill. Vol 4 of *Environment and Culture*. New York: Plenum Press, 1980.

Hunt, John Dixon. *Gardens and the Picturesque*. Cambridge: MIT Press, 1992.

Hunt, John Dixon and Peter Willis, ed. *The Genius of the Place, The English Landscape Garden 1620-1820*. Cambridge: MIT Press, 1988.

Jackson, J. B.. *Discovering the Vernacular Landscape*. New Haven: Yale University Press, 1984.

_____. *Landscapes*. Ed. Ervin H. Zube. University of Massachusetts Press, 1970.

Jackson, Wes. *New Roots For Agriculture*. Lincoln, Nebraska: University of Nebraska Press, 1985.

Jacobs, Jane. *The Death and Life of Great American Cities*. New York: Random House, 1961.

Jefferson, Thomas. *Notes on the State of Virginia*. Ed. William Peden. New York: Norton, 1972.

Keller, Suzanne. *The Urban Neighborhood: A Sociological Perspective.* New York: Random House, 1968.

King, Mel. *Chain of Change, Struggles for Black Community Development.* Boston; South End Press, 1981.

Kotler, Milton. *Neighborhood Government, The Local Foundations of Political Life.* Indianapolis: Bobbs-Merrill Company, 1969.

Kourik, Robert. *Designing and Maintaining Your Edible Landscape Naturally.* Santa Rosa, CA: Metamorphic Press, 1986.

Lead in Soil: Issues and Guidelines. Northwood: Science Reviews, 1988. Proceedings of a conference in Chapel Hill, NC, March 1988.

Leopold, Aldo. *A Sand County Almanac.* New York: Oxford University Press, 1949.

Leviseur, Elsa. "Avant-garde ecology." *Architectural Review,* (September 1992), pp. 53-58.

Lyle, John. *Design for Human Ecosystems: Landscape, Landuse and Natural Resources.* New York: Van Nostrand Reinhold, 1985.

Lynch, Kevin. *Good City Form.* Cambridge: MIT Press, 1981.

_____ and Gary Hack. *Site Planning.* 3rd ed. Cambridge: MIT Press, Machor, Stephen. Pastoral Cities. 1987.

Marsh, George Perkins. *Man and Nature.* Ed. David Lowenthal. Cambridge: Belknap Press of Harvard, 1965.

Marx, Leo. "The American Ideology of Space." *Denatured Visions, Landscape and Culture in the Twentieth Century.* New York: Museum of Modern Art, 1991.

_____. *The Machine in the Garden.* 1964.

_____. "Does Pastoralism Have a Future?". *The Pastoral Landscape.* 1992.

McAllister, Donald M.. *Evaluation in Environmental Planning, Assessing Environmental, Social, Economic, and Political Tradeoffs.* Cambridge: MIT Press, 1980.

McCleary, Peter. "Some Characteristics of a New Concept of Technology." *Journal of Architectural Education.* 42, No. 1 (Fall 1988).

McHarg, Ian. *Design With Nature.* New York: Doubleday, 1969.

_____. "Ecology for the Evolution of Planning and Design." *VIA 1*, pp. 44-67.

Mitlin, Diana. "Sustainable Development: a Guide to the Literature." *Environment and Urbanization.* 4, No. 1 (April 1992) pp. 111-124.

Molison, Bill. *Permaculture, A Designers' Manual.* Tyalgum, NSW, Australia: Tagari, 1988.

Moore, Charles W., William J. Mitchell and William Turnbull, Jr. *The Poetics of Gardens.* Cambridge: MIT Press, 1988.

More, St. Thomas. *Utopia.* ed., Edward Surtz S.J. New Haven: Yale University, 1964.

Mosser, Monique and Georges Teyssot ed. *The Architecture of Western Gardens.* Cambridge: MIT Press, 1991.

Mumford, Lewis. *Technics and Civilization.* New York: Harcourt, Brace and World, 1963.

Nagel, Andrea Isabel. *The Dudley Street Neighborhood Initiative: A Case Study in Community-Controlled Planning.* Cambridge; MIT Thesis, 1991.

National Gardening Association. *Special Report on Community Gardening in the U.S.* Burlington, VT: N.G.A., 1985.

Nicholson-Lord, David. *The Greening of the Cities.* London: Routledge and Kegan Paul, 1987.

Odum, Eugene P. *Fundamentals of Ecology.* 3rd ed. Philadelphia: W. B. Saunders, 1971.

_____ *Ecology and our Endangered Life-Support System.* Sunderland, MA: Sinauer, 1989.

Olmstead, Frederick Law. *Civilizing American Cities.* ed. S.B. Sutton. Cambridge: MIT Press, 1971.

Orians, Gordon H. "Ecological Concepts of Sustainability." *Environment* 32, no. 9 (November 1990), p. 10-39.

Paddock, Joe, Nancy Paddock and Carol Bly. *Soil and Survival, Land Stewardship and the Future of American Agriculture.* San Francisco: Sierra Club Books, 1986.

Peattie, Lisa. "Realistic Planning and Qualitative Research." *Habitat International* 7 No. 5/6 (1983), pp. 227-234.

_____. *The View from the Barrio.* Ann Arbor: University of Michigan Press, 1968.

Prigogine, Ilya, Gregoroire Nicolis and Agnes Babloyantz. "Thermodynamics of Evolution." *Physics Today* (November 1972).

Rapoport, Amos. *House Form and Culture.* Englewood Cliffs, NJ: Prentice Hall, 1969.

Rees, William E. "The Ecology of Sustainable Development." *The Ecologist.* 20, no. 1 (Jan/Feb 1990) pp. 18-23.

Rehmann, Elsa. "An Ecological Approach." *Landscape Architecture.* 23, No. 4 (July 1933) pp. 239-245.

Reps, John William. *The Making of Urban America; a History of City Planning in the United States.* Princeton, N.J.: Princeton University Press, 1965.

Riddle, Mason. "Mel Chin." *Arts Magazine,* (February 1991), p. 89.

Rowe, Peter G. *Making a Middle Landscape.* Cambridge: MIT Press, 1991.

Ruff, Allan R. *Holland and the Ecological Landscape.* Manchester: Dept. of Town and Country Planning, 1979.

Rykwert, Joseph. "Il giardino del futuro fra estetico e tecnologia." *Rassegna,* No. 8 (October 1981), p. 5-12.

Seymour, Whitney North Jr.. *Small Urban Spaces, The Philosophy, Design, Sociology and Politics of Vest Pocket Parks and Other Small Urban Open Spaces.* New York: New York University Press, 1969.

Searles, Harold F.. *The Nonhuman Environment in Normal Development and in Schizophrenia.* New York: International Universities Press, 1960.

Simo, Melanie Louise. *Loudon and the Landscape: from Country Seat to Metropolis, 1783-1843.* New Haven: Yale University Press, 1988.

Smithson, Robert. *The Writings of Robert Smithson.* ed. Nancy Holt. New York: New York University, 1979.

Solomon, Barbara Stauffacher. *Green Architecture and the Agrarian Garden.* New York: Rizzoli, 1988.

Soule, Judith D. and Jon K. Piper. *Farming in Nature's Image, An Ecological Approach to Agriculture.* Washington, D.C.: Island Press, 1992.

Spirn, Anne Whiston. *The Granite Garden*. New York: Basic Books, 1984.

_____. "The Poetics of City and Nature: Toward a New Aesthetic for Urban Design." *Landscape Journal* (Winter 1989).

Stearns, Forest and Tom Montag ed. *The Urban Ecosystem: A Holistic Approach.* Stroudsburg, PA: Dowden, Hutchinson and Ross, 1974.

Stilgoe, John R. *Common Landscape of America*. New Haven: Yale University Press, 1983.

Thompson, J. William. "Landscape of Dream, Warrior of Vision," *Landscape Architecture.* (September 1989), p. 81-87.

_____. "Landscape Design as if Survival Mattered," *Landscape Architecture.* (June 1991), p. 82-88.

Thoreau, Henry David. *Walden and Civil Disobedience.* New York: Harper & Row, 1965.

Todd, Nancy and John Todd. *Bioshelters, Ocean Arks, City Farming: Ecology as the Basis of Design*. San Francisco: Sierra Club, 1984.

——— *The Village as Solar Ecology*. East Falmouth, MA: New Alchemy Institute, 1980.

Tunnard, Christopher. *Gardens in the Modern Landscape.* 2nd Ed. New York: Scribner, 1950.

Urban Forestry. San Francisco: Global Cities Project, Center for the Study of Law and Politics, 1991.

Vale, Brenda and Robert Vale. *Green Architecture.* London: Thames and Hudson, 1991.

Van der Ryn, Sim. *Sustainable Communities a New Design Synthesis for Cities, Suburbs and Towns*. San Francisco: Sierra Club, 1986.

VanDeVeer, Donald and Christine Pierce, ed. *People, Penguins and Plastic Trees, Basic Issues in Environmental Ethics.* Belmont, CA: Wadsworth Publishing Co., 1986.

Visions of Sustainability, A Sourcebook for Environmentally Responsible Design. Boston: Architects for Social Responsibility, April 1991.

Wagner, Judith Joan. *The Economic Development Potential of Urban Agriculture at the Community Scale.* Cambridge: MIT Thesis, 1980.

Warner, Sam Bass. *To Dwell is to Garden.* Boston: Boston University Press, 1987.

_____. "Restorative Gardens." Paper in progress, August 1992.

Waugh, Frank A. "Ecology of the Roadside." *Landscape Architecture.* 21, No. 2 (January 1931) pp. 80-92.

White, Lynn Jr. "The Historical Roots of Our Ecologic Crisis." *Science,* 155, no. 3767 (10 March 1967), p. 1203-1207.

White, Rodney and Joseph Whitney. "Cities and the Environment: An Overview." *Sustainable Cities.* Boulder, CO: Westview Press, 1992.

Williams, Raymond. *The Country and the City.* New York: Oxford University Press, 1973.

World Commission on Environment and Development. *Our Common Future.* Oxford: Oxford University Press, 1987.

World Conservation Strategy: Living Resource Conservation for Sustainable Development. Morges, Switzerland: IUCN, 1987.

Worldwatch Institute. *State of the World.* New York: Norton, 1987, 1991.

Worster, Donald. *Nature's Economy: The History of Ecological Ideas.* New York: Cambridge University Press, 1977.

Wright, Frank Lloyd. *The Disappearing City.* 1932; facsim with Wright's corrections. New York: Horizon Press, 1969.

Wright, Gwendolyn. *Building the Dream. A Social History of Housing in America.* Cambridge: MIT Press, 1981.

Zonneveld, I. S. and R. T. T. Forman ed. *Changing Landscapes: An Ecological Perspective.* New York: Springer-Verlag, 1990.

Zube, Ervin. "The Advance of Ecology." *Landscape Architecture,* (March/April 1986), pp. 58-67.