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Sustainable Urban Development: A Literature Review and Analysis

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SUSTAINABLE URBAN DEVELOPMENT:
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ABSTRACT

SUSTAINABLE URBAN DEVELOPMENT:

A LITERATURE REVIEW AND ANALYSIS

by

Stephen Maxwell Wheeler

This report reviews current literature on sustainable development and proposes a framework for applying this concept to city and regional planning. It begins by exploring interpretations of the conccpt of sustainability itself, next looks at some urban planning traditions that lay a foundation for its applications to city planning, and finally suggests steps toward an urban planning framework that can incorporate this concept. The following definition of sustainable urban development is proposed:

> Sustainable urban development seeks to create cities and towns that improve the long-term health of the planet's human and ecological systems.

Means to achieve this objective include protecting and restoring natural ecosystems in urban areas, creating community environments that nurture human potential, using land and resources wisely, and facilitating human lifestyles that contribute to global sustainability.

The author argues that sustainable urban development is indeed possible if 1) some degree of consensus is reached on values that can underlie it, 2) methods are developed to evaluate progress towards or away from sustainability, 3) specific policies, designs and programs are developed to implement sustainable urban development based on these values and yardsticks, and 4) the necessary political organizing, leadership development, and public education can be carried out.

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INTRODUCTION

The term "sustainable" has been widely used in the last 10 to 15 years to describe a world in which both human and natural systems can continue to exist long into the future. The concept of "sustainable development" has been employed to denote alternatives to traditional patterns of physical, social and economic development in both industrialized nations and what is often called the Third World — alternatives that can avoid problems such as pollution, exhaustion of natural resources, overpopulation, loss of species, destruction of ecosystems, and the degradation of human living conditions.

But the concept of sustainability has existed in its current form only since the late 1970s, and for many individuals the term is quite fuzzy. Many questions surround it. What does "sustainable development" really mean? Can this idea be defined in ways that are specific and that generate consensus? Rather than representing a progressive wish-list, can it instead express a coherent and meaningful philosophy that points in clear directions and has concrete applications? In particular, can the term be applied to the processes of urban and regional development which are proceeding at such a rapid pace around the globe, and which are creating the physical environments within which future generations will live?

In addressing such questions I will first of all examine the concept of sustainable development generally, and then will look at its implications for cities and urban planning. Next I will propose a framework for sustainable urban development, one that starts with a definition of this term, outlines a small number of basic values for sustainable urban development building on the work of past urban theorists, describes methods to measure progress towards sustainability, and points to institutions, policies, programs, and educational methods to move towards this goal. Finally I will present a

bibliography of literature relating to sustainable development in general and sustainable urban development in particular, with annotations on as many entries as possible. This literature review has been updated in February 1996.

Since we all work within particular intellectual, cultural and personal frameworks which influence what we see, it is only fair then that I state my own biases at the start so that readers will know more about what to expect. My background is as an activist in environmental and peace causes as well as a student of urban planning. Although I respect scholarship, I want to see it applied to real problems, believing with Marx that "The philosophers have described the world; the point, however, is to change it." (Not all the changes that Marx caused, of course, were good ones, but we must have faith that positive change is in fact possible.)

Beyond this basic tendency towards activism, I will rest my arguments on a number of underlying assumptions that I will not explore themselves at any great length. First is that the world's ecological and social problems are in fact serious and demand attention. There is much evidence for this, which most of us are aware of through the media. A great variety of challenges face our species, from environmental concerns such as overpopulation and the greenhouse effect to social problems such as poverty and inequality. Without being unduly alarmist about it I will simply assume that these exist and require changes in our current ways of operating if they are to be solved in the long term. This assumption is common to most advocates of sustainability.

Second, I will assume that patterns of urban and regional development are one of the most important influences on current environmental and social problems. If readers question this, I suggest that they simply observe for themselves the rate at which cities and suburbs are devouring the landscape, or the decline of many central city areas, or the

damage that urbanization has caused to many ecosystems, or the vast waste of resources represented by an average rush hour commute near a major metropolitan center. Granted, there have been urban problems for millennia. But the scale of impacts now is particularly large, and the rate of change frighteningly rapid both in already industrialized nations and the Third World. There is also the fact that once areas are urbanized — once property is subdivided and sold, buildings built, infrastructure set up, and economic patterns established — the landscape becomes vastly more difficult and more expensive to change, if indeed this can be done at all. So it is important to think about processes of urbanization, then, both because they have a large effect on global sustainability, and because it is easier to build human communities in good ways to start with than to rebuild them later on.

My third basic assumption is that although some advocates of sustainable development would be satisfied with stricter environmental protections within existing economic and political frameworks, sustainability in fact implies a rearrangement of values in which long-term ecological and human needs are given top priority. This point will be expanded upon later. Put another way, my bias is towards believing that political and social problems tend to have psychological, cultural and spiritual roots expressed through prevailing value structures that must be addressed if lasting change is to occur. To solve current problems will require changes in the values and consciousness of society. This may happen gradually or quickly (in response to a global crisis, for example), but I do think it will need to happen at some point for sustainable development to come about.

Lastly, I strongly disagree with those who say that there is no use thinking about concepts such as a sustainable society because human nature is impossible to change. To paraphrase this argument in its most blunt sense, since it is people's nature to muck up the

planet and mistreat each other, there is no point in trying to fundamentally alter this situation. Just establish whatever rules are essential to survive, maintain them by force, and get on with one's own life. To the contrary, I would argue that cynical approaches such as this cause many problems themselves, and are used mainly as a rationalization for not taking responsibility to change the world. The reality instead seems to be that human nature is at least somewhat malleable and is influenced by the environments and cultures that we create for ourselves. A great deal of anthropological, sociological and psychological literature supports this position. Therefore, the response goes, if we *can* learn to live in more sustainable fashion, why not try? Why not build cities, societies and economies that shape human nature and human environments in directions that most of us agree are wise?

Following this line of reasoning, I will assume both that development of a more values-based politics aimed at helping people and societies evolve in positive directions is possible and essential, and that it should be tried even if we don't know for sure that it is possible, just because we don't know for sure that it isn't. The politics of values is often derided on the one hand as liberal idealism and on the other hand (with some justification) as a conservative attempt to prescribe lifestyles. But a new language of values, if developed in constructive ways (as, for example, the Green parties of the world have tried to do), can potentially underlie the transition towards a more sustainable society, and offers one of the most conscious and responsible ways to make this transition.

Since I believe that the subject of sustainable development should be of interest to both academic readers and the general public, I am trying to write for both audiences. If I can reach either one, I will be happy. I invite comments and dialogue from readers.

— Stephen Wheeler

I. WHAT IS 'SUSTAINABLE DEVELOPMENT' IN GENERAL?

A. History

The verb "sustain" has been used in English since the year 1290 or before, and comes from the Latin root "sub" + "tenere," meaning "to uphold" or "to keep". The Oxford English Dictionary traces the adjective "sustenable" to around 1400 and the modern form "sustainable" to 1611. However, this term appears to have been used mainly in legal contexts until recently, as in "The Defendant has taken several technical objections to the order, none of which...are sustainable" (1884). Many other variants of "sustain" have existed for centuries, but only in the past couple of decades has the term "sustainable" emerged with its current meaning, perhaps most simply defined as "that which can be maintained into the future."

It is far from clear who was the first to use the term "sustainable development" in its current sense. Rather, it seems one of those inevitable expressions that so neatly encapsulates what many people are thinking that once the words are mentioned they quickly become ubiquitous. The first reference to the modern concept of sustainability that I have been able to document points to a 1974 conference of the World Council of Churches which issued a call for a "sustainable society." This conference is mentioned in the earliest book specifically discussing sustainability, a 1976 volume entitled *The Sustainable Society: Ethics and Economic Growth* by Lutheran theologian Robert L. Stivers. Other uses of the term soon followed, most notably a volume entitled, *The Sustainable Society: Implications for Limited Growth* (1977), edited by Dennis Clark Pirages, a futurist who by that date had established a Program in Technology, Resources and Sustainable Growth at the University of Maryland.

In the late 1970s and early 1980s the volume of writings on sustainability grew rapidly. However, the sudden popularity of the concept must be seen as arising from a number of intellectual currents during the past hundred years which laid the groundwork. Most important, of course, was the growth of environmentalism and the recognition of ecological and resource limits to human development on the planet. Developments in economics, psychology, forestry, and the biological sciences were influential as well. Particular events probably also helped, such as the 1973 oil embargo during which millions of people suddenly realized that their use of fossil fuels could not continue to expand forever.

Current notions of sustainability can be seen as emerging most directly from the late nineteenth and early twentieth century conservationist movement, in particular from "sustained yield" concepts of forest management developed by nineteenth century German foresters. Essentially these were techniques of selectively cutting certain mature trees from a forest while leaving others to grow and perpetuate the forest community. The notion of "sustained yield" influenced American policy makers such as Gifford Pinchot, Theodore Roosevelt's chief forester, who examined model forests in France, Germany and Switzerland, and natural resource scientists such as Aldo Leopold. Leopold took German forestry concepts a step farther; his notion of a "land ethic" — a human responsibility to care for particular lands and ecosystems, discussed most fully in *A Sand County Almanac* (1948) — has proven extremely influential with later environmentalists. Such a philosophy represents a fundamental shift from the view that natural resources should be seen in terms of their utility for human beings toward the perspective that species and ecosystems have intrinsic value in their own right and should be stewarded and sustained indefinitely into the future.

In the post-World War II period a long line of environmentalist works such as William Vogt's best-selling *Road to Survival* (1948), Fairfield Osborn's *Our Plundered Planet* (1948), Rachael Carson's *Silent Spring* (1962), and Barry Commoner's *The Closing Circle* (1971) sounded a note of alarm about the global ecological situation, setting the stage for overt discussions of sustainability. Such authors argued that overpopulation, pollution, wasteful resource use, and the accumulation of toxins in the environment was jeopardizing the future of many species, including our own, and their work helped create a strong environmental movement in the U.S. and elsewhere. The nuclear arms race during those years also raised questions about whether human civilization had a future at all. The 1972 U.N. Conference on Environment and Development, held in Stockholm, and an associated book by Barbara Ward and Rene Dubos summarizing main themes of the conference, entitled *Only One Earth: The Care and Maintenance of a Small Planet* (1972), helped focus global attention on environmental themes. Equally important, such works helped tie the rise of ecological problems to ongoing patterns of industrial development.

The publication of *The Limits to Growth* (1972) by Donella Meadows, Dennis Meadows, John Forrester and Jurgen Randers helped catalyze the debate about global patterns of resource use, population growth, pollution, and agricultural production. Although this work did not discuss sustainability per se, it did show with some degree of scientific authority that current global trends are unsustainable. Basically, the systems dynamics approach used by these authors entailed computer modeling of global systems, which showed that without change in existing human practices these systems are likely to collapse partway through the 21st century. The *Limits to Growth* approach has been criticized for being overly deterministic and not taking into account human initiatives, but that was never its point, which was simply to say what would happen if current trends continued. The Meadows' later works such as *Alternatives to Growth* (1979) and *Beyond*

the Limits (1992) have refined their original analysis without contradicting its fundamental findings. For the latter book the authors revised and reran their World3 computer model 20 years after its original creation. From this and other evidence they concluded that human use of many resources and generation of many pollutants has already surpassed sustainable levels, resulting in a condition of "overshoot." However, the authors still believed that through "a comprehensive revision of policies and practices" a sustainable society could be achieved.

In addition to environmentalism, developments in the philosophy of science and theory of knowledge helped set the stage for discussions of sustainability. Particularly important were new understandings of how systems of knowledge evolve and in turn affect people's observations, assumptions, and values. Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) introduced the concept of "paradigm shifts" to many and precipitated a great variety of "new paradigm" literature in following decades. Defining "paradigm" as "the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community," Kuhn attacked the view of science as a slow, steady progress toward truth, and put forth a new theory of knowledge as embedded within particular world views, which in turn are periodically transformed in dramatic intellectual revolutions. This approach fit nicely with the fundamental questioning of social and cultural structures that took place for many in the 1960s and 1970s, and stimulated the search for new paradigms of economic and social development that would better address the global problems that environmentalists and others were warning about.

Social critics, futurists, and new age writers further prepared the way for discussions of sustainable development by critiquing existing notions of development and exploring more specific forms of paradigm change. Books such as Theodore Roszak's *Where the Wasteland Ends: Politics and Transcendence in Postindustrial Society* (1972),

Charles Reich's *The Greening of America* (1973), Marilyn Ferguson's *The Acquarian Conspiracy* (1979), Alvin Toffler's *The Third Wave* (1980), and David Spangler's *Emergence: The Rebirth of the Sacred* (1984) repeatedly suggested that an alternative to existing development patterns was inevitable and necessary. This alternative would emphasize the spiritual, the natural, and the human over values of profit and traditional economic progress. Somewhat more indirectly, writers in the fields of humanistic and transpersonal psychology aided in the search for new, more sustainable ways of living by pointing out the ways in which human potential is shaped by the surrounding environment, and ways in which it can perhaps be shaped in healthier directions in the future (e.g. Maslow, 1968). The implication of such work is that people and perhaps entire societies *can* evolve into more conscious, compassionate, and sustainable modes of living, given the right conditions.

Many other literatures also helped lay the foundation for considerations of sustainable development, from those on specific topics of forestry, agriculture and ecology to very abstract or utopian bodies of work. For example, research into organic agriculture helped show how human communities can feed themselves in sustainable ways. Works on alternative energy showed how homes could be heated and powered sustainably. Utopian fiction such as Ernest Callenbach's *Ecotopia* (1975) or Marge Piercy's *Woman on the Edge of Time* (1976) help develop images of what a sustainable society would look like and how its different components would fit together.

The literature on sustainability got one of its strongest pushes in the late 1970s from Lester Brown and others at the Worldwatch Institute. This group began publishing a great number of papers and volumes related to global conditions and steps toward sustainability, starting with a 1978 report entitled *Repairs, Reuse, Recycling — First Steps Toward a Sustainable Society*, written by Denis Hayes, coordinator of Earth Day

1970. Later publications include Brown's book *Building a Sustainable Society* (1981) and the Institute's annual *State of the World* reports. In these works Brown and his coauthors surveyed a wide range of global environmental and resource problems, including overpopulation, deforestation, soil erosion, overgrazing, and depletion of nonrenewable resources, offering alternative approaches in each case.

The tide of literature related to sustainable development expanded in the 1980s with the International Union for the Conservation of Nature's influential *World Conservation Strategy* (IUCN, 1980), the President's Council on Environmental Quality's *Global 2000 Report* (Barney et al., 1981), and above all the report of the World Commission on Environment and Development (the Brundtland Commission), *Our Common Future* (World Commission, 1987). These documents warned about global environmental problems and to differing extents critiqued notions of "development," although generally accepting the desirability of continued economic growth. The influence of the IUCN and Brundtland reports in particular stemmed from the broad participation of mainstream governmental officials and academics within these bodies, which gave their findings an air of considerable authority going beyond the "alarmist" reports of the *Limits to Growth* researchers, *Global 2000*, or the Worldwatch Institute. The Brundtland Commission in particular received input from literally thousands of individuals and organizations from around the world. Initiated at the request of the United Nations Secretary-General, it followed in the footsteps of two other highly respected U.N.-sponsored commissions, the Brandt Commission on North-South Issues and the Palme Commission on Security and Disarmament Issues. A more authoritative body to explore the topic would have been hard to find.

The Brundtland Report produced what is now the standard definition of sustainable development and wove together many current concerns and challenges,

including resource exploitation, wasteful energy use, urban decline, poverty, militarism, and the destruction of environmental systems. The Commission concluded that equity issues and other Third World concerns needed to be addressed, but did not put these as the central focus of its work, which remained centered on global environmental problems, population growth, and resource depletion. Although the Brundtland approach has been criticized for being anthropocentric as well as too accepting of existing economic systems and the concept of continual economic growth, it nevertheless helped give the concept of sustainable development respectability and inject it into mainstream conversations in a way that no other effort had been able to.

Major post-Brundtland contributors to the literature related to sustainable development have included U.S. Vice President Al Gore, whose 1990 book *Earth in the Balance* stresses the need to get the global environment on a stable footing although without dwelling on the concept of sustainability per se, the World Resources Institute, and beginning in the early 1990s the World Bank. These authors and institutions come to the topic of sustainability with scientific or public policy perspectives, and display a strong faith in the ability of science, policy and economics to deal with current global problems — a faith not shared by certain other groups.

Since its founding in 1982 the World Resources Institute has published a large number of reports providing scientific information about global resources, population, biological diversity, sustainable agriculture, climate change, energy, atmospheric pollution, transportation, and other subjects. Its senior economist, Robert Repetto, has been at the forefront of efforts to develop a new discipline of ecological economics, which attempts to address environmental problems by integrating them into an economic framework.

The World Bank — strongly criticized by many environmentalists for supporting environmentally destructive projects — has nevertheless developed a sizable program in Environmentally Sustainable Development (ESD) since 1992 under Vice President Ismail Serageldin, and has issued a large number of publications related to energy conservation, land use, urban development, environmental regulation, and sustainable development generally. The World Bank documents focusing most heavily on sustainable development include *Making Development Sustainable: From Concepts to Action* (1994), a report edited by Serageldin and Andrew Steer which takes a theoretical look at different perspectives on the relationship between sustainable development and international assistance efforts, *Valuing the Environment* (1993), also edited by Serageldin and Steer, which presents the proceedings of the Bank's First Annual International Conference on Environmentally Sustainable Development, and *Making Development Sustainable: The World Bank Group and the Environment* (1994), an extensive annual report on the Bank's environmental activities. The Bank's approach emphasizes resource, pollution, infrastructure, and environmental protection issues related to sustainability, rather than social justice issues.

The 1992 U.N. Conference on Environment and Development, otherwise known as the Earth Summit, produced a growing global consensus on the need for sustainable development, and codified many related principles in the long document known as Agenda 21 (Keating, 1993). In the mid-1990s many other international development agencies, including the U.S. Agency for International Development and various United Nations branches, are developing approaches to sustainable development. Meanwhile, grass-roots efforts to define visions of sustainability are underway in U.S. communities such as Seattle, Cambridge, Chattanooga, Olympia, Washington, and the San Francisco Bay Area.

B. Definitions

Many definitions for "sustainable development" have been proposed, none entirely satisfactory. The most commonly cited is that of the Brundtland Commission:

> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission, 1987)

This definition has been criticized on a number of grounds, in particular for being anthropocentric (expressing sustainability entirely in terms of human concerns, as opposed to the needs of other species, ecosystems, or the planet itself), and for raising the difficult-to-define concept of needs. Does one *need* a television set, a second car, or a car at all? Does one need clean air or wilderness? Such questions are hard to answer.

Another well-known definition is that given by the World Conservation Union in its 1991 report *Caring for the Earth*, which defines sustainable development as

> "improving the quality of human life while living within the carrying capacity of supporting ecosystems." (World Conservation Union, 1991)

This definition relies on the concept of "carrying capacity," which is extremely hard to define. However, its emphasis on quality of life is useful; within industrial cultures quality of life or quality of environment have frequently been eclipsed by a focus on the quantity of material goods a society produces. A new emphasis on these qualitative factors is important to the concept of sustainability.

In 1986 the International Union for the Conservation of Nature (IUCN) Conference on Conservation and Development, held in Ottawa, Canada, produced a somewhat more detailed definition emphasizing equity, social justice, and human needs. This gathering of several hundred scientists, politicians, industrialists and activists from 50 countries agreed on the following statement:

> "Sustainable development seeks ... to respond to five broad requirements: (1) integration of conservation and development, (2) satisfaction of basic human needs, (3) achievement of equity and social justice, (4) provision of social self-determination and cultural diversity, and (5) maintenance of ecological integrity." (in Blowers, 1993).

Another approach is simply to assert that sustainability means making things better instead of making them worse. In their book *Sustainable Development: Economics and Environment in the Third World*, David Pearce, Edward Barbier and Anil Markandya put this point in more technical language, defining "development" as "a vector of desirable social objectives...a list of attributes which society seeks to achieve or maximize" and "sustainable development" as "a situation in which the development vector D does not decrease over time" (Pearce, Barbier and Markandya, 1990). A similar approach is used by groups such as the Sustainable Seattle Coalition, which have developed "indicators of sustainability" that can be used to measure whether the social and natural environment of a particular region is improving over time (discussed further below).

The inverse of the approach taken by Pearce et al. is proposed by William Rees, who argues that sustainable development includes any form of change that does not make the current situation worse. Rees defines sustainable development as

> "any form of positive change which does not erode the ecological, social, or political systems upon which society is dependent." (Rees, 1988)

Many other definitions of sustainable development have been offered. Some of these are listed in Table 1. In general it is difficult to express such a complex concept in a brief sentence or phrase. However, anything longer quickly becomes complicated and formalistic. Either way, definitions often raise as many questions as they answer, and it is probably not worth spending too much time searching for the perfect formulation. Rather, it is more useful to look at core themes and values behind the concept, and then explore the implications of these.

Table 1: Some Definitions of Sustainable Development

Theme: Meeting the Needs of Future Generations
"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
— *Brundtland Commission (1987)*

Theme: Carrying Capacity of Ecosystems
Sustainable development means "improving the quality of human life while living within the carrying capacity of supporting ecosystems."
— *World Conservation Union (1991)*

Theme: Maintain Natural Capital
"Sustainability requires at least a constant stock of natural capital, construed as the set of all environmental assets."
— *David Pearce (1988)*

Theme: Maintenance and Improvement of Systems
"Sustainability...implies that the overall level of diversity and overall productivity of components and relations in systems are maintained or enhanced."
— *Richard Norgaard (1988)*

Theme: Not Making Things Worse
Sustainable development is "any form of positive change which does not erode the ecological, social, or political systems upon which society is dependent."
— *William Rees (1988)*

Theme: Meeting Both Human and Ecological Needs
"Sustainable development seeks...to respond to five broad requirements: (1) integration of conservation and development, (2) satisfaction of basic human needs, (3) achievement of equity and social justice, (4) provision of social self-determination and cultural diversity, and (5) maintenance of ecological integrity."
— *International Union for the Conservation of Nature (1986)*

Theme: Sustaining human livelihood
Sustainability is "the ability of a system to sustain the livelihood of the people who depend on that system for an indefinite period." —*Otto Soemarwoto (1991)*

Theme: Oppose exponential growth
"Sustainability is the fundamental root metaphor that can oppose the notion of continued exponential material growth." —*Ernest Callenbach (1992)*

Theme: Protecting and restoring the environment
"Sustainability equals conservation plus stewardship plus restoration."
—*Sim Van der Ryn (1994)*

C. Core Themes

A few basic beliefs are common to most writers on the subject of sustainable development. These may be summarized as follows:

1. ***A deep concern about environmental problems.*** As basic as this motivation is, it is also remarkably recent and should not be taken for granted. Widespread interest in the state of the natural environment is only a few decades old. Also new is the belief that current development patterns are leading to ecological and social problems on a global scale. In its simplest formulation, concern about global environmental problems is expressed as "this can't go on" or "this is unsustainable." For example, if human population, nonrenewable resource use, or greenhouse gas emissions continue to grow indefinitely, it is quite clear that disaster of one form or another will result.

In more complex, systems-oriented formulations, environmental and social problems are seen not so much as leading to specific disasters in specific time frames, but as contributing to an increasingly unstable and unhealthy global system, which could be plagued by any number of unpredictable catastrophes as well as by a generally increased level of suffering on the part of human beings and natural ecosystems. Either way — whether leading to straightforward Malthusian collapse or more complex and chaotic systemic decline — the environmental risks and costs of current development patterns are viewed as unacceptable by increasing numbers of participants in global development efforts. Hence the search for "sustainable" alternatives.

2. ***A view of the planet as a whole.*** A large part of the recent concern about global problems results from the "small planet" viewpoint that has become widespread in recent decades. Again, this perspective is remarkably new. By seeing the planet as a whole, finite system whose horizons are shrinking rapidly, people come to an intuitive

understanding of the need for stewardship of the planet. This perspective has been stimulated most directly since the 1960s by space exploration, which for the first time showed people the entire planet in a single photographic frame. However, global travel, telecommunications, cultural exchange, and other changes have also helped make the planet seem like a whole. It is hard to underemphasize the importance of this "small planet" understanding to the rising concern about global sustainability.

3. ***Holistic and systemic thinking.*** Advocates of sustainability generally recognize the need to move beyond narrow, single-issue approaches to consider instead the development of entire systems that are sustainable. This implies both a holistic look at any particular situation — seeing the links between different elements of the system — and an appreciation of the dynamic, evolving nature of the system over time. Since current problems are complex and systemic in nature, the logic goes, solutions need to be these things as well. Rather than viewing each problem in isolation from all others at a single point in time, moving towards sustainability requires a broad look at the entire context of the problem, its history and evolution, and then the development of new solutions based on this understanding. Such ways of thinking can be seen as stemming from the postmodern rejection of simplistic modernist beliefs in science, rationality, and objectivity.

At the most basic level, a holistic approach to sustainable development means coordinating traditionally disparate fields such as transportation and land use planning. At more sophisticated levels, it implies more complex and far-reaching approaches. For example, reducing air pollution might be seen not simply as a question of putting better pollution control devices on automobiles and factories, but a task of finding ways to alter a whole range of transportation, land use, urban design, and manufacturing practices as well as human lifestyles so as to reduce the generation of pollutants in more fundamental

and lasting ways, while at the same time improving the health of other aspects of human and natural systems.

Part of this new interest in holistic approaches to problem-solving stems from the science of ecology itself, which emphasizes the interrelationships between elements of an ecosystem rather than the existence of these elements in isolation, and the importance of paying attention to all aspects of the system at once. If ecology teaches us anything, it is that the components of our world are intimately linked. Sustainable development is therefore a field requiring a new level of interdisciplinary connection.

4. ***A search for a new balance between environment and economics.*** Though the "jobs vs. the environment" debate has received a great deal of media attention in the U.S. and elsewhere, it is increasingly clear that ways must be found to have both. It has also become obvious to many that existing economic systems do not adequately take into account needs for environmental and human well-being, and that some way must be found to better value these in the future, by reforming economics to more fully incorporate non-economic goods, by developing value frameworks other than economics to ensure that public goods are protected, or both. This tension between economics and the environment is in fact viewed by many as being at the heart of the sustainable development debate.

5. ***Agreement on the need for a long-term perspective.*** Sustainability implies patterns of development that will produce a socially and ecologically healthy world far into the future. This long-term viewpoint is sometimes seen as promoting "intergenerational equity" or "intergenerational solidarity". Many individuals have cited the Native American tradition of considering the effects of one's actions on the seventh generation. The current short-term focus of current economic and political decision-making is often seen as a serious problem.

These shared themes form a starting point for discussions of sustainable development. Other concepts are frequently cited as well, but do not play such a central role. The principles of thermodynamics are frequently referenced, for example, usually to argue that growth in human systems cannot go on indefinitely within a larger closed system (the Earth). This leads writers such as economist Herman Daly to call the concept of sustainable growth "a bad oxymoron". The idea of "natural capital" is also attractive to many, particularly economists; sustainability is seen as preserving the existing stock of natural capital, defined as the sum of environmental assets, in a particular place or in the world as a whole.

Finally, the notion of "carrying capacity" has wide appeal and seems to mesh well with the idea of global limits. However, the "carrying capacity" concept works better in ecological contexts than human ones, and indeed is almost unworkable for the latter. It is relatively easy to say that the "carrying capacity" of a given watershed is about 1,000 black-tailed deer, since the available food, water and shelter within that ecosystem are relatively constant within a certain range of normal fluctuation. It is much harder to say that the "carrying capacity" of a bioregion is 1,000,000 humans, since people can so extensively and creatively alter their environment, and can transport themselves and their materials between regions. Although the term keeps resurfacing, attempts to define sustainability in terms of human carrying capacity usually bog down quickly.

Concerns about sustainability represent a fundamental questioning of traditional notions of progress. Many environmentalists and others have come to focus on "growth" itself as the culprit behind many current problems, and to view sustainability as essentially an alternative philosophy. Thus *Ecotopia* author Ernest Callenbach comments that:

"Sustainability is the fundamental root metaphor that can oppose the notion of continued exponential material growth." (Callenbach, 1993)

However, there is no consensus on this viewpoint, and many continue to believe that the challenge is how to achieve sustainable economic growth with far lower environmental impact than currently.

D. Different Perspectives

Although writers on sustainable development do share many concerns in common, there are also large differences to their approaches to the subject. One main debate is between those who maintain a faith in technology and economic growth and those who don't. Technocratic approaches fit in well with the mainstream conservation movement in the North and with large agencies who are used to engaging in detailed scientific, economic and policy analysis. The aim is often seen as to achieve ecological goals by quantifying environmental impacts, regulating private industry more effectively, fine-tuning government policies, and adjusting market mechanisms.

In contrast, others believe that sustainability is fundamentally incompatible with current economic structures, attitudes, and lifestyles. For example Australian sociologist Ted Trainer believes that "a sustainable society must be based on non-affluent living standards, on highly self-sufficient and small-scale local economics, and on zero economic growth" (Trainer, 1986). Nothing short of a total transformation of economy, society and lifestyles, in other words, will be sufficient.

A second main division is between those who place the focus on ecological crises and those who emphasize social needs. "Deep ecologists" and mainstream environmentalists in the nations of the North tend to fall into the first camp, while social ecologists and Third World grassroots activists favor the latter. Third World activists

often see First World concern about the environment as a way to deny them the advantages of development that industrialized countries already enjoy. However, many individuals transcend this dichotomy, recognizing "the intimate connection between the ecological crisis and the broader issues of social and economic justice," as *Ecologist* co-editor Nicholas Hildyard puts it (in Norberg-Hodge and Goering, 1992).

A third area of confusion has to do with recent changes within ecological science itself, in particular the move away from the notion that ecological systems naturally reach a point of balance or harmony. Is sustainability to be a state of balance and steady-state harmony, as the traditional ecological theories of Eugene P. Odum and others imply? Or can sustainability co-exist with more recent notions that ecosystems are always changing and have no "natural" point of balance? This debate has real-world political implications. Assuming that sustainability requires a state of balance tends to give greater urgency to political efforts to reverse environmental and social degradation, while accepting notions of ever-shifting ecosystems is viewed by some as supporting more conservative policy approaches and reducing the sense of political urgency. Luckily, it is possible to argue that sustainability does not necessarily imply the creation of a steady-state economy or society. Many sorts of continued change are possible, so long as they do not harm the long-term viability of human and natural ecosystems. For example, patterns of human settlement might shift to develop certain sites while others are restored. Economies might change to reflect shifting social values and priorities. Technology itself could potentially evolve, as long as new forms do not lead to unsustainable practices. All of these changes could be possible within an overall framework of sustainability.

A final area of contention has to do with the extent to which indigenous peoples should be used as models of sustainability. On the one hand, many radical ecologists and social activists agree with the International Society for Ecology and Culture that "traditional societies are the only tested models of truly sustainable development" (ISEC,

in Norberg-Hodge and Goering, 1992). On the other hand, others dismiss this viewpoint as romanticism, and argue that indigenous peoples frequently behaved in unsustainable ways themselves. The Plains Indians, for example, reportedly stampeded large herds of buffalo off cliffs, and Paleolithic hunters may have caused mass extinctions. The truth probably contains both points of view. Indigenous cultures are highly varied and many may have engaged in practices that be labeled "unsustainable" in one way or another. Yet on the whole indigenous peoples seem to have lived with a respect and reverence for land and nature that industrial society would do well to learn from.

A good starting place for a deeper look at different perspectives on sustainable development is to examine four main groupings of writers on the subject: environmentalists, environmental economists, critics of current development efforts, and those whose principle interest is in the ethical, moral or spiritual dimensions of sustainable development. These four categories can in turn be broken down into a number of subgroups, though on the other hand it should be stressed that many writers combine more than one approach and may be seeing as belonging in more than one category. Table 2 below provides a general overview of how some commentators on topics related to sustainability may be viewed in relation to these groupings, with authors arranged in rough order of chronology.

Though useful for purposes of discussion, such a categorization should not be taken too literally. In practice, advocates of sustainable development often have complicated mixtures of interests and viewpoints. While it is important to be aware of certain common gathering points on the political terrain and certain common rifts between the parties, the debate over sustainability is a complex and multidimensional one that is rapidly evolving. New areas of unity or division are likely to emerge as the field matures, positions solidify and key issues get hashed out.

Table 2: Perspectives on Sustainable Development and Antecedents

Environmentalists	Environmental Economists	Critics of Development	Spiritual Ecologists/ Ethicists
Environmental concerns paramount; spectrum ranges from "environmental management" to "deep ecology"	*Economics as the focus and language of choice* *Emphasis on incorporating environmental concerns into an economic framework*	*Structural inequality, exploitation, and first world overconsumption as the primary concerns* *Emphasis on resisting GATT and the new world order, reclaiming the "commons" and local control over development*	*Focus on a trans-formation of values and mindsets; reconnection with the earth and each other*
Predecessors 19th Century Sustainable Forestry 20th Century Natural Resource Scientists Aldo Leopold Rachael Carson Barbara Ward Rene Dubos Donella Meadows 1960s-70s Environmental Movement *Recent Authors* Lester Brown/ Worldwatch Institute 1980 World Conservation Strategy Brundtland Report 1990 IUCN Report Al Gore World Resources Inst. 1992 Earth Summit President's Council on Sustainable Development	*Predecessors* John Stuart Mill Kenneth Boulding E.F. Schumacher Herman Daly *Ecological Economics* Robert Repetto Robert Costanza David Pearce Michael Redclift Kerry Turner Johan Holmberg *More Radical Approaches* William Rees Hazel Henderson Paul Hawken David Morris/Institute for Local Self-Reliance Richard Norgaard	*Predecessors* Marxist, Socialist, Anarchist critiques of capitalism *Social Ecologists* Murray Bookchin *Development Critics* Edward Goldsmith Nicholas Hildyard (*The Ecologist*) The Other Economic Summit Frances Moore Lappe Anti-GATT Activists *Third World Activists* Vandana Shiva Martin Khor O.P. Diwivedi W.M. Adams *Historians Criticizing Development* Carolyn Merchant L.S. Stavrianos Martin O'Connor	*Predecessors* Henry David Thoreau Teilhard de Chardin Gregory Bateson Paul Goodman Theodore Roszak Ivan Illich *New Age Writers Humanistic Psych.* Ervin Laszlo Fritjof Capra *Deep Ecologists* Arne Naess Bill Devall George Sessions *Green Politics Ecofeminists* Charlene Spretnak Petra Kelly Helena Norberg-Hodge *Spiritualists* Gary Snyder Thomas Berry Matthew Fox Thich Nat Hahn Dalai Lama

Note: These groupings are of course debatable and should not be taken to be rigid or absolute.

1. The Environmentalist Perspective

The first, and perhaps the dominant group of writings on the subject of sustainable development has been created by mainstream-to-progressive environmentalists concerned about issues of ecology, population, pollution and resource use. This camp has been particularly motivated in the 1970s, 1980s and 1990s by the growing attention given to global environmental issues such as the greenhouse effect, the destruction of the ozone layer, tropical deforestation, and the loss of species. It is represented by a large collection of non-governmental organizations, academics, and, increasingly, officials within governments and international development agencies.

Environmentalist writings related to sustainable development often have a strong sense of urgency, as the authors want to see change before the ozone layer disappears, the earth's climate changes irrevocably, or millions more species are lost. However, these writers tend to stress environmental and resource issues more heavily than equity issues, gender issues, structural inequality, or overconsumption. Nor do many environmentalist writers fundamentally challenge existing institutional structures or the concept of economic growth itself, although "deeper green" environmentalists head in this direction.

The more radical side of the environmentalist movement is represented by deep ecologists such as Arne Naess, George Sessions, and Bill Devall, bioregionalists such as Kirkpatrick Sale, Peter Berg and Gary Snyder, and ecofeminists such as Charlene Spretnak, Bella Abzug, Wangari Maathai, and Vandana Shiva.

Deep ecologists unite behind three main beliefs: that diversity of life forms is essential to healthy ecosystems, that present human interference with the non-human world is excessive and should be reduced, and that all life on Earth has inherent value

(e.g. Devall and Sessions, 1985). These individuals implicitly or explicitly challenge the anthropocentrism of mainstream environmentalist writers on sustainable development, calling instead for the Earth and its ecosystems to be the subject of primary concern ("Earth First!"). For example Naess, who first coined the term "deep ecology," criticizes the 1980 World Conservation Strategy of the International Union for the Conservation of Nature — one of the main early calls for sustainable development — by calling it "thoroughly anthropocentric in the sense that all its recommendations are justified exclusively in terms of their effects upon human health and basic well-being" (Naess, in Zimmerman et al., 1993).

Bioregionalists tend to focus on identification with particular ecological regions, which are often defined in terms of watersheds. Like deep ecologists they call for a vision of the future in which human beings are less numerous and their society more decentralized — steps which most mainstream environmentalists would not advocate. Kirkpatrick Sale, for example, suggests in his 1980 book *Human Scale* that the ideal size of human communities is no more than 50,000 (Sale, 1980). In this viewpoint, sustainability requires large reductions in the planet's human population and a radical restructuring of urban areas so that economic systems and human communities are grounded in the local region.

Meanwhile, ecofeminists call for changed relations between the sexes and relate male attitudes toward nature to male attitudes toward women. As writers such as Carolyn Merchant and Susan Griffin have pointed out, nature has often been perceived as female and treated accordingly by men (e.g. Merchant, 1976). Moving towards sustainability would then imply changing attitudes and behaviors on an interpersonal level as well as addressing overt global problems. Commentators such as Bella Abzug stress the direct role of women in managing daily use of natural resources in many parts of the world, and

see women's empowerment as "the central and powerful force in the search for equity between and among the peoples of the Earth and for a balance between them and the life-support systems that sustain us all" (Abzug, in Braidotti, et al., 1994).

These more radical philosophies tend to stem from fundamentally different worldviews than those of the average environmentalist, and strongly challenge existing economic, political, class and gender constructs. Many of these writers could just as easily fit into the third and fourth categories described below.

2. The Environmental Economist Perspective

A second main group of writings on sustainable development consists of economists who like many others are trying to reconcile the concepts of "ecology" and "economy," but do so primarily within an economic framework using economic language and tools. Such authors bring a decidedly different slant to their work, less concerned with impending environmental disaster and more with the question of how to modify markets, prices and institutions to meet environmental objectives. A spectrum of opinion exists between those who fundamentally challenge concepts such as growth and materialism, and those who believe that economic growth can be made sustainable. But most still write in the language of economics and display some faith in this discipline's ability to address current problems.

The idea that sustainable development involves fundamentally rethinking economics builds on work by economists such as Kenneth Boulding, who coined the term "spaceship earth" in 1966 and whose works include *The Meaning of the Twentieth Century* (1964), *Ecodynamics* (1978), and *Evolutionary Economics* (1981), and E.F. Schumacher, whose 1972 book *Small is Beautiful* has inspired a generation of

"appropriate technology" activists. Though well-known economists both of these authors argue that sustainability will come about due to the advent of new cultural values and perspectives — such as Schumacher's Buddhist economics — rather than economic initiatives.

Equally important has been Herman Daly, whose books include *Toward a Steady State Economy* (1972), *Steady-State Economics* (1977), and *For the Common Good* (with John Cobb, Jr.; 1993). Daly has been the strongest and most persistent critic of the notion that continued exponential economic growth is possible. Instead, economic systems that do not depend on continual growth in the production of goods and services must be developed. His 1993 book contains a proposal for a new Index of Sustainable Economic Welfare (ISEW), developed in large part by Clifford Cobb, which suggests replacing the concept of growth in production of goods and services (GNP) with growth in human and ecological well-being. Among its 22 components, this Index of Sustainable Economic Welfare includes measures such as income distribution, public expenditures on health and education, costs of urbanization, costs of pollution, depletion of nonrenewable resources, long-term environmental damage, and the value of unpaid household labor. Shifting to such an index would represent a wholesale shift in economic philosophy, effectively integrating "bottom line" concerns with a great many human and ecological values.

In recent years a more conservative approach has taken by a large and prolific contingent of English economists, including David Pearce, Michael Redclift, Timothy O'Riordan and Kerry Turner. Turner's anthology *Sustainable Environmental Management: Principles and Practice* (1988) and Redclift's book *Sustainable Development: Exploring the Contradictions* (1987) are among the leading discussions of how economics can be reformed to lead toward sustainability. These authors' sympathies lie with economics rather than environmentalism. Although they recognize that

environmental values can never be fully incorporated into economics, many seek to develop technocratic "environmental management" approaches to make development as sustainable as possible, basically building a more environmentally benign economy using new economic tools and practices.

David Pearce and his colleagues have issued a number of specific proposals for developing a sustainable industrial economy in their books which include *Blueprint for a Green Economy* (1989), *Blueprint 2: Greening the World Economy* (1991), and *Blueprint 3: Measuring Sustainable Development* (1993). For example, they suggest new methods of "discounting the future" — more fully including the future value of resources and services in current economic equations. They also discuss ways that the monetary value of environmental damage (such as air or water pollution) can be calculated, methods of "environmental accounting" whereby nations can keep track of their stocks, usage rates, and flows of natural resources, pricing mechanisms to reduce resource use, carbon taxes to reduce greenhouse gas emissions, applications of the "polluter pays principle" to reduce various forms of pollution, and elaborate methods of cost-benefit analysis and project appraisal.

In the U.S. similar efforts to marry ecology and economics have emerged, led by writers such as Robert Costanza, author of *Ecological Economics: The Science and Management of Sustainability* (1991), and Robert Repetto, author of *The Global Possible: Resources, Development, and the New Century* (1985). These approaches likewise assume that economics can in fact incorporate ecological values, and discusses how sustainability can be brought about through methods such as "proper resource pricing," "managing common resources," "demand management," "designing for efficiency," and "building management capability." Like many environmentalists, these economists omit discussion of global equity, structural inequality or overconsumption in

the developed world, and tend to assume that environmental problems can be managed within existing institutional and economic structures while sustainable growth is achieved.

A more skeptical approach is taken by William Rees and Mark Roseland of the University of British Columbia, in their article "Sustainable Communities: Planning for the 21st Century" (1991), following a line of argument initiated by Herman Daly and Nicholas Georgescu-Roegen. Rees and Roseland believe that neoclassical economics inappropriately chose a mechanical rather than a biological metaphor for economy, which led to a number of unfortunate results, including that society perceives the economy as an entity separate from the rest of reality, and that resource depletion is not taken into account within the economic logic. The answer in their view is to "restructure the relationship [between the economy and the ecosphere] more on physical reality than on economic abstraction." This means that in the end that humankind must "learn to live on the interest generated by our remaining stock of natural capital."

Berkeley economist Richard Norgaard takes a more radical view, maintaining that a broad transition of worldviews is underway in which habits of thought dating back to the Renaissance and traditional beliefs in progress are giving way to a "coevolutionary paradigm" in which values, organization, technology, and knowledge evolve in organic fashion. In writings such as "Sustainable Development: A Co-Evolutionary View" (1988) and *Development Betrayed* (1994), Norgaard seeks to reframe the current challenge as arriving at the sustainable "coevolution" of human and natural systems, and emphasizes this coevolutionary process rather than the attainment of any sustainable end-state. *Development Betrayed* presents a sweeping critique of the dominant traditions of liberal individualism, modernity, economics and science, and suggests a view of the

future as "an evolving patchwork quilt" of changing values and beliefs which presumably will lead towards sustainability.

Another strong critic of economics generally is Hazel Henderson, who in books such as *Creating Alternative Futures: The End of Economics* (1978), *Politics of the Solar Age* (1981), and *Paradigms in Progress: Life Beyond Economics* (1991) has labeled economics "a form of brain damage," and envisions the rise of an "information age" in which broader dissemination of information allows networks of citizens to cross-cut old power structures and develop "a new paradigm based on planetary awareness." This "information age" would no longer rely on economic logic and would feature many specific elements leading towards greater sustainability, such as extensive use of solar technologies, less materialistic lifestyles, new indicators of social health, greener products, and more socially responsible ways of doing business.

Instead of attacking economics or the business establishment, businessman Paul Hawken argues in *The Ecology of Commerce* (1993) that business is in fact the only force powerful enough to solve global environmental problems, and that it must be harnessed to do this through fundamental changes in economic philosophy. He calls for the elimination of the concept of waste from the industrial system, a change from an economy built on carbon-based forms of energy to one based on hydrogen and solar energy, and the creation of extensive systems of feedback and accountability — including a tax system based on "green taxes" and fees for resource use, as well as a reward system for long-term thinking — all of which can lead in his view towards a "restoration economy." This economy would not just refrain from polluting and abusing the Earth further, but would apply its energies toward improving the health of human and ecological systems.

3. Critics of Development

Critics of current patterns of global development constitute another main group of writers commenting on themes of sustainability. These individuals are not motivated primarily by environmentalism or a faith in economics, but by concerns about equity, poverty, exploitation, and the plight of disadvantaged groups and Third World nations. Many are influenced by Marxist, socialist and anarchist critiques of capitalist development. These writers tend to see traditional forms of development and traditional development agencies themselves as the problem. They frequently view structural inequality and First World overconsumption as the root causes of unsustainability, and would like to overhaul current economic and political frameworks. Many look upon First World concern about sustainability with suspicion, seeing it as an attempt by well-off white environmentalists to paternalize less developed nations.

A number of the environmentalists or economists previously cited, such as Norgaard, Boulding and Henderson, have strongly criticized traditional development practices. Other articulate critics of development policy include Edward Goldsmith and his colleagues at *The Ecologist* magazine in London. Since the early 1970s the latter group has unleashed a stream of influential publications on the subject, including *A Blueprint for Survival* (1972), *The Future of Progress: Reflections on Environment & Development* (1992), *Whose Common Future?: Reclaiming the Commons* (1993), and *The Way* (1994), as well as *The Ecologist* itself. These works strongly criticize mainstream sustainable development approaches such as that of the Brundtland Commission for ignoring ongoing patterns of exploitation, and argue that existing development policy primarily serves to open up Third World markets for western manufactured goods. The answer in Goldsmith's view is to return to a low energy, low

resource, low pollution society on a global level, and to develop a "biospheric ethic" arising from an ecological view of the world we live in, in which individualism, materialism, scientism, technologism, institutionalism and economism are de-emphasized.

Other writers on this theme (many of whom have worked with Goldsmith) include Vandana Shiva, Martin Khor, and Helena Norberg-Hodge. Shiva has been involved with the Chipko movement in India, in which villagers literally threw their bodies in front of loggers to save forests from destruction, and combines feminist, ecological, and Third World perspectives on sustainable development in works such as *Close to Home: Women Reconnect Ecology, Health and Development Worldwide* (1994). Khor is trained as a political economist and has been a leading activist in Malaysian consumer and environmental groups. A strong critic of the General Agreement on Tariffs and Trade (GATT), he calls for an alternative vision of development in which there is a redistribution of wealth, resources and income in the Third World, a reduction in the "irrationally high consumption levels" of the developed world, a progressive reduction in the unecological exploitation of resources, and the development of renewable resources and appropriate technologies. (Khor, in Goldsmith et al., 1992).

The need for an entirely new vision of development is stressed as well by Norberg-Hodge, who has extensively studied the Ladakh region of northern India. In works such as *Ancient Futures* (1990) and *The Future of Progress: Reflections on Environment & Development* (1992), an anthology edited with Peter Goering, she discusses the need to preserve traditional cultures and find alternatives to western-style development. A main theme of Norberg-Hodge's writing is the destruction of traditional cultural wisdom by "development," and the need to reclaim many aspects of this in order to develop more sustainable societies. This need is emphasized as well by Jerry Mander

in his book *In the Absence of the Sacred: The Future of Technology and the Survival of Indigenous Peoples* (1992). In this critique of technology, science, and development, Mander argues that technology is not a neutral force that can be used for good or bad, but instead tends to push society in directions that are unsustainable, in the process wiping out indigenous cultures whose value systems hold a much-needed alternative to current patterns of development. On a more theoretical and academic level, Manuel Castell's detailed analysis of the impact of technology on the new global order in *The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process* (1989) tends to support Mander by showing how technology is reinforcing the power of capital and business on a global level, in effect creating a new electronic dimension of space in which capital can operate freely, gaining leverage over people and societies, which are more place-bound.

Feminist critics of patriarchy offer a related critique of current patterns of development, seeing it as often representing a continuation and enhancement of male power and domination as Third World societies modernize. A number of feminist histories such as Marilyn French's *Beyond Power: On Women, Men and Morals* (1985), Elise Boulding's *The Underside of History* (1976), and Riane Eisler's *The Chalice and the Blade* (1988) set the stage by describing the evolution of hierarchical, power-oriented male social systems since prehistoric times. Meanwhile, writers such as Vandana Shiva and Filomina Chioma Steady, editor of the anthology *Women and Children First: Environment, Poverty, and Sustainable Development* (1993), argue that current efforts at sustainable development must focus heavily on the situation of women, since in many parts of the world women play the dominant role in the daily management of natural resources. Likewise, in their book *Women, the Environment and Sustainable Development: Towards a Theoretical Synthesis* (1994), Rosi Braidotti, Ewa Charkiewicz, Sabine Hausler, and Saskia Wieringa explore the 1980s shift from the "Women in

Development" (WID) notion, which focuses on the role of women within economic development processes, to the "Gender and Development" (GAD) concept, which involves more in-depth gender analysis and gender planning, and further to the "Women, Environment, and Sustainable Development" approach (WED), which acknowledges women's central role as environmental managers, their plight as those most severely impacted by past development priorities, and their potential to fundamentally redefine concepts of development in ways that are more inclusive, more ecological, and more equitable.

Criticisms of current development patterns are made as well by a broad collection of activist groups, many of whom participated during the early 1990s in The Other Economic Summit (TOES), a process which was organized as a shadow version of the GATT talks. Activist groups also spearheaded a "50 Years is Enough" campaign to commemorate the World Bank's golden anniversary. Non-governmental organizations are also involved in many actual demonstration projects of more sustainable development in the Third World, a number of which are chronicled in reports such as *Bankrolling Successes: A Portfolio of Sustainable Development Projects* (1988), issued by the Environmental Policy Institute and the National Wildlife Federation.

4. Spiritual/Ethical Approaches

A final diverse and influential group of authors has adopted an approach to global development issues which sees a transformation of values, paradigms and consciousness as necessary to bring about any lasting change, and emphasizes the need for a basic reconnection of people with the earth and with each other. This tradition builds on past influences such as Henry David Thoreau and Pierre Teilhard de Chardin who drew

attention to the need for people to nurture spiritual understandings of nature and evolution. During the past 30 or 40 years a concern for finding a deeper spiritual foundation to western culture — and a belief that this needs to be done if the culture is to survive — has been present in critiques by a wide variety of writers including E.F. Schumacher, Paul Goodman, Ivan Illich, Herbert Marcuse, Kenneth and Elise Boulding, David Riesman, Ashley Montagu, Phillip Slater, Marilyn French, Riane Eisler, Fritjof Capra, and Theodore Roszak. It has been present as well in the thought of many well-known figures such as Gandhi, Einstein, Schweitzer and Martin Luther King, Jr.

Though they may at first glance seem far removed from the "practical" questions of development, spiritual perspectives converge with approaches taken by many environmental activists and advocates of sustainable development who feel that a fundamental reordering of human values and understandings of the world is in order. On a personal level many writers on topics related to sustainability have had a strong background in spiritual concerns. Economist Kenneth Boulding was a dedicated Quaker, while Buddhist views have influenced writers ranging from E.F. Schumacher to Donella Meadows. Bioregionalist Gary Snyder has a deep grounding in Zen and other eastern traditions, while Thomas Berry is a Catholic monk. Buddhist leaders such as the Dalai Lama and Thich Nat Hahn, like these others, have increasingly come to see the need to heal the Earth as inseparable from the need to heal human societies and the human spirit.

Sustainable development tends to be seen as part of a much broader change in human consciousness by such individuals, and so the subject is not always addressed directly. However, sustainability is definitely part of the agenda, and current unsustainable global patterns are seen as much of the impetus for bringing about change. These patterns are often viewed as being caused by a mechanistic, Cartesian world view that has been dominant in industrial society since at least the eighteenth century, leading

people to view the natural world and other humans as resources to be exploited rather than as parts of a single interrelated ecology. The alternative is seen as the adoption of a holistic, ecological world view which acknowledges the fundamental interdependence and interconnection of all things, affirms life in all its forms, and seeks to improve the health of whole systems rather than individual parts.

Fritjof Capra's 1982 book *The Turning Point: Science, Society and the Rising Culture* offers a good overview of the "paradigm shift" perspective. Capra believes that current problems

> derive from the fact that we are trying to apply the concepts of an outdated world view — the mechanistic world view of Cartesian-Newtonian science — to a reality that can no longer be understood in terms of these concepts. We live today in a globally interconnected world, in which biological, psychological, social and environmental phenomena are all interdependent. To describe this world appropriately we need an ecological perspective which the Cartesian world view does not offer. (Capra, 1982)

He goes on to explain how this shift in viewpoint plays out in fields such as physics, biology, medicine, psychology, and economics. Capra's 1984 volume (with Charlene Spretnak) *Green Politics: The Global Promise* examines how such a new world view might enter the political realm, in this case by considering the example of the West German Green Party. Spretnak's book *The Spiritual Dimension of Green Politics* (1986) also describes this link between ecological consciousness, spirituality and politics. E.F. Shumacher's call for a Buddhist economics in *Small is Beautiful* (1973) represents an integration of spirituality with economics and ecology, as do several of Theodore Roszak's works, including *Person/Planet: The Creative Disintegration of Industrial Society* (1978) and *Ecopsychology* (1995), with an added emphasis on the psychological growth and evolution of the individual. Most movingly, the Dalai Lama issues a call for

compassion and awareness to be brought to bear on the global situation in his public statements and writings such as *Kindness, Clarity, and Insight* (1984). In the view of many such individuals, only a focus on spiritual values — not economic or worldly ones — can solve world's problems, and, by implication, lead to a sustainable future.

E. Assessment

Is any particular perspective on sustainability more appropriate than the others? Does the search for sustainability lead inevitably in certain directions, for example toward a sweeping critique of past development patterns, an indictment of capitalism, or a belief in the need for a new moral or spiritual grounding to modern culture?

There are no easy answers to such questions. Certainly there are the common themes discussed earlier behind many discussions of sustainability — concerns with environmental problems, with the need for holistic and interdisciplinary solutions, with balancing economics and the environment, and with the long-term perspective. Beyond this, sustainable development by definition implies at least a partial rejection of past patterns of development and the values that underlie them. New approaches are clearly required; however, many of the above writers differ on the urgency of the challenge, its root causes, and the tools needed to address it.

Certainly a number of different strategies can be tried at the same time. Some individuals will want to focus on developing an ecological economics, which will be useful because markets and capitalism are not going to go away, and can potentially be reformed to better include the environment and the needs of people. Others can focus on environmental education, or gender and development, or the task of better articulating new attitudes toward the earth. Such strategies are not mutually exclusive. Indeed, what

would seem to fit best with the basic ecological metaphor underlying efforts at sustainability is a synthetic, holistic approach, which though it may choose tactically to focus on one area or another, using one technical language or another, seeks at the same time to develop awareness of the interconnections between issues and disciplines, and a passionate connection with the situations of people and ecosystems.

Beyond this starting point, a look at the historical development of environmental problems indicates that minor revisions to current economic systems or development practices are unlikely by themselves to bring about sustainability. Current social patterns need fundamental revision if they are to be sustainable in the long run. At times reforms and compromises may be necessary, but what seems most needed at the moment is a sense of long-term vision concerning how the well-being of people and the earth can be truly valued within economic and political contexts.

It also seems clear that a different world view is needed in the long run, in particular one that gives priority to values other than economic progress, the well-being of humans and ecosystems for example. Basically, instead of human and ecological values being placed within an economic framework, economic values should be seen as subservient to the values of human society, which in turn is a subset of that overall planetary ecology which might best be referred to as "the web of life." From this viewpoint, people, other species and ecosystems have value in their own right, not as resources to the economic system. The goal is to maximize the well-being of the whole ecological framework, including human society, not to stimulate the performance of the economic system alone with little reference to the well-being of people or the planet. This transformation of world views is illustrated graphically in Figure 1.

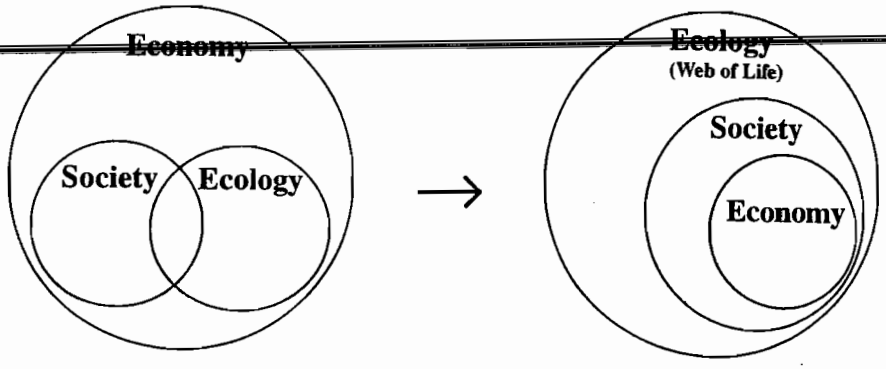


Figure 1: Economic vs. Ecological Frameworks

To put this debate another way, it is possible to distinguish between relatively "strong" and "weak" versions of sustainability. (My definition of these terms is somewhat different than that used by Daly and Cobb, who employ the terms in a technical economic sense to refer to approaches that do or don't preserve the existing stock of "natural capital".)

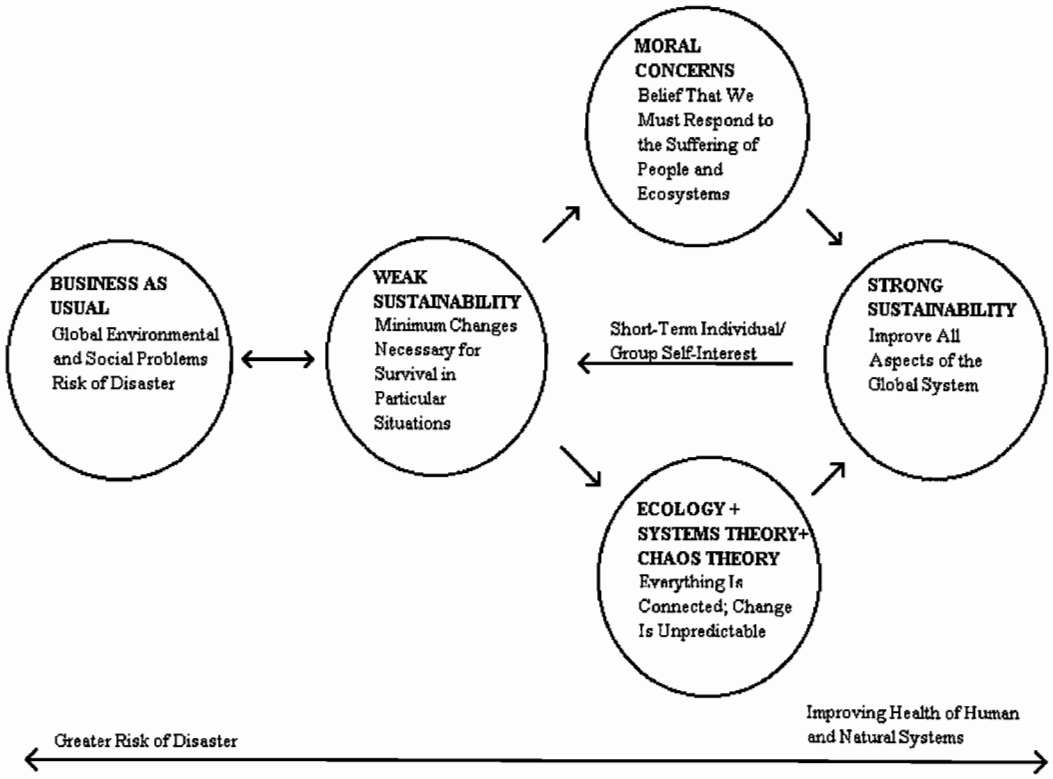
"Weak" approaches to sustainability seek to do the minimum necessary to make particular situations more sustainable, without trying to reform entire systems. Compared with "strong" approaches, their philosophy is less holistic, less long-term, and driven more by pragmatic than moral concerns. If air pollution is a problem, then a weak approach might be to simply regulate tailpipe emissions on automobiles, factory emissions, and other point sources of pollution. Such efforts are good in that they lower pollution, but they do so while maintaining existing lifestyles and ways of doing business more or less unchanged.

In contrast, a strong approach to sustainablity would require looking at how to change the underlying system in order to solve not just this problem but others as well.

In addition to putting emissions control equipment on cars, it would seek to reduce driving overall, thus improving congestion, quality of life, and the fabric of the urban environment (by requiring fewer roads and parking lots, and making more pedestrian-oriented communities possible). In addition to controlling factory smokestack emissions, it would look at what those factories were making, whether these things were needed, and whether more ecological substitutes were available. "Strong" approaches to sustainability tend to be similar to those taken by deep ecologists and other groups who question the fundamental nature of "development" in the world, while "weak" approaches are often found among the more pragmatic policy-makers and economists who seek to solve problems within current systems.

The dynamic between "strong" and "weak" forms of sustainability is shown in Figure 2. In this diagram, the need for particular individuals and groups to survive in the long term can be seen as leading from "business as usual" (i.e. relatively unfettered self-interest) to "weak sustainability" (i.e. a situation in which the minimum changes are made to survive particular threats). Beyond the "weak sustainability" position, two paths lead to a stronger stance. The paths can be combined, although either alone is sufficient if rigorously followed. First, a rational understanding of ecological theory and systems theory shows the ways in which everything is connected. For example, all components

Figure 2: Sustainable Development — Strong vs. Weak Approaches



of a natural ecosystem (soils, hydrology, vegetation, animal life, etc.) are in various ways dependent on one another. Applied to the global system, this means that all aspects of the system must be improved in order to improve all others. The tropical rainforest must be preserved in order to maintain the climate in Alaska; the poverty of villagers in Brazil must be addressed so that they do not feel compelled to chop down and sell trees in which songbirds nest that in turn eat insects that destroy crops in North America. Thus, purely on this rational, analytical understanding of how things fit together — often in unforseeable ways — an individual is likely to seek strong approaches toward bringing about global sustainability. This line of reasoning is similar to that used by Immanuel Kant and John Rawls to justify moral action in general (Kant, 1788; Rawls, 1971).

Rawls' version is perhaps the strongest and most progressive, in that it argues that the good of all parts of a system can be best enhanced by focusing on the least well-off part of it, which in the case of human societies means focusing especially on the situation of the poor and disempowered.

On the other hand a moral/spiritual/intuitionist approach leads in similar directions, toward strong sustainability. This path might be termed the Buddhist approach, since that religion focuses most specifically on a compassionate response to the sufferings of people and ecosystems, and on efforts to alleviate that suffering. However, similar perspectives can be found in other spiritual traditions as well. Basically, one feels motivated by feelings of empathy as well as an intuitive understanding of the plight of other people and parts of the ecosystem to work towards the most far-reaching forms of sustainability as a way to heal the planet and reduce suffering. This is a heart-felt approach quite different from the rational analysis of western philosophy. But in this case head and heart both can argue for a "strong" approach to sustainability.

Countering these influences leading toward stronger forms of sustainable development are the well-known calls of self-interest. The automaker will adopt pollution controls (a weak sustainability approach, often necessary to comply with regulation) but will not seek to reduce the number of automobiles in the world (a stronger step towards sustainability), since money is to be made by selling them (self-interest). The politician will not challenge the automaker, since his or her election may be at stake and workers' jobs or campaign contributions might be at stake. Real life situations are always complex, but the basic motivations often boil down to simple ones such as these. In such cases short-term self-interest tends to lead away from a position of strong sustainability back towards business as usual.

To conclude, a great many approaches and strategies will be needed to bring sustainability about, and they can be used in different combinations at different times to achieve the maximum effect. It is important to try to take strong action, to always work to set the stage for strong action, and not to let weak actions take the place of strong. However, less far-reaching steps have their place at times too. To finish the previous example, air pollution can be reduced through a variety of weak steps — emissions controls, reductions in car use, taxes on engine size or fuel consumption, price hikes on petroleum, and so forth — and also by strong steps involving changes in lifestyles and the basic arrangement of the landscape that drastically reduce driving and resource use. Various mixtures of these can be employed wherever and whenever possible, preferably containing the strongest measures possible at any given moment, and seeking ways to prepare the ground for even stronger actions in the future. Seen in this way, moving toward sustainable development does not involve rigid adherence to an ideology or preset path, but rather a constant, creative search for better ways of doing things.

II. PERSPECTIVES ON SUSTAINABLE *URBAN* DEVELOPMENT

As of yet there has been relatively little written on sustainable urban development per se (Mitlin, 1992). There is recognition by many parties that sustainability requires a broader look at urban development patterns in both industrialized nations and the Third World, but this new approach is still emerging, and efforts to put such alternative models of urban development into practice face difficulties because current patterns and ideologies are so entrenched.

Still, a growing number of writers are considering how the concept of sustainability affects architecture, building construction, transportation, urban design, and the restoration of natural areas. And a number of past planning traditions — for example the Garden City movement — relate directly to current considerations of urban sustainability. In this section I will look at some of these traditions, before proposing a further framework for sustainable urban development.

For the purposes of discussion I will divide the literature on urban sustainability into four general categories: garden city planners, environmentalists, ecological designers, and visionaries or utopians. The garden city viewpoint is primarily interested in large-scale urban design, and has been influential since the late nineteenth century. It currently finds expression in the work of "new urbanist" planners such as Peter Calthorpe, Andres Duany, and Elizabeth Plater-Zyberk. Meanwhile, environmentalists have focused on cleaning up urban environments, reducing energy use, preventing pollution, and so forth using a range of economic, legal and policy tools. The emphasis here is often on policy, law, regulation and economics rather than design. In contrast, ecological designers focus on innovative designs that are usually limited to a particular building or

site. The work of these architects, landscape architects, builders and designers generally takes place at a much smaller scale than the garden city planners, and makes more overt use of ecological features such as solar power, passive solar design, and biological wastewater treatment. Lastly, a large and diverse group of individuals can be considered utopian planners or visionaries in that they try to assemble in synthetic fashion the whole picture of what ecologically and socially healthy cities would look like. This group includes such diverse figures as Lewis Mumford, Paolo Soleri, Christopher Alexander, and Dolores Hayden.

Table 3 provides a rough breakdown of some of the main figures in these progressive planning traditions:

Table 3. Perspectives on Sustainable Urban Development, A Rough Categorization

Garden City Planners/ New Urbanists	Environmentalists	Ecological Designers	Utopians/Visionaries
Essentially improved versions of suburbia, green and highly livable; large scale communities, often designed around transit; some emphasis on regional planning	*Focus on cleaning up the urban environment and using resources wisely; less on design and social issues; main tools are policy, law, regulation and organizing. Some writers take a more holistic approach than others*	*Focus on "green" design of particular buildings and sites; often using innovative and holistic approaches* *Interested in environment-friendly materials, passive solar design, biological wastewater treatment, etc.*	*Comprehensive visions of healthy community which incorporate social and spiritual aspects as well as design; a complete rethinking of urban form and content* *Classic Utopians*: Thomas Moore Thomas Campenella Edward Bellamy etc. Patrick Geddes
Garden City Planners Ebenezer Howard Raymond Unwin Barry Parker Clarence Stein Clarence Perry	*Late 19th century health and sanitation reformers* *City Beautiful Movement*		Lewis Mumford Paul Goodman Jane Jacobs Paolo Soleri
Michael & Judy Corbett	*Greenbelt Movement*		Dolores Hayden Christopher Alexander Kevin Lynch
Transit-Oriented Development/ The New Urbanism Peter Calthorpe Andres Duany Eliz. Plater-Zyberk	*Mainstream Environmentalism from 1960s on* David Morris Tim Elkin et al. Amory Lovins Worldwatch Institute World Resources Institute	*Landscape Designers* Ian McHarg Michael Hough John Tillman Lyle John Todd *Ecological Architects* Sim Van der Ryn William McDonough Brenda and Robert Vale *Healthy Building Movement*	*Eco-city Activists* Ernest Callenbach Richard Register Paul Downton *Auto-Free Cities Groups* *Environmental Justice* Carl Anthony *Bioregionalists* Peter Berg Gary Snyder Kirkpatrick Sale

A. Garden City Planners/New Urbanists

The garden city movement is one of the classic urban planning traditions behind many current efforts at urban sustainability. Beginning with the publication of Ebenezer Howard's *Garden Cities of Tomorrow* in 1898 as a reaction to the crowded, polluted, unhcalthy cities of the industrial revolution, this philosophy has sought to preserve open space around cities, create greener, pleasanter communities, and provide light, air and garden space to residents.

Garden city ideas have directly influenccd scores of British new towns and a number of American communities. Leading practitioners of this tradition have included British architects Raymond Unwin and Barry Parker, creators of Letchworth and Hampstead garden cities, and Clarence Stein and Clarence Perry in the U.S., designers of Sunnyside and Radburn. Garden city themes influenced the writings of Lewis Mumford, and have been important on the European continent and elsewhere. More recently, a number of contemporary garden city communities have been designed by new urbanist planners such as Peter Calthorpe, Andres Duany and Elizabeth Plater-Zyberk, whose projects and ideas are summarized in works such as Calthorpe's *The Next American Metropolis* (1993), Peter Katz's *The New Urbanism* (1993), and Judy Corbett and Steve Weissman's *Land Use Strategies for More Livable Places* (1992). Calthorpe's Laguna West south of Sacramento, California and Duany/Plater-Zyberk's Seaside on the Florida Panhandle and Kentlands in Montgomery County outside of Washington, D.C. are two of the best-known examples of this contemporary garden city tradition.

Rather than creating highly urban landscapes, the garden city approach historically produced something more like a "green suburb," and its current new urbanist incarnation is no different. The aim seems to be to create relatively compact, mixed-use,

and transit-oriented versions of traditional suburban towns. This perspective emphasizes improved design of regions, towns and neighborhood centers, relying heavily on proven forms. The small town of the nineteenth century is frequently held up as an ideal, and Duany and Plater-Zyberk have consciously labeled their own work "neo-traditional." The "sustainable" aspects of such development result from somewhat higher density, lower automobile usage, greater preservation of open space, potential integration of garden space with dwellings, and greater opportunities for community development. The current new urbanist incarnation is perhaps strongest in its visions of transit-oriented regional planning and infill development, which Calthorpe's writing in particular has helped popularize (see Calthorpe, 1993).

B. Environmentalists

Often allied with garden city planners have been environmental movements to clean up urban air, land and water, improve health and sanitation, preserve open space outside the city, and use resources wisely. The word "environment" here refers not just to natural environments, but to many specific elements of the human environment as well, such as the quality of urban air and water, the amount of green space, the volume of traffic, and the quality of human experience in urban spaces, all of which have been centers of concern.

Nineteenth century health and sanitation reformers, the late nineteenth century City Beautiful Movement, and twentieth century efforts to establish parks and open space around cities can all be seen as environmentalist in character, in that they all seek to improve the quality of the urban environment. Beginning in the 1960s new topics have received increasing attention from urban environmentalists. Freedom from toxic

chemicals, energy conservation, the recycling of materials, reductions in automobile use, bicycle planning, and (at times) equity and social justice have become priorities.

The popular literature has reflected this range of urban environmental interests. Among these writers have been Amory Lovins, whose books promoting alternative energy and reduced resource use include *Soft Energy Paths: Toward a Durable Peace* (1977); David Morris, whose writings on local self-reliance and energy conservation include *Self-Reliant Cities: Energy and the Transformation of Urban America* (1982); William Whyte, noted for works on land use and the humanistic design of public spaces such as *The Last Landscape* (1968); and Jane Jacobs, whose analysis of urban spaces and plea to save dense, fine-grained older central city areas from redevelopment in *The Death and Life of Great American Cities* (1961) have inspired a great many urban activists. Sweeping critiques of the current urban and suburban environment have also appeared from time to time, such as James Howard Kunstler's *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape* (1993).

Lewis Mumford's many writings between 1922 and the late 1960s were perhaps the most influential of all, systematically examining ways to improve many aspects of the urban environment. In books such as *The City in History* (1961) and *The Urban Prospect* (1968), Mumford sees the city ideally as an organic community, designed at a human scale, oriented towards human needs, fueled by a life-enhancing economy, surrounded by undeveloped lands, and with streets filled with people instead of automobiles. Mumford will be discussed further in the section below on visionaries, but whatever his influence as a visionary, he was above all a superb critic of existing urban environments.

More recently, one of the most prolific publishers on urban environmental topics has been the Worldwatch Institute. Among these Worldwatch Papers are *Shaping Cities:*

The Environmental and Human Dimensions (1991) and *Alternatives to the Automobile: Transport for Livable Cities* (1990), both by Marcia D. Lowe; *The Future of Urbanization: Facing the Ecological and Economic Constraints* (1987), by Lester R. Brown and Jodi L. Jacobson; and *Jobs in a Sustainable Economy* (1991), by Michael Renner. In such publications, Worldwatch paints a picture of cities that are far less automobile dependent, less consumptive of resources, much better at recycling and reuse, and better able to meet human needs. The group has developed a style that is authoritative, extensively researched and footnoted, and also visionary.

Since the late 1980s, a great many popular materials have been written on the need to improve the livability and sustainability of urban environments by planning for pedestrians, bicycles, and public transit rather than automobiles. Examples include David Engwicht's book *Reclaiming Our Cities & Towns: Better Living With Less Traffic* (1993), Wolfgang Zuckerman's *End of the Road: The World Car Crisis and How We Can Solve It* (1991), Deborah Gordon's *Steering a New Course: Transportation, Energy and the Environment* (1991), and Steve Nadis and James J. MacKenzie's *Car Trouble* (1993). In addition, "auto-free" activist groups have sprung up in cities such as New York, Toronto, Washington, D.C. and the San Francisco Bay Area. As traffic worsens and the negative impacts of automobiles on the urban environment become clear to more people, this literature is likely to expand further.

A small but growing number of publications try to weave ecological city ideas together for a general audience. These including Mark Roseland's *Toward Sustainable Communities: A Resource Book for Municipal and Local Governments* (1992); the Town and Country Planning Society's *Planning for a Sustainable Environment* (1993, Andrew Blowers, ed.); Tim Elkins and Duncan McLaren's *Reviving the City* (1992); Marcia Nozick's *No Place Like Home: Building Sustainable Communities* (1992); Urban

Ecology's *Report of the First International Ecological Cities Conference* (1990); and the proceedings of the 1991 Los Angeles Ecocity Conference, edited by Bob Walter, Lois Arkin and Richard Crenshaw, entitled *Sustainable City Development: Concepts and Strategies for Eco-City Development* (1992). In addition, the San Francisco-based Global Cities Project has since 1991 been preparing an ambitious series of reports aimed at planning professionals, entitled *Building Sustainable Communities: An Environmental Guide for Local Government*, covering topics such as water conservation, solid waste, toxics, transportation, energy, land use, air quality, urban forestry, open space, water quality and environmental management. A more academic look at the sustainability of Third World Cities is provided by *Sustainable Cities: Urbanization and the Environment in International Perspective* (1992), edited by Richard Stren, Rodney White, and Joseph Whitney. The picture that emerges from such publications is one of cities that are far less automobile dependent, less consumptive of land and resources, much better at recycling and reuse, and better able to meet human needs.

A main criticism of environmentalists generally has been that they pay more attention to the "natural" environment than the social one — saving the whales but ignoring problems closer at hand. In the case of urban environmentalists, many social justice activists feel that the main concern has been to save the greenbelt, clean the air, or beautify downtown spaces without dealing with underlying political, economic and social issues. American environmental groups have been criticized along this line by the emerging "environmental justice" movement, whose perspectives are summarized in an anthology edited by Richard Hofrichter, entitled *Toxic Struggles: The Theory and Practice of Environmental Justice* (1993). Although a number of the above writers (Mumford and Morris for example) do integrate environmental and social themes, this is an area which is likely to be of increasing concern.

C. Ecological Designers

A related group of individuals, often architects, landscape architects or urban designers, has focused more specifically on how to develop "sustainable" designs for particular buildings, sites, or areas. Although the number of actual built projects has been severely limited by the market, their ideas have become increasingly influential in more mainstream architecture and site planning, and have influenced current concepts of sustainability.

Ian McHarg's *Design With Nature* (1969) was an influential early work in this field, and popularized the method of producing overlays of various natural factors to assist in site design. Michael Hough's *City Form and Natural Process* (1984) continued in a similar vein, looking systematically at the interaction between cities and climate, water, vegetation, wildlife, and agriculture. Hough called for a new vision of "urban ecology" weaving together the social and ecological landscape, and an "alternative design language" heavily based on natural factors. More recently, Robert Thayer, Jr.'s *Gray World, Green Heart* (1994) looks at the contemporary landscape and seeks to describe a three-way tension between topophilia (love of the land), technophilia (love of technology), and technophobia (fear and remorse over the negative effects of technology). Sustainability in his view lies in reawakening the "green heart" and learning to apply it to the ways that we treat the landscape.

Former California State Architect Sim Van der Ryn has been a strong advocate of ecological design since the 1970s, and co-authored the books *Sustainable Communities* with Peter Calthorpe in 1984 and *Ecological Design* with Stuart Cowan in 1996. His Bateson State Office Building in Sacramento is a model of an energy-efficient building designed to make maximum use of solar heating in the winter and natural cooling in the

summer, and the Integral Urban House was a visionary attempt at ecological residential living in the late 1970s.

British architects Brenda and Robert Vale have published several influential works on ecological design, including *Green Architecture: Design for an Energy-Conscious Future* (1991). Their focus is on architecture per se, rather than site planning, and specifically on architecture that uses energy and materials in an ecological manner. In the U.S., John and Nancy Todd and John Tillman Lyle have conducted adventurous eco-architectural experiments; the Todds' books include *Bioshelters, Ocean Arks, City Farming: Ecology as the Basis of Design* (1984) and *From Eco-cities to Living Machines: Principles for Ecological Design* (1994), while Lyle has recently published *Regenerative Design for Sustainable Development* (1994), a book that emphasizes how sustainable development relies on the interaction of numerous systems working in harmony with one another. Specific topics covered include solar design, water conservation, waste assimilation, and building construction. Lyle has pioneered a 16-acre Center for Regenerative Studies at the California State Polytechnic University in Pomona, intended to illustrate many of these concepts. William McDonough, an architect and dean of the school of architecture at the University of Virginia, has also been an articulate spokesperson for sustainable design, and his Hannover Principles for Sustainable Development have been widely circulated within design communities (see Appendix B).

On the level of construction and materials, a sizable "Healthy Building" movement is underway, focusing on ways to design and construct buildings that integrate air, sun, water and plants into the architecture, and that reduce use of potentially hazardous materials such as carpets that outgas harmful chemicals and fiberboard that emits formaldehyde. Such efforts add an important element to the overall picture of

urban sustainability. However, without attention to the broader context it is difficult to call any building "sustainable," no matter how well designed. McDonough, for example, has been much criticized for designing a "green" Wal-Mart store in Kansas, when many see Wal-Mart as inherently unecological due to its tendencies to encourage driving, promote suburban sprawl, and undermine the economy of traditional downtowns.

D. Utopians/Visionaries

The most sweeping visions of sustainable cities — though not always called such — have been developed by a small number of utopian writers who tend to be more interested in the overall ecology of the urban system than in any of its individual components. These visions go much beyond the relatively traditional designs of garden city planners to fundamentally reconceptualize the ways that cities and towns are built. The politics and economics of land development and urban planning being what they are, utopian urban visions have generally remained unbuilt.

The traditional utopian literature, including Thomas More's original *Utopia* (1516) necessarily contains images of ideal cities and towns. Ecological factors tend not to be stressed until recent times, but nevertheless some of these utopias include elements sought by current ecocity activists. More, for example, describes a city of pleasant three-story dwellings receiving plenty of light, with well-tended gardens producing a high degree of local self-sufficiency. Buildings are preserved and cared for, open land is rarely built on, and the society is characterized by a high degree of equality and cooperation.

Modern approaches to visionary planning probably start with Patrick Geddes, the influential advocate of a regional planning that systematically analyzes the ecological features of a region and designs accordingly. Not much a writer himself, Geddes' ideas

were popularized and expanded by Lewis Mumford in such works as *The Culture of Cities* (1938), *The Highway and the City* (1964), and *The Urban Prospect* (1968). In *Technics and Civilization* (1934), Mumford steps back to present a more general view of the development of civilization which prefigures many current criticisms of technology and economics, and which implicitly points out the need for more sustainable alternatives.

Paul and Percival Goodman present a similar call for more humanistic and presumably sustainable forms of city development in *Communitas: Means of Livelihood and Ways of Life* (1947), in which they argue that cities should be designed on a humanistic and ecological scale to help people have constructive, meaningful lives and to integrate work, love and knowledge. In the 1970s Ernest Callenbach took this model farther and added more ecological elements to develop a detailed picture of a sustainable society in *Ecotopia* (1975) and *Ecotopia Emerging* (1981). Despite their popularized style these latter works offer one of the best images yet of a humane and ecological culture.

The ecological visionary tradition has been added to in recent years by Richard Register, whose book *Ecocity Berkeley: Building Cities for a Healthy Future* (1987) goes beyond most other writings to suggest how a built-out, gridded American city (in this case Berkeley, California) can be literally reshaped into a collection of urban villages surrounded by restored natural areas. Register sets forth basic principles of ecocity building ("life, beauty, equity") and discusses design strategies for attaining them. Register's Australian colleague Paul Downton has visually portrayed such ecological communities in great detail, and has received planning approval from the city of Adelaide to begin construction of a prototype in the center of that city.

Feminist writers have developed a number of visions of ideal cities, often focusing on humanizing the urban environment and making communities work for women, children, and old people. Examples can be found in Dolores Hayden's *Redesigning the American Dream: The Future of Housing, Work, and Family Life* (1984), and her article "What Would the Non-Sexist City Be Like?" (in Stimpson, 1980), as well as in Clare Cooper Marcus and Wendy Sarkissian's book of design guidelines, *Housing As If People Mattered* (1986). These feminist visions fit closely with those of other advocates of urban sustainability, in that they promote a human environment that works better for a wide range of people, and tend to favor greener, safer, more pedestrian-oriented, and more community-oriented neighborhoods.

On a more theoretical level, Kevin Lynch offers his own version of a utopian urban region at the end of *A Theory of Good City Form* (1981). Though not focused on urban sustainability per se, this volume provides one of the best overviews of historical theories of urban form and design. Lynch includes extensive discussion of ideal values underlying good city form, which are fairly similar to those of sustainable city activists though with less of an ecological emphasis, and describes his own personal utopian urban form, which is basically a patchwork of urban communities separated by well-defined green space.

A somewhat different theoretical approach is provided by Christopher Alexander, in works such as *A Pattern Language: Towns, Buildings, Construction* (1977), *The Timeless Way of Building* (1979), and *A New Theory of Urban Design* (1987). These writings present a vision of communities which emphasizes wholeness, life and integration, and which is based on the organic evolution of a great many "patterns" which fit together. Some of these patterns address environmental problems directly, such as those calling for preserving the countryside and developing a "web of public

transportation," while many others are concerned with promoting a healthy social ecology. Taken as a whole, this design-oriented language is perhaps the most sweeping attempt to date to envision a healthy and sustainable urban ecology.

III. TOWARD A FRAMEWORK FOR SUSTAINABLE URBAN DEVELOPMENT

In this final section, I will propose a framework for applying the concept of sustainability to the development of cities and urban regions. I will first present a more specific definition of sustainable urban development, next discuss values and key themes that follow from this, then consider tools to measure progress towards urban sustainability, and finally address policies, programs and designs that can help implement sustainable urban development in a number of key areas. Needless to say, this analysis is only a framework; each of these topics could be explored at much greater length. Yet since we are still in the very early stages of addressing how cities, regions and human society generally can become viable in the long run, a discussion of broad frameworks seems useful and important at this time.

A. A Working Definition

To begin further consideration of "sustainable urban development," it will help to formulate a more specific definition of this term, which can then be elaborated upon as needed. Realizing that no definition is perfect, I propose the following:

> **Sustainable urban development seeks to create cities and towns that improve the long-term health of the planet's human and ecological systems.**

This definition is simple, yet differs from the Brundtland formulation in that it includes specific mention of natural ecosystems and does not define "sustainability" primarily in terms of the needs of future human generations. It assigns human and ecological systems equal importance, and implies that the health of both is interdependent. Such a formulation builds upon the core themes of sustainable development mentioned on pages 13-16, in particular the need for a long-term

perspective. It adopts an approach similar to Pearce, Barbier and Markandya in assuming that the basic task is simply to improve human and ecological systems as much as possible, recognizing that these systems are dynamic and unpredicatable, and that it is impossible to define a specific set of criteria that will be "sustainable" now and in the future.

Such a definition is consistent with a systems-oriented, process-oriented view of the world — with ecological forms of thought in other words — which following the lead of concepts such as the Heisenberg Uncertainty Principle in the physical sciences denies that absolute certainty can ever be attained about complex, real-world systems. Chaos and uncertainty will always rear their ugly heads. Rather than striving for an unattainable certainty — in this case a guaranteed sustainable world — what is important instead is to make global systems as strong and robust as possible so that the chances of unforseen disaster are minimized. In the case of urban development, such an approach means constantly looking for ways to shape human and natural environments so that they improve both local and global well-being. Hence this definition.

B. Core Values

This definitional discussion requires a broader consideration of the values that are appropriate for sustainable urban development. It is important to be clear about the value choices and beliefs that underlie specific urban policies and designs — these values help clarify ideals and directions in which to go, and let us know what sorts of actions will in fact improve the human and natural systems in the urban environment. Examining them can also unearth hidden assumptions that currently affect the nature of the built environment.

A few particular influences are worth mentioning further here. The first, Lewis Mumford, is no longer as frequently cited by planners as a few decades ago, but remains one of the most incisive critics of urban planning in this century. Building on the ideas of turn-of-the-century regionalist Patrick Geddes, Mumford viewed social and natural aspects of the urban region as an organic ecology. The ideal city for Mumford would be one based on organic unity and what he called the "life economy."

Implicit throughout Mumford's work is a call for planning according to humanistic values, meeting needs of equity, fairness, community and human well-being (see for example Mumford, 1938). In his view the urban region would be oriented around people and their interactions rather than machines. Cities would emphasize pedestrian-oriented environments and sharply reduce the use of automobiles and the building of large roads. Greenbelts, neighborhood playgrounds, gardens, and open space would be important elements of the design, providing places for people to interact with each other and the natural world. The urban economy likewise would be oriented towards meeting human needs.

The second figure that even more specifically grappled with the question of what values should underlie urban development is Kevin Lynch. In *A Theory of Good City Form* (1981), he develops an elaborate theoretical framework for determining values for urban and regional form, assessing many different historical patterns of urban development. Lynch's orientation is heavily aesthetic and experiential, focusing on the individual's interaction with the city. Nevertheless, as with Mumford his ideal values are humanistic ones, aimed at making a city that nurtures human growth and well-being. Lynch concludes:

> So what is good city form? Now we can say the magic words. It is vital (sustenant, safe, and consonant); it is sensible (identifiable, structured, congruent, transparent, legible, unfolding, and significant); it is well fitted (a close match of form and behavior which is stable, manipulable, and resilient); it is accessible (diverse, equitable, and locally manageable); and it is well controlled (congruent, certain, responsible, and intermittently loose). And all of these are achieved with justice and internal efficiency. (Lynch, 1981)

Though this definition may seem highly abstract, Lynch defines and justifies each of these terms at length. In an earlier work he presents a more concise list of desirable urban design values:

comfort
diversity
identity
legibility
meaningfulness
support for human development
(Lynch, 1968)

As described in *Good City Form*, Lynch's ideal urban environment like Mumford's is a region containing "a network of small, intensive urban centers". Community ownership is emphasized through regional land trusts. The built landscape is "a fine-grained mix of activity" including "production, consumption, residence, education, and creation". The design includes both functional integration and social integration — different land uses close together and different people living in proximity. Buildings are tightly clustered and joined by a grid of public transportation. Each road and place has its own character. Indeed, "landscape design — place creation — is an admired art." Human feelings, human cognition, and the sacredness of specific places are highly valued.

A related set of urban design values is proposed by Donald Appleyard and Allan Jacobs, both of whom worked with Lynch, in their 1980 article "Toward an Urban Design

Manifesto". Appleyard and Jacobs suggest the following similar list of values for urban design:

livability
identity and control
access to opportunity
imagination and joy
authenticity and meaning
community and public life
urban self-reliance
an urban environment accessible to all.

According to Appleyard and Jacobs, these values lead toward some basic design guidelines: livable streets and neighborhoods, a minimum density in urban areas, an integration of activities, clearly defined public space, and diverse building arrangements. Though oriented in this case specifically toward design, there is no reason why such principles should not apply to policy and program planning as well. Other sets of similar principles have been proposed in recent years by Peter Calthorpe, the Local Government Commission ("The Ahwahnee Principles", in Appendix C), William McDonough, and others.

Another figure that is central to consideration of the values and principles behind urban development is Christopher Alexander. Using a less analytical and more intuitive approach than Lynch or Mumford, he nevertheless arrives at some similar conclusions, especially in his emphasis on the organic unity of the city. In *A New Theory of Urban Design* (1987), Alexander describes the urban region as "a growing whole," and sets forth two different formulations of a single overriding rule of city development:

> Every increment of construction must be made in such a way as to heal the city.
>
> Every new act of construction has just one basic obligation: it must create a continuous structure of wholes around itself.

"Creating wholes" in Alexander's view can only be done through a process of piecemeal growth utilizing a consistent "pattern language". Each change to the urban fabric must be made with a supreme consciousness of the whole, and an awareness of how the whole can be made stronger. This process demands a great deal from developers, planners and other parties, but also has a great integrity to it, and places the wholeness, vitality, creativity, spontaneity and humanity of the city among its highest values.

A further influence on any consideration of urban development values is provided by feminists and humanists who stress the ways that cities work for women, children, the elderly, and other groups. In her books such as *Housing as if People Mattered* (with Wendy Sarkissian, 1986) and *People Places* (with Carolyn Francis, 1990), Clare Cooper Marcus has called attention to the need to design and plan to meet the needs of all of these groups, and to the ways in which urban design has often failed to do this. In *Redesigning the American Dream* (1984), Dolores Hayden makes similar points. William H. Whyte's studies of how small urban parks and public spaces can be made to work better for urban dwellers follow in a similar vein, as do Randolph T. Hester's discussions of community design in *Community Design Primer* (1990) and *Neighborhood Space* (1975). Such writers take a very people-oriented approach to urban planning. The strong implication is that human needs — especially those of traditionally disempowered groups such as women and persons of color — should be valued more strongly than other traditional planning values such as mobility, efficiency, and a purely formal, isolated aesthetics.

A final group that has looked extensively at the values that might underlie healthy forms of development are theoreticians of Green political parties in various countries. The core value set originally formulated by the German Green Party in the late 1970s

consists of "ecology," "social responsibility," "grassroots democracy," and "nonviolence." A fifth core value is sometimes added: "decentralization." U.S. Greens have come up with a somewhat broader list of core values which includes:

ecological wisdom
respect for diversity
nonviolence
post-patriarchal values
grassroots democracy
decentralization
community-based economics
personal/social/global responsibility
future focus.

Though developed to crystallize the Green political agenda overall, such values have profound implications for the development of urban regions. The emphasis on decentralization argues for smaller communities than the "megacities" currently emerging around the world — a perspective that Mumford and Lynch would have endorsed. The emphasis on community-based economics implies changes to the regional economic structure, making it more small-scale and locally-controlled. The attention to gender issues, somewhat awkwardly expressed as "post-patriarchal values," implies a re-evaluation of many aspects of urban form and institutions, meaning for example that designers might try to create neighborhoods in which women are not isolated in the home with small children, far from services, public spaces and other individuals.

With such influences in mind — and stressing that no single formulation is perfect — my own preference for a basic list of values to guide urban development consists of the following:

ecological health
community vitality
livability

diversity
equity
local orientation
global awareness

The health of the natural environment is of course central to efforts at sustainable development. Whatever the specific concepts and mechanisms used — environmental stewardship, restoration, watershed planning, pollution prevention programs, environmental regulation, green plans, etc. — the point is for cities and urban regions to develop a much closer, less destructive relationship with the natural systems around them. A sense of responsibility toward the Earth's natural environment must be factored into all urban planning. If it is not, further environmental crises will result. This is a basic starting point of sustainable urban development.

Community is likewise a much-discussed goal these days, one of the most important and difficult-to-obtain values in many peoples' everyday lives (Bellah et al., 1985). The vitality of cities and towns, not to mention democracy itself, depends on their inhabitants caring for one another, maintaining a healthy public life, and developing strong bonds of friendship, responsibility and empathy. Otherwise the culture disintegrates into a corrosive individualism in which public goods and the public realm are not maintained, and in which the entire social system is increasingly undermined. If a sustainable society is to be achieved, then, community is an important value.

Livability is another essential aim of sustainable urban development. A livable city is one in which a healthy, pleasant urban environment has been created that nurtures the people within it, and in which urban problems such as congestion, crime, pollution and social strife are minimized. Livability is a rather general term which needs to be defined more precisely in specific contexts — it should not be taken to mean, for example, an exclusive upper-class community in which green, safe, pleasant streets are

maintained at the expense of equity and diversity. Maximizing one value at the expense of others is not the way to sustainability. Rather, new concepts of livability are needed that promote equity, diversity, community and cultural vitality as well as meet aesthetic and practical considerations.

Diversity is likewise important to a healthy society. A region which is diverse (though this does not mean homogeneously mixed) retains the strength and richness of many heritages and offers individuals opportunities for greater growth and learning. It also tends to avoid becoming xenophobic and culturally inbred. A great strength of cities traditionally is that they have provided diversity and the cultural vitality that goes with this, simply because they have housed many racial, ethnic and income groups within close proximity to one another. To be sure, proximity has not always led to mixing — quite the opposite in many cases. Nor is complete mixing necessarily desirable, if cultural traditions and identity are lost in the process. But a diverse urban environment does often provide opportunities for learning, tolerance, and cultural richness that would not exist otherwise, and is likely to lead to the healthiest and most vital urban fabric in the long run.

Equity is at the heart of what is often referred to as "social justice." A society in which large differences in wealth, power or opportunity are allowed to exist between groups is most likely one in which some people are suffering at the expense of others, and in which the whole of the urban system is degraded. This problem is especially pronounced within many American urban regions currently, where poor central cities occupied primarily by persons of color are increasingly isolated from affluent suburbs. Secondary problems resulting from this situation include crime, drugs, and that general deterioration of the urban environment which is sometimes referred to as "blight". An urban society which values equity is most likely to take steps to improve the lot of its

least well off residents, in line with Rawls, and to maximize its own health in the long run. This leads in turn to urban sustainability.

A sustainable community must be firmly rooted in a particular place, respecting, preserving and drawing strength from local ecosystems. It must value the locality in which it exists. Local self-determination and local self-reliance are important related concepts. If goods are produced locally then the consumers are more likely to know the producers, building a web of mutually reinforcing social relationships. Transportation costs are also lower, and local dollars help create local jobs. Likewise if the owners of a business live locally they are more likely to see the effects of their company's operations on their own friends and family. Local self-sufficiency is a somewhat problematic concept, however. On the one hand, an urban region which is reasonably self-sufficient is one which is likely to be more connected to its local ecosystem and to meaningful forms of work — those which help the local community survive and flourish. A more self-sufficient community is also likely to be more energy and resource efficient (food products are not transported thousands of miles, for example), and those growing up in it are more likely to learn the connections between their actions, the local ecosystem, and the local community. On the other hand, total self-sufficiency is virtually impossible in the modern world, if many of the benefits of modern life are to be maintained. There seems little point in being purist about it. Some balance can and should be struck in which cities are a good deal more self-reliant than currently, growing much of their food locally for example, but still benefit from existing within a global context and utilizing products and resources that can only be produced elsewhere.

At the same time as people "act locally," they must "think globally". A new global awareness must be constantly valued within urban development. Local development patterns affect the prospects for long-term global survival, and this

awareness must become integrated into daily urban development decision-making at a local level.

Such values — which are not meant to be absolute or exclusive of others previously mentioned — can in turn underlie urban policies and designs. A city valuing the health of its local ecosystems, for example, would be more likely to restore its creek channels and look for ways to make them a central urban focus that it would be to culvert these waterways. An urban region valuing equity would look at the distribution of resources between its central cities and suburbs, and develop policies and mechanisms such as regional revenue-sharing to ensure that one area was not deprived while others prospered. A community valuing livability and public life would pay special attention to the design of its public spaces, and make them places where people could enjoy spending time and meeting their neighbors.

Each value can lead to a large number of practical applications, many of which cannot be foreseen in advance. The point is simply to maintain these principles in mind and constantly seek ways to apply them as cities and urban regions attempt to move toward greater sustainability.

C. Key Themes

A number of additional concepts can be seen as expressing these values and helping implement the notion of urban sustainability. These themes get across ideas that are a bit more complicated than simple one-word principles. These concepts include the following:

1. ***Open vs. closed resource flows.*** Instead of using non-renewable resources once and then discarding them, urban regions moving towards sustainability will progressively reduce their use of such inputs, their generation of wastes and pollution, and their overall consumption, while simultaneously increasing reuse and recycling of materials to move towards a "closed loop" resource flow. Ideally, a truly sustainable society would not use any non-renewable resources at all, since by definition these are bound to run out eventually. Likewise, it would not generate wastes or pollutants at all, because these are bound to accumulate in a finite biosphere. In practice, any movement in these directions promotes the cause of sustainability.

2. ***Integration of human and natural systems.*** People in urban regions tend to become alienated from the ecological systems around them, simply because so much of the urban environment is human-made. This effect has been drastically heightened in the twentieth century by technology and increasingly advanced urban infrastructure. Cars, televisions, computers, central heating and air conditioning, and all manner of other inventions move humans from the natural world into artificial ones. These changes are not necessarily bad and in fact have many benefits, but the current human separation from the environment is in many ways worrisome, and leads toward a lack of awareness of how human actions affect the natural world. A sustainable urban region is likely to promote contact between people and the ecosystem in which they exist. Means to do this include ecological restoration (daylighting creeks, restoring native vegetation, creating new parks and natural areas, etc.), urban agriculture, a variety of urban greening programs (such as planting street trees), and ecological education programs. Those forms of technology which mediate between urban residents and the environment (e.g. cars) will be used more sparingly and wisely, and traditional behaviors which serve to reconnect people with the land (e.g. walking) will be encouraged.

3. ***Emphasis on both diversity and connection.*** As has been previously mentioned, diversity can provide great benefits to the social ecology of an urban region, broadening the pool of ideas and cultures as well as teaching respect and tolerance. However, connections between diverse groups are extremely important as well. The current move towards increasing separation of social groups within many urban areas, often along lines of class or race, creates problems. A sustainable city is likely to emphasize reconnection of groups of people with onc another, while maintaining and supporting the vitality of a diverse range of cultures.

4. ***A balance of public and private.*** Capitalist society has resulted in a privatization of much of the physical landscape as well as much of the economy. Common land has been fenced and privatized in both urban and rural situations. In many cities little public space now exists except for streets, which are often full of automobile traffic. The lack of public open space near the home makes many central city areas less livable. In suburban areas, the modern situation in which each family lives on its separate lot with an entirely separate set of appliances and household resources is often the least efficient, ecological, or socially desirable pattern. Some balance must be struck between public and private in the physical planning of urban areas as well as in economic and political planning. New forms of ownership and living arrangement, such as cohousing and shared open-space developments, can help address this situation, as can wise action by cities to create new parks, public spaces, community gardens, recreational facilities, and cultural resources. It is these public gems that often make cities most attractive. In a more general sense, a better balance must be found between public and private, individualism and community, if the overall well-being of urban systems is to be sustained.

5. ***Human scale.*** As Jane Jacobs and others have pointed out, urban environments that work well for people in the long run are ones that are designed at a human scale, with

a network of streets that is easy, comfortable and convenient, with plazas and public spaces that are not too huge, with buildings that one can see into and out of, with housing that provides a mix of private, semi-private and public open space, and with the urban fabric created at a relatively fine grain so that people are not dwarfed by huge, impersonal blocks and buildings (Jacobs, 1961; Cooper-Marcus and Sarkissian, 1986). All of these design principles create a human-scale city, unlike the enormous, sterile, dehumanized urban environments of many cities currently.

6. ***Ecological stewardship and restoration.*** Throughout urban regions, planning for sustainability will involve preserving and restoring elements of the natural ecosystem, rather than further degrading it. Current interest in restoring creeks, replanting native species, and preserving wetlands and shorelines can be seen as moving in this direction.

7. ***Fulfilling human potential.*** Sustainability will most likely involve a similar attitude towards people. Like the ecosystem, human potential will be seen as a quantity to be conserved, stewarded, and nurtured. Specific actions toward fulfilling human potential might involve provision of good public education, health care, social services, opportunities for culture and creativity, and opportunities for meaningful work and community involvement.

A move toward urban sustainability, along the lines laid out by the above values, implies changes to all the usual dimensions of urban planning. In the sections below I will outline a few of these. But first, it is necessary for both policy makers and the general public to know whether a particular urban area is moving towards or away from sustainability, and also in which areas work is most needed.

D. Indicators of Sustainable Development

To help measure progress towards fulfilling such values, empirically-testable indicators of sustainable urban development can be developed that can then be reassessed year after year (see Figure 3).

Ideally, these indicators would show a fair bit of detail about the rate of movement toward sustainability or away. But even a rough indication (getting better, getting worse) can prove a very valuable organizing tool. Such an approach was taken by the Sustainable Seattle Coalition beginning in 1992. The organization convened meetings of hundreds of local citizens, who developed a list of 100 indicators of sustainability. The top 20 were researched and publicized, with a rough assessment of whether the region was making progress toward or away from sustainability in each case (see Table 4).

On a global level, some indicators are likely to have great importance in their own right. The carbon dioxide concentration in the atmosphere and the percentage of ozone depletion of the northern hemisphere, for example, are likely to be closely watched in coming decades. Global population has been scrutinized for many years already. New measures may need to be developed to assess changes in equity between rich nations and poor, the relatively peacefulness of the international situation at any given point in time, or the well-being of many of the world's previously overlooked populations.

On an urban or metropolitan level, indicators that are specifically related to the local human and natural ecology can be developed. Some of these would be of largely symbolic importance (the number of salmon in a river, for example, might be used to approximate the overall health of the river's ecosystem). Others would be of absolute

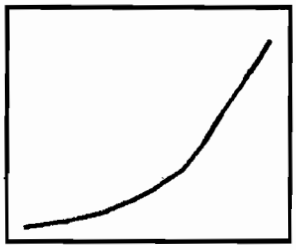
importance, such as average air quality figures, or traffic indicators such as "vehicle miles traveled." To provide a second example of indicators of sustainable development in a particular urban area, a list developed for the city of San Francisco by the *San Francisco Bay Guardian* is shown in Table 5.

To simplify further, indicators of sustainable urban development could be combined into a single statistic representing the overall ecological and social health of an urban region. On a national level, the Index of Sustainable Economic Welfare, or other versions such as the Genuine Progress Indicator developed by the Redefining Progress organization in San Francisco, could be used instead of the GNP (Daly and Cobb, 1993). On a regional level an Index of Regional Sustainability could be developed that would play an analogous function. This might be a task for an enterprising regional government or agency to compile and release, preferably in conjunction with regional plans for development and infrastructure.

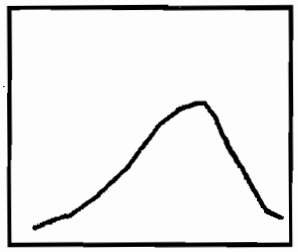
Figure 3: Sample Indicators of Sustainable Urban Development

Unsustainable *Sustainable*

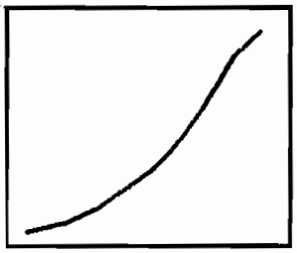
Non-Renewable Resource Use



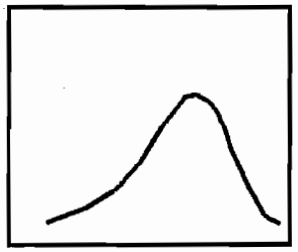
VS.



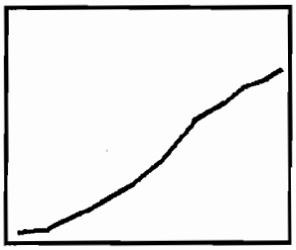
Air and Water Pollution/Greenhouse Gas Emissions



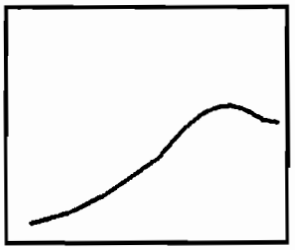
VS.



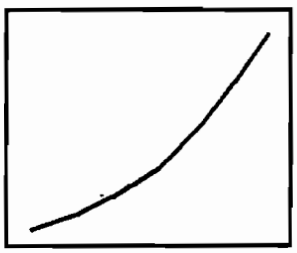
Developed Land



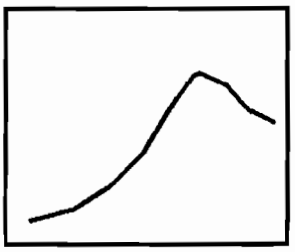
VS.



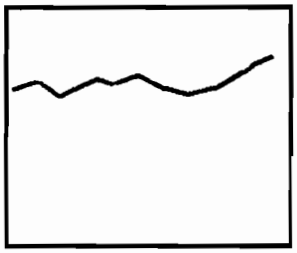
Automobile Miles Travelled



VS.



Equity Gaps Between Rich and Poor, Black and White, Men and Women



VS.

Table 4: Sustainable Seattle Indicators of Sustainable Community (1993)

An assessment of whether the region is making progress toward sustainablity, moving away from it, or staying unchanged.

Direction (—> = Toward Sustainability)	*Indicator*
	Environment
<—	Wild salmon runs through local streams
—>	Number of good air quality days per year
—	Percentage of Seattle streets meeting "Pedestrian-Friendly" criteria
	Population and Resources
<—	Total population of King County
—>	Gallons of water consumed per capita
<—	Tons of solid waste generated and recycled per capita annually
<—	Vehicle miles traveled and gasoline consumption per capita
<—	Renewable and nonrenewable energy (in BTUs) consumed per capita
	Economy
—>	Percentage of employment concentrated in the top 10 employers
—	Hours of paid work at the average wage required to support basic needs
<—	Percentage of children living in poverty
<—	Housing affordability for median- and low-income households
<—	Per capita health expenditures
	Culture and Society
<—	Percentage of infants born with low birthweight
<—	Juvenile crime rate
—	Percent of youth participating in some form of community service
<—	Percentage of population voting in local primary elections
—	Adult literacy rate
—>	Library and community center usage rates
—	Participation in the arts

Table 5: Sustainable San Francisco Indicators (San Francisco Bay Guardian, 1993)

Direction (—> = Toward Sustainability)	*Indicator*
	Environment
<—	Striped bass count in San Francisco Bay
—	Number of days air quality fails to meet ground-level ozone standards
	Population and Resources
—	Population of San Francisco
<—	Muni ridership (public transit)
—	Public expenditure on transportation in San Francisco
—>	Private vehicle miles traveled per capita
—>	Gasoline consumption per capita
<—	Gallons of water consumed per capita
<—	Tons of solid waste generated in San Francisco
—>	Tons of solid waste recycled in San Francisco
—	Percentage of PG&E electricity from renewable sources
	Economy
—>	Percent of residents employed by firms with more than 100 workers
<—	Employment in San Francisco
—	Percent of population living below poverty level
—>	Children under six living below poverty level
—	AFDC recipients as a percent of population
—	Household income distribution
<—	Median household rent as a percentage of income
—>	Percentage of new housing construction that is 'affordable'
	Culture and Society
<—	Percentage of infants born with low birth weight
<—	Percentage of population that votes in local elections
—>	Percentage of people 25 and older who have not completed high school
—>	Deaths by suicide
—>	Percentage of residents who qualify to buy a house in the Bay Area

E. Tools and Mechanisms

A great many mechanisms can help urban regions move towards sustainability, just as they fulfill other planning objectives. These mechanisms can be seen as falling into several main categories. First is an enormous variety of regulatory approaches — zoning ordinances, building and subdivision ordinances, clean air laws, affordable housing set-asides, parking restrictions, environmental impact reporting requirements, and the like. At their best these regulations stem directly from clearly understood policy and values, and directly implement public objectives that help create a more sustainable region. At their worst they have little connection to broader goals, and result instead from politics or whimsy. Zoning has frequently fallen into the latter category, having often been modified according to the needs of local interests or developers rather than any coherent urban or regional pattern.

In order to move towards urban sustainability, the task in many cases will be to get rid of counterproductive regulation, while strengthening other forms, and rooting these in clearly articulated values related to improving the ecological and social health of the city or region. In the United States, examples of successful regulation improving urban sustainability include the federal Clean Air Act and Clean Water Act, and the state of California's Solid Waste Recovery Act.

Other regulatory or legislative approaches, such as the establishment of urban limit lines or the adoption of civil rights laws, represent more proactive and visionary initiatives affecting urban sustainability. These go beyond simple regulations saying in effect "you can do this" or "you can't do that" to systematically implement broad fields of urban policy, which can be oriented towards sustainability or not. The establishment of 20-year Urban Growth Boundaries around cities in the state of Oregon, for example,

represents a pro-active attempt to channel urban growth in positive directions, rather than simply preventing negative impacts through narrower forms of regulation. Decisions by cities such as Toronto, Canada and Curitiba, Brazil to expand their transit systems and orient land use around them were likewise proactive planning frameworks that helped make those cities and regions more sustainable.

A third category of mechanisms potentially useful for sustainable urban development involves direct government participation in markets. In the field of land use, for example, instead of simply regulating private development the government itself can buy large amounts of land, develop or otherwise alter it, and then return it if desired to private ownership and use. Mechanisms such as land banking, land redevelopment, land readjustment, and the development of entire new towns can potentially allow local governments to take an active role in planning for sustainability, though all of these must be used with caution. Sweden and the Netherlands, for example, have both been very active in land-banking; at one point some 60 percent of the land in the Stockholm areas was in public ownership, allowing the government to lease land for development near new transit stations when desired. In the field of recycling as well, governments can promote environmentally sustainable practices through policies to build a market for recycled goods. An example is a joint recycled materials marketing effort launched by the cities of Oakland and Berkeley, California.

The provision of infrastructure offers a further category of mechanisms through which urban regions can move towards or away from sustainability. By building roads, public transit networks, water mains, sewer facilities, electric lines and the like, governments and public utilities play a major role in determining how land is developed, how their residents get around, and how they live. Most obvious is the effect of rail lines and highways upon the growth of cities, but other forms of infrastructure can be almost as

important, as shown by repeated battles over the control of water in the western U.S. In the absence of regional planning authorities in much of the U.S., regional transportation and other infrastructure plans often become the dominant force in directing development, and moving towards sustainability may require revising these.

Economic interventions through tax policy, the provision of credit or financing, and resource pricing represent a fifth area in which a society, acting through its governmental bodies, can promote urban sustainability. Providing tax incentives or easy financing for certain sorts of development encourages it. In this way the deduction for home mortgage interest and federally guaranteed mortgages have historically encouraged suburban single family home construction in the U.S. Conversely, heavy taxes on certain land uses and transactions can discourage sale or development. Many nations, for example, have at one time or another tried to discourage land speculation by heavily taxing the profits from short-term ownership. Resource pricing can also affect land development and prevent suburban sprawl, for example by making it very expensive to travel to far-flung sites or to build using excessive amounts of scarce materials.

The conscious shaping of cultural attitudes and traditions offers a more general means by which a society creates its own future. By influencing the awareness and values of individuals, a culture changes the ways people will treat land, resources, and each other. This evolution of cultural attitudes occurs through educational systems, the media, the example of leaders, social institutions, and the design of physical places. Unrestricted television advertising, for example, helps promote unsustainable levels of materialism and stimulates consumer tastes for products such as automobiles, food, tobacco and alcohol. For this reason, cigarette advertising is already banned in the U.S., and advertising for hard liquor is restricted by industry convention. If by some fluke automobile and oil company advertising were banned as well, the American love affair

with the car might diminish, and citizen tolerance of oil spills and wasteful energy use might lessen as well.

Though it is difficult to change deep-seated cultural attitudes toward environmental or social issues, public officials, cultural leaders, and the media help shape such opinions, and by their example can show the way towards a more sustainable society.

Lastly, cooperative decision-making frameworks are an increasingly important technique by which individuals, governments, groups and agencies can facilitate efforts toward urban sustainability. Watershed planning and cooperative resource management programs are examples of planning processes in which people living in proximity to one another get together to plan more sustainable management of resources affecting them all. Community involvement in local environmental planning can also help ensure maintenance and stewardship of projects in the long run.

The actual structure of government — whether for example a regional government agency exists in a particular area with power over land use and transportation — is probably less important than whether the localities and people of that area have a commitment to moving towards sustainability and a willingness to use any available mechanisms to do so. To be sure, regional government mechanisms can be very useful for attacking many problems, and are sorely lacking in the U.S. But without regionwide commitment to, say, compact land development or reductions in automobile usage, a regional agency would be unable to do anything even if it existed. And even without a regional government, neighboring municipalities can implement a great number of regional planning initiatives through joint powers agreements, existing single-purpose agencies, or other mechanisms.

F. A Policy Framework

Building upon the preceding definition, values, core themes, indicators, and mechanisms related to urban sustainability, policy changes in a number of key areas of urban planning can help bring about greater urban sustainability. These represent the actual agenda of urban sustainability. While the details will certainly take time to work out, many broad policy directions are becoming clear. These include the following:

1. ***Wise, efficient use of land.*** In most countries this most important resource is rapidly being consumed for human settlements, and its natural qualities, species and soils degraded. Land is also often divided very inequitably, with some individuals denied the access needed for basic housing or subsistence. Such inequality can lead in turn to social problems and tensions. Perhaps the best starting place for thinking about more specific principles of sustainable land use policy is the Declaration of Principles approved by 131 nations at the U.N. Conference on Human Settlements, Habitat '76, held in Vancouver in June 1976. This declaration strongly affirms the need for a new attitude toward land use, and expresses agreement that land use should be subject to public control, that land speculation should be curbed, and that speculative gains should be recaptured for the public good. The prologue to the Declaration states that:

> Land, because of its unique nature and the crucial role it plays in human settlements, cannot be treated as an ordinary asset controlled by individuals and subject to the pressures and inefficiency of the market....Government must have the political will to evolve and implement innovative and adequate urban and rural land policies as a cornerstone of the efforts to improve the quality of life in human settlements. (Gertler, 1978)

The declaration then goes on to list seven key land policy "recommendations for national action":

1. Land resource management: Land is a scarce resource whose management should be subject to public surveillance or control in the interest of the nation.

2. Control of land use changes: Change in the use of land, especially from agricultural to urban, should be subject to public control and regulation.

3. Recapturing plus value: The unearned increment resulting from the rise in land values resulting from change in use of land, from public investment or decision or due to the general growth of the community must be subject to appropriate recapture by public bodies (the community), unless the situation calls for other additional measures such as new patterns of ownership, [or] the general acquisition of land by public bodies.

4. Public ownership: Public ownership, transitional or permanent, should be used, wherever appropriate, to secure and control areas of urban expansion and protection, implement urban and rural land reform processes, and supply serviced land at price levels which can secure socially acceptable patterns of development.

5. Patterns of ownership: Past patterns of ownership rights should be transformed to match the changing needs of society and be collectively beneficial.

6. Increase in usable land: The supply of usable land should be maintained by all appropriate methods including soil conservation, control of desertification and salination, prevention of pollution, and use of land capability analysis and increased by long-term programmes of land reclamation and preservation.

7. Information needs: Comprehensive information on land capability, characteristics, tenure, use and legislation should be collected and constantly updated so that all citizens and levels of government can be guided as to the most beneficial land use allocations and control measures. (in Gertler, 1978)

Although not specifically concerned with environmental protection, such recommendations do affirm the need for much more socially-responsible uses of land, and can be seen as furthering many values of urban sustainability.

Numerous other commentators have agreed on specific directions for ecological land use in urban areas. Foremost among these principles is the need to limit the overall growth and size of cities, so that cities and suburbs do not indefinitely expand and destroy open land and natural ecosystems, and so that energy and resources are conserved. Secondly, there is much agreement that substantial amounts of open space and farmland should be preserved in metropolitan areas, so that people's recreational, educational and aesthetic needs can be met, species and ecosystems can be preserved, and a reasonable degree of local self-sufficiency in food production attained. Parks, greenbelts, and farmland protection ordinances are means toward this end. Third, it is often seen as desirable for communities to have coherent shape and a vital urban fabric, as demonstrated by levels of human interaction, diversity and community participation. Rigid, top-down planning toward this end is highly problematic, however; ideally such shape and fabric would come about organically. Fourth, it is usually seen as desirable for land use patterns to promote equity, reduce separations between human groups, and eliminate the enforced isolation of some groups.

There is more agreement on some of these points than others. The need to limit suburban sprawl and prevent cities from taking over the entire landscape has been frequently noted by commentators from many parts of the political spectrum. According to Julius Gy. Fabos, "many observers have suggested that large-scale urban decentralization may be the most important environmental problem of our time" (Fabos, 1979). The desire to limit sprawl helped inspire Lewis Mumford, Benton MacKaye and others to form the Regional Planning Association of the United States in the 1920s, led to the creation of greenbelts around many English cities in the late 1940s, catalyzed other sorts of regional planning initiatives such as Copenhagen's 1948 Finger Plan, and has served as a foundation of national land-use planning policy in France, the Netherlands, Sweden, and many other countries.

The need for land use planning that promotes energy and resource efficiency is likewise fairly obvious. Low-density development requires inhabitants to travel farther and consume more fuel than higher-density alternatives. Studies by authors such as Peter Newman and Jeff Kenworthy show a strong relationship between density and transportation fuel use (Newman and Kenworthy, 1989). Although some of these findings have been criticized on methodological grounds, the general trend seems beyond argument.

The correlation between residential density and water consumption is also relatively clear (suburbanites tend to use large amounts of water to water their lawns and golf courses). Somewhat less clear is the relationship between low density suburban development and other forms of resource use. Suburban houses tend to be larger than urban ones, and thus use more construction materials; single family construction is also inherently more resource consumptive than multi-family construction simply because the latter takes advantage of shared walls, shorter utility lines, and shared infrastructure such as access roads and sewer lines. Finally, there is a large difference in resource consumption and waste generation between those who live on different density land use patterns, which stems from different lifestyles and economic conditions. To the extent that land use policy promotes or discourages resource consumptive suburban lifestyles, it affects sustainability.

Others of the above points are less obvious. The need to give coherent shape to communities follows from needs to restrain their overall growth, increase transportation efficiency, conserve resources, and promote neighborhood vitality within them. Yet debates about the most desirable shape and urban form are far from conclusive. Some principles such as the need to move toward more mixed-use development patterns, "urban

villages," and a fine-grained urban fabric are fairly well agreed upon by progressive planners. But specific designs, such as those employed by the new urbanists and the new town programs of countries such as Britain, France and Sweden, are controversial.

Humanistic concerns such as equity, justice, and the needs of disadvantaged communities are not widely seen as a concern of land use planning. Yet land use planning does clearly affect such things. The American pattern of suburbanization, for example, has dramatically increased the isolation of many poor communities of color. Likewise, authors such as Cooper Marcus and Hayden have made the case that suburban styles of development do not well serve the needs of large sectors of the population, such as women, teenagers, the elderly, the disabled, and the poor.

Beyond specific land use changes, sustainable patterns of development are likely to involve changes to the relationship between people and the land. In particular, a new balance between private property rights and human responsibilities toward both natural and human systems seems needed. The "land ethic" proposed by Aldo Leopold maintains the concept of private ownership but places a weight of responsibility to care for land on top of current rights to use it. Under this perspective use rights often come secondary to stewardship responsibilities (Leopold, 1949). Deep ecologists take a somewhat more radical approach, proposing that other species have inherent rights to exist on the land, and endorsing bioregionalism and watershed management as practical ways for humans to care for the land around them. Whatever the case, wise use of land seems likely to depend on a shift away from the view of land as a commodity for human use and profit towards a renewed perception of human interrelationships with the land.

2. ***Less transportation, clean methods.*** Among the main determinants of land use patterns and urban form generally are transportation systems. For this reason alone,

transportation policies are extremely important to regional sustainability. Beyond this, transportation systems contribute to a complex web of interconnected urban problems such as air quality, congestion, blight, suburban sprawl, ecosystem destruction, and social fragmentation.

Transportation in the ecological city will most likely be based on several simple principles: access by proximity, demand reduction, and an inversion of the current transportation hierarchy. Together these are likely to reduce the total amount that people need to travel, and to allow them to travel by far cleaner and more resource efficient means.

When almost everything a person needs is nearby, he or she doesn't need much transportation. So naturally, any attempt to reduce transportation needs and automobile dependency should start with "access by proximity." This involves creation of mixed-use urban and neighborhood centers, instead of the general twentieth-century tendency towards large single-use districts, and other steps such as the integration of child care centers into workplaces and parks, recreational facilities and shopping into neighborhoods. The concept of "urban villages" has been frequently mentioned in recent years; these would contain all the critical components of a community — shops, homes, workplaces, parks, civic centers, recreation, etc. — within walking or bicycling distance of one another. As a practical matter, mixed-use, higher-density zoning, especially around transit stops, downtown areas and neighborhood centers can help this come about.

Changes to existing transportation priorities are important as well. The current hierarchy of priorities should be reversed, with the heaviest emphasis placed on helping the pedestrian, who represents the most energy efficient form of transportation and adds a much-needed human presence to city streets. Adopting traffic calming measures,

implementing specific street design policies (providing adequate sidewalks and crossings, for example, as well as pleasant streetscapes), and developing more compact, mixed-use urban centers are all ways to foster the pedestrianization of urban areas. Bicycle planning should also be placed near the top of the priority list, followed by public transit, particularly transit that serves existing central cities and communities of color. The automobile should be given lowest priority in the new hierarchy, and existing automobile subsidies ended.

Efforts to develop more sustainable regional transportation systems should also include looking at the demand side of the equation rather than supply. By reducing demand — actually lowering variables such as "vehicle miles traveled" — congestion problems can be solved and quality of life improved without building new roads or other infrastructure. "Access by proximity" helps do this. Reversing current transportation priorities and providing alternatives to the automobile helps do this. "First source" hiring policies can help encourage businesses to hire locally, reducing commuting. And many market-based mechanisms can help as well, such as higher parking charges to discourage driving, higher gas taxes and tolls, and higher vehicle registration fees.

*3. **Efficient resource use, zero pollution and waste.*** Certainly one of the most important areas in which to focus efforts on urban sustainability has to do with the flows of energy and materials through human society. Traditionally, these resource flows have resulted in many of the most egregious environmental problems — polluted air and water, wasteful consumption of fossil fuels, and overflowing landfills. All of these can be overcome. Energy conservation and materials recycling is the area in which ordinary citizens can most directly take action towards sustainability through small daily initiatives, and so is a good focus for public involvement efforts. As discussed earlier, the overall challenge can be seen as one of moving from open-ended resource flows, in

which nonrenewable resources are harvested, used once by human systems, and then discarded, toward closed-loop flows, in which resources are reused and recycled.

A great number of mechanisms are available to urban and regional authorities to encourage this transition in resource flows. As with the field of transportation, demand-side management (DSM) programs offer great potential to reduce environmental impacts of resource use, in this case by lowering the amount of resources consumed rather than cleaning up after consumption. In the area of energy use, for example, utility DSM programs to date have included offering consumers free or reduced-price compact fluorescent light bulbs, which typically use about one-fifth the electricity of incandescent models of similar wattage, as well as rebates on energy-efficient refrigerators, air conditioners, and water heaters. Home weatherization and improved energy efficiency standards in building construction have also produced large energy savings in many parts of the country.

Pollution prevention programs take a similar approach, trying to eliminate pollution before it is created rather than cleaning it up afterwards. Such programs involve taking a systematic look at manufacturing processes to see where changes in inputs and procedures can eliminate creation of pollutants. It is also useful to shift the costs of pollution onto the individual or group which produces it — what has become known as the "polluter pays principle."

Municipal recycling programs are one of the most obvious areas in which cities can demonstrate their commitment to closed-loop resource flows and urban sustainability. These have snowballed over the past decade, and marketing and collection efforts have increased in sophistication. A major problem has been creating markets for collected recyclables. Many cities, states and federal agencies have been able to help stimulate

such markets by mandating the purchase of recycled materials in government offices, and by setting up cooperative marketing agencies for recyclables (see for example Pollock, 1987; Young, 1991).

4. ***Restoration of natural systems.*** Even though many urban areas may seem entirely artificial — full of pavement and buildings, and often landscaped with non-native plants — still in almost every location there are many elements of the original ecosystem that can be reclaimed. Such restoration efforts add to the livability, ecological health, and overall sustainability of the urban region.

Creek restoration, for example, is an idea that is catching on rapidly in many parts of the U.S. as well as overseas. In some places community groups simply remove debris from neglected streams and replant native vegetation. In other areas cities are seeking ways to recreate natural beds for creeks and rivers that were channelized or culverted decades ago. Restoring a natural watercourse provides corridors and habitat for wildlife as well as walkways and open space for people. It also helps reconnect urban dwellers to the bioregion, reminding them that they live in a natural world with cycles of rainfall and waterflow. The California town of San Luis Obispo has restored a creek through its downtown, encouraging local restaurants and businesses to reorient to face the green pedestrian pathway along it. Boston's Fenway is a semi-natural waterway designed in the nineteenth century by Frederick Law Olmstead, which has proved an asset to the city ever since in aesthetic terms as well as flood prevention.

Wetlands restoration is another area of growing interest, as people realize how little natural shoreline, swamp and marsh is left in many urban regions and learn the biological importance of these sites. In the past decade or two wetlands have been increasingly protected from further development. The next challenge will be to restore

many wetland areas that have already been degraded through human activity. In the northern part of San Francisco Bay, for example, an agreement has been worked out between federal agencies and Cargill, Inc. to restore 10,000 acres of commercial salt ponds to wetlands status.

Many existing urban parks and areas of open space can benefit from restoration activities as well. Volunteer site restoration programs and stewardship approaches to watershed management can help this happen. Sizable volunteer efforts are underway in a number of U.S. cities. For example between 1990 and 1994 the Anacostia Watershed Society mobilized 2,440 volunteers to plant 4,661 trees and remove 65 tons of trash along the Anacostia River in Washington, D.C. Specific watershed management planning models, such as the Coordinated Resource Management and Planning model, can lead to successful, ongoing regeneration of urban park and open space areas.

Urban agriculture is another area in which nature is being brought back into the city and urban sustainability enhanced. Groups in many urban regions are digging community gardens, reclaiming vacant lots, planting gardens on rooftops, and forming community-supported agriculture networks that link local farmers with city dwellers. The San Francisco League of Urban Gardeners, for example, operates or supports 33 community gardens within that city. Urban gardens are also a long tradition in European cities such as Berlin and Stockholm. Biointensive agriculture methods make it possible for urbanites to grow substantial amounts of food on very small areas of land. In a symbolic but important way, urban gardening helps reconnect city dwellers with the earth.

Finally, restoration is urgently needed in many inner city areas, which are often home to lower-income groups and communities of color. Enormous opportunities exist

in many of these neighborhoods. Abandoned industrial land can be reclaimed and restored, while vacant lots can be turned into parks or community gardens. Intensive urban agriculture can be used to provide jobs, supply food, bring communities together, and help inner city residents regain connection with their cultural roots.

Healing ecological systems within urban regions can help heal social systems as well. Cities are often seen as unlivable because they have lost any sense of connection between people and the natural world. There is a widespread belief that densely settled areas cannot also be green. Restoring important features of urban ecosystems can lead to more healthy cities and help people see relatively dense urban areas as an attractive alternative to suburbia.

5. ***Good housing and living environments.*** One of the main purposes of cities and towns, after all, is to create decent places for people to live, and if these do not exist or are not affordable, the urban system is bound to suffer. Active steps to support housing creation include active government construction of housing — which has a checkered history in the U.S., although a somewhat better record in European countries — support of non-profit housing developers, and tax credits and other economic incentives for the creation of affordable housing. The design of housing and neighborhoods also needs to be rethought in many cases to ensure that people have access to open space, meeting areas, shared facilities, shops, offices, transportation, child care facilities, and other essentials which can make urban communities more livable.

6. ***A healthy social ecology.*** The human ecology of an urban region is much more difficult to grasp that the natural ecology. Streams, rivers, wetlands, and native habitats can be identified and to some extent restored through relatively straightforward technical means, given sufficient political interest. However, the components of the human

ecology are far more complicated and subtle, and require additional understanding, compassion, and commitment.

Certain social problems, such as homelessness, are of course quite obvious to anyone who walks down an urban street. Though the causes of such problems are deeply systemic — having to do in this case with equity within the society, the deinstitutionalization of the mentally ill during the 1980s, the paucity of affordable housing, the destruction of single-room occupancy hotels, the lack of economic opportunity for unskilled workers, the lack of sufficient support services, and cultural dynamics such as racism — there are concrete things that can be done to solve them. In the case of homelessness, actions to address the problem might include construction of transitional housing and SRO hotels, additional support services for the mentally ill, an increase in emergency shelter beds in many cities, and, perhaps most importantly, a large increase in preventive services designed to assist at-risk youth and other individuals before they become homeless in the first place.

Other deeply entrenched social problems, which help to decrease the overall sustainability of urban regions in the long run, are more difficult to determine or acknowledge. Racism, for example, has been an enormous factor shaping American cities for many decades. Expressed in particular through the denial of housing and financing to persons of color, this factor has done as much as any other to contribute to the decline of many central city areas. Addressing the problem will require new efforts throughout society, for example by educating children to be more comfortable with others different from themselves, and by rectifying institutionalized racism within real estate, housing and financial industries. Particular pieces of legislation, such as the federal Fair Housing Act, are often required. Special attention will also need to be paid to the topic of

"environmental justice," looking particularly at the siting of hazardous facilities within central city communities of color.

Promoting a healthy social ecology overall means looking for every opportunity to enhance human community, opportunity and empowerment. It requires an ability to put oneself in the shoes of any resident of an urban region, and ask what are the opportunities available to him or her? What is the environment like in which they must live? What public policies, design improvements, and social programs could help improve this environment? Through such a process, the social ecology can be made healthier and more sustainable.

7. ***A sustainable economics.*** Developing a more sustainable economics is central to the effort to create a more sustainable urban area. It would be a mistake to say that any one economic model holds all the answers, but in general a sustainable regional economy is likely be oriented around three main principles. First, it is likely to be what Paul Hawken terms a "restoration economy" — one which helps restore the environmental and social damage done in the past, rather than creating new problems (Hawken, 1993). Second, it is likely to be a "human-centered economy", one which meets real human needs and provides meaningful work to people at decent pay. Third, it is likely to be a locally-oriented economy, one which emphasizes local ownership, local control, local investment, use of local resources, production for local markets. This does not mean to ignore the rest of the world, but to encourage as much economic activity as possible to be rooted in particular communities and regions.

The sustainable economy is likely to meet these goals through a mixture of market mechanisms, appropriate government action, and the integration of social and

environmental responsibility into economic decision-making. One important step toward a more sustainable economy will be to phase out industries or particular industrial processes that consume large amounts of energy and nonrenewable resources and produce large quantities of pollutants and toxics. In his 1991 Worldwatch Paper entitled "Jobs in a Sustainable Economy," Michael Renner gives the following breakdown of the most consumptive and polluting industrial sectors:

Table 6:

Energy Use, Pollution and Employment by Industry, 1987/1988
(Percent of all Manufacturing)

Industry	GDP	Employment	Energy Use	Toxics Released
Refining & Coal Products	3.9	0.8	31.2	3.7
Chemicals	9.0	5.5	21.2	58.4
Primary Metal	4.3	4.0	14.0	12.5
Paper	4.6	3.6	11.5	13.6
Food Products	8.7	8.4	4.8	1.4
Stone, Clay & Glass	3.2	3.1	4.7	0.5
Lumber & Wood Products	3.2	3.9	2.0	0.2
Transportation Equipment	5.8	10.6	1.7	1.6
Fabricated Metal	7.1	7.4	1.7	1.5
Non-Electrical Machinery	9.5	10.7	1.4	0.4
Electrical Machinery	10.0	10.7	1.1	1.4
Printing & Publishing	6.8	8.0	0.6	0.3
Other Manufacturing	23.8	23.3	4.1	4.2
ALL MANUFACTURING	100.0	100.0	100.0	100.0

Source: Worldwatch Institute

In addition to these highly polluting or energy-consuming industries, economic sectors based on extraction of natural resources such as timber, minerals, and oil are unlikely to be sustainable in the long run, since these resources will eventually run out after enduring various price and supply shocks along the way. Likewise, sections of the regional economy based on government subsidy — such as military contractors — are not particularly sustainable either, since these handouts may cease.

Somewhat more arguably, sectors of the economy which support the automobile should not be considered sustainable, since cars and car-dependent patterns of suburban sprawl cause a great deal of ecological and social damage. Even more arguably, some elements of the finance, insurance and real estate (FIRE) sector will not play so prominent a role in a sustainable society, which will not follow the current spiraling path of increasing litigation, insurance, and financial and real estate speculation, much of which adds nothing productive to regional economies but instead places impediments in the way of achieving many public goals.

Businesses engaged in environmental cleanup, recycling, transit construction, affordable housing and the like can be considered highly "sustainable," in that these improve the social and environmental health of the region. Likewise, agriculture is an important part of a sustainable society, supplying needed food to local and regional markets, though hopefully in the future this sector will evolve towards a more locally-based, organic agriculture than at present.

While some industries may dwindle in a sustainable economy while others grow, many will simply find ways of doing the same things better. Figuring out how to reduce waste, pollution, and resource use, redesign products for ease of recycling, and take steps toward ecological and social responsibility will be among the challenges facing industry and economic development planners.

A sustainable regional economy will be one which uses natural resources in an efficient and sustainable manner, and which does not generate large amounts of pollution and wastes as a result of that resource use. Open-ended resource flows will become closed. Inputs will be either renewable or recycled materials, and outputs will be greatly

decreased and recycled. Waste products from one industry will be used by another. Resource flows will be considered as part of the "industrial ecosystem".

One example of such an industrial ecosystem developed during the 1980s in Kalundborg, Denmark. Seven contiguous industrial and agricultural producers developed arrangements to use one another's waste products. A powerplant began selling its flyash to a cement manufacturer, its waste gypsum to a wallboard plant, and its excess steam to a district heating system for 3,500 homes. A pharmaceutical plant began turning its sludge into fertilizer for local farms. An oil refiner began selling sulfur to a sulfuric acid producer, waste heat to greenhouses and a fish farm, and waste water and surplus gas to the power plant. These arrangements were each commercially viable and saved large amounts of materials from being wasted. Closing similar resource loops in the Bay Area regional economy could save enormous amounts of raw materials, reduce pollutants and landfill needs, and generate jobs creating a cleaner environment.

Many writers have argued that a cooperative, locally-oriented economics, emphasizing worker, producer and consumer co-ops and small, locally-owned businesses, is healthiest for local communities. Such a system promotes economic democracy, local control, diversity of ownership, and social responsibility, and offers an alternative model to the global market economy envisioned under GATT. Other observers have lamented the dominance of the large corporation, which undermines local ownership and control, replaces a diversity of small retailers with a few standardized chains, and frequently exports capital from local communities. Recent theories of "flexible specialization" such as advanced by Michael Piore and Charles Sabel appear to lend support to the idea that the most robust economy is one dominated by small, flexible, locally-controlled firms (Piore and Sabel, 1984).

8. ***Community participation and involvement.*** One of the most important components of urban sustainability will be creation of participatory communities and highly functional political systems, which are in turn able to bring about other positive changes.

There is no single best way to promote these things. But a package of policies aimed at opening up local political processes, insulating them from money and special interests, producing an informed electorate, and promoting local decision-making and responsibility can help lead to such a state of affairs. Community participation in local planning and design is important, as is the enlightened leadership of officials at local, state and federal levels of government, who must demonstrate that it is possible at every level to make decisions honestly and with global as well as local sustainability in mind.

9. ***Preservation of local culture and wisdom.*** Much of the strength of any particular urban region lies in its cultural traditions and the unique relationships that people develop there with each other and with the land. This uniqueness gives a region vitality, helps it take advantage of particular local features, and makes it an interesting place to live. Local culture, history and wisdom can add to sustainability, and their best aspects should be preserved. Such preservation will often take conscious action by governments to encourage traditional crafts, languages, rituals, cultural practices, and building techniques; to protect important local products from mass-produced generic imports; to protect local farmland and resource stocks; and to integrate traditional wisdom — for example traditional crops and agricultural techniques — into the evolving urban ecology.

G. IMPLICATIONS FOR PLANNING THEORY

What is the relationship between planning theory — the set of ideas about why and how planners do what they do — and the concept of "sustainable development"?

Does a concern for sustainability lead to a new paradigm in planning thought and practice? Do existing theories of planning theory shed light on how to view sustainable urban development?

In his 1987 book *Planning in the Public Domain: From Knowledge to Action*, John Friedmann posits four main traditions in planning theory: planning as social reform, policy analysis, social learning and social mobilization. Through much of the past two centuries, he argues, planning has served goals of social reform, ameliorating the excesses of industrial capitalism and improving daily quality of life for segments of the population. Toward these ends planning has followed prevailing concepts of rationality, in particular western beliefs in progress, science, economics, and centralized management. The positivism of Auguste Comte and the rationalist sociology of Max Weber have been particular philosophical influences in this pursuit.

However, this "grand tradition of planning theory" has come under attack from many sides. In particular, positivist beliefs in science and rationality were challenged by Thomas Kuhn (1962) and others, who pointed out the existence of paradigms and paradigm shifts. The analogous faith in "rational comprehensive analysis" within the planning profession was criticized by Charles Lindblom (1954), who advocated instead a method of successive limited comparisons. Neo-marxists such as David Harvey, Robert Beauregard and Manuel Castells have attacked reform-minded planners for serving as the handmaidens of capitalist ruling classes. Other radical and Third World critics have lambasted the mainstream reform tradition for ignoring critical issues of equity, exploitation, power, class, race and gender.

The "policy analysis" tradition can be seen as an even more apolitical and technocratic approach to solving urban problems, also based on unquestioned faith in

science, reason and progress, and overlooking important dynamics of power, race, class and gender. Although ascendant in the post-World War II period, policy analysis too has come under fire for many of the same reasons mentioned above. Its usefulness by itself is limited, in part because it has no real basis for developing normative solutions, and in part because real-world situations tend to be complex, dynamic and "wicked", to use Mel Weber's term, and not amenable to technocratic approaches in the long run.

Based on the educational philosophy of John Dewey, "social learning" approaches lead to a process-oriented view of planning in which political strategies, theories of reality, values and knowledge evolve in tandem. As such this view holds similarities to postmodern and co-evolutionary perspectives on society. Yet aside from Dewey and the problematic figure of Mao Tse-tung this branch of planning theory seems to have had few important theorists, and Friedman himself acknowledges that "there is little agreement on the meanings of even basic categories, such as action and learning" (Friedman, 1987, 183).

Friedman places greatest emphasis on "planning as social mobilization," and on a potential evolution of this planning tradition into "radical planning" which focuses on meeting goals of empowerment, emancipation, and the recovery of political community. He sees this stream of planning theory combining utopian, social anarchist, radical, critical theorist and neo-marxist (historical materialist) thought, all of which are motivated by moral outrage over the conditions of industrial capitalism and by dreams of a dramatically better society. In his view planning for social mobilization starts with a far-reaching social and political critique which includes an awareness of power dynamics, human suffering and oppression. It then looks for strategies for social transformation, emphasizing grass-roots liberation movements "from below."

Following this approach Friedman redefines planning as "an activity in which knowledge is joined to action *in the course of social transformation*" (Friedman 1987, 250; italics original). He calls for a radical planning that will help "recenter political power in civil society" to emerge from the social mobilization tradition, and notes in particular the need for new conceptions of "development:"

> citizens around the world have begun to search for an "alternative" development that is less tied to the dynamics of industrial capitalism. Emancipatory movements have emerged to push for a more positive vision of the future than the present system-in-dominance holds out to us: a world working to eliminate the threat of a nuclear winter and in serious pursuit of a balanced natural environment, gender equality, the abolition of racism, and the eradication of grinding poverty. (Friedmann, 1987: 10).

However, the main problem with the social mobilization tradition lies in the difficulty of developing a vision of alternative goals and actions:

> The political Left is fragmented precisely over disputes concerning the proper course of action. As it turns out, agreement on the decisive NO to every form of exploitation and oppression does not mean that there is consensus on the methods for struggle and for reconstruction (Friedmann, 1987: 271).

It is to this need for a new alternative vision that sustainable development planning can most contribute. A focus on sustainability based on common global values related to ecological and social well-being can provide a new common ground for planning action — underlieing Friedman's notion of "radical planning" — and can also integrate planning theory traditions such as social reform and social learning. However, sustainable development differs from existing planning paradigms in some important ways, in particular its emphasis on the long-term perspective, common global values, and the interrelationship of social, economic and environmental factors.

A commitment to sustainability and a common base of global human values reinforces the concept of a "public interest" that has been so important to planning

historically — although this must be broadened to include the interests of future generations, ecosystems and other species — and reinforces the role of planners as advocates for those parties who are not now represented in policy debates. Advocacy planning as advanced by Paul Davidoff, equity planning as advocated by Norman Krumholtz, gender-conscious planning as developed by writers such as Leonie Sandercock and Jane Forsyth, and environmental planning such as outlined by Timothy Bentley and others all offer ways in which planners can advance the cause of sustainable development by advocating for groups and values that have traditionally been underrepresented.

Rather than favoring a particular stance or ideology, a concern for sustainable development places a responsibility on planners to ensure that whatever they do leads to long-term improvement in social and ecological well-being. This requires a critical ability and a willingness to look beyond traditional dichotomies (e.g. jobs vs. the environment) for creative solutions that satisfy the well-being of all parties. Since such "yes-yes" solutions are not possible in all cases, planners must be willing to stand up at time for values which lead toward greater sustainability.

The sustainable development paradigm is likely to lead planners toward more systemic, holistic thinking, and to encourage them to integrate traditionally separate disciplines within planning. In contrast to past rationalistic approaches, it will require combining reason with compassion, intuition, and emotion. It will take values and ethics more into account, require participatory methods, and stress awareness of different discourses and power relationships. Emphases on "communicative action and interactive practice" will be important (Innes, 1995), following philosophy developed by Jurgen Habermas and adapted for planners by John Forester and others.

IV. CONCLUSION

Planning for urban sustainability is still in the very early stages. As of now little progress has been made on turning today's huge, resource-consumptive megalopolises or sprawling, even more resource-consumptive suburbs into communities that meet long-term human and ecological needs. Although urban theorists have proposed a number of principles and values that can help underlie sustainable urban development, and some degree of consensus is emerging around many of these, many specific policies remain to be worked out, and even more importantly, the political will must be found to implement changes.

Moving toward urban sustainability will take time. Built landscapes evolve slowly, over many decades, and even more glacially if economic interests and human behavior patterns are invested in current patterns of developing them. Suburbs once built cannot easily be turned into ecological villages; freeways are unlikely to be replaced by more sustainable transportation solutions as easily as the old urban trolley lines were replaced by highways in the U.S., because the economics and culture does not favor it, and because a sprawling land use pattern has been created that depends on these freeways.

Different approaches will have to be found for different cities. Third World urban regions often require a heavy focus on providing basic infrastructure in ways that will be sustainable in the long run and that will avoid some of the problems that industrialized cities have gotten into, for example suburban sprawl, pollution, and automobile dependency. First World cities will often need to think of ways of redeveloping existing urban areas that have plenty of infrastructure but do not provide an ecologically or socially healthy urban environment. Unfortunately many past public housing projects

and redevelopment areas fit this bill, as do many suburban communities for very different reasons. Sometimes the needs of cities in the industrialized world and the Third World will be exactly opposite. Planners in the U.S. often seek higher residential densities to support transit, community interaction, and more sustainable patterns of land use. Yet in Hong Kong — the world's densest city — officials often aim for lower densities, with much justification. Many Third World urban areas such as Mexico City, Bangkok and Lagos are struggling to provide their residents with basic water and sewer systems; worrying about trendy concepts such as transit-oriented development, urban limit lines, or environmental protection may seem a luxury. Yet ways can usually be found to pursue both.

Cities also face unique challenges because of local geographical factors. Those in semi-arid regions will need to focus more heavily on water conservation; those in the midst of fertile agricultural land will need to think about how to preserve this resource; and those in northern climates will need to develop different architectures and urban designs to conserve heating energy and meet the needs of people who must be indoors much of the year.

The history of each city affects its opportunities to move towards urban sustainability. Rapidly developing cities such as in the Western U.S. and Asia have great opportunities to shape their own development in wise directions. Older, more stable cities the eastern U.S. or Europe may have less opportunity to shape their form and overall layout, but by the same token may benefit from more compact land use patterns, transit systems, and urban design of the nineteenth century and before. Their challenge may be instead to revitalize the existing urban fabric.

There are many further questions concerning a healthy and sustainable urban ecology that could be touched upon. For example, the trend since the Second World War has been toward increasingly large-scale development — giant subdivisions, condominium complexes, and downtown projects. To some extent, this seems necessitated by the realities of our current economics. However, is this scale of development desirable for sustainability? Does it not produce a certain uniformity and homogeneity to the urban landscape that drains it of vitality and character? Writers such as Alexander and Jane Jacobs have argued that a piecemeal, organic process of development, resulting in a more fine-grained urban fabric, can help produce the sort of organic unity and beauty that will make the city vital in the long run. Such questions cannot be answered here, but are important to think about in the process of developing long-term plans for greater urban sustainability.

Currently there are very few built examples of relatively sustainable communities, apart from traditional villages and towns that are not yet part of the modern world. All that exists are fragmentary examples of what might be. Given current political realities in the industrialized world, it will be some time before a number of large-scale model communities and projects are actually built. Yet the large number of small-scale projects underway, the volume of literature just being developed, and the obvious need for new models of urbanization suggest that interest in sustainable urban planning will continue to expand in the future.

It is important to remember that the current city is very recent. Its form and environment are heavily determined by technological innovations such as the automobile and the elevator, which have only existed since the late nineteenth century. The creation of megacities of more than ten million people is an even more recent phenomenon,

having to do with the rapid pace of current global patterns of development in the late twentieth century.

Just as recent patterns of suburban development are now layered on top of nineteenth century streetcar grids and eighteenth century walking cities, so new and more ecological patterns of development may someday be added to these, gradually bringing cities back into a better balance with the ecological limits of regions and the planet as a whole. Suburbanization was in large part a reaction against the dirty, crowded, unhealthy cities of the industrial revolution, in which people were crammed into terrible housing virtually without amenities, to serve the needs of ruthless early forms of industrial capitalism. In a similar manner sustainable city initiatives of the next century may form a reaction against the excesses of suburban, material culture, which is dominated by economic rather than environmental or social values. The transition toward more sustainable cities will not happen overnight. But through a rising ecological and social consciousness, the development of models and examples, and better understandings of the values, indicators, policies, programs and designs appropriate to urban sustainability, new, more sustainable forms of urban development can come about.

V. ANNOTATED BIBLIOGRAPHY

A large body of literature has grown up around the concept of "sustainable development" during the past 15 years. Following the 1987 Report of the U.N. Commission on Environment and Development (the Brundtland Report) and the 1992 U.N. Earth Summit, this literature began to expand rapidly; in the mid-1990s the rate of growth seems ever faster. The sheer volume of publications with the word "sustainable" in the title can be bewildering at times.

This bibliography catalogs many recent writings on the subject, looking first at general discussions of sustainability and then at works that focus on sustainable urban development. Given the vast amount that has been published on the former topic especially, this is at best a partial accounting of the literature. It concentrates on book-length publications.

The first section of this bibliography focuses on authors dealing with sustainable development in a general sense. For the most part it does not include writers who focus on sustainability only within the context of a particular field, such as "sustainable agriculture" or "sustainable energy policy." It also does not include most studies of particular countries or regions, which often have the word "sustainable" somewhere in their title these days. Instead, this portion of the review looks mainly at works seeking to weave together environmental and social themes to address the challenge of how to create alternative modes of development that are in one sense of another sustainable. Many of these books focus on the general question of how to integrate economics and ecology; others contribute to the debate in more specific ways.

The second section of this review looks at sustainable urban development and is of necessity more limited, since fewer individuals have written on this subject. I have included recent reports, papers, books and manifestos that outline specific mechanisms for more sustainable urban development, whether or not they mention sustainability, as well as some general visions of ecological city development. Most of these works have been written in the last 25 years. I have generally not included previous writers who have helped lay the foundation for the current discussion, such as Lewis Mumford and Ebenezer Howard, although their contributions should certainly be acknowledged.

Materials in this bibliography are drawn from computer searches of the University of California GLADYS and MELVYL systems, as well as from publications and materials received by Urban Ecology, Inc., a nonprofit membership group based in Oakland, California. I will happily expand this list if reviewers can pass along recommendations for further readings.

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Kuik, Onno and Verbruggen, Harmen, eds., *In Search of Indicators of Sustainable Development*, Kluwer Academic Publishers, Dordecht and Boston, 1991.

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Larson, Geri, *Financial Mechanisms for Sustainable Conservation*, Environmentally Sustainable Development Division, The World Bank, Washington, D.C., May 1993. Presents results of two World Bank workshops on the subjects, looking at "long-term financial mechanisms" such as trust funds, endowments and foundations which can

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Lipschutz, Ronnie D, *Three Worlds or One?: Global Sustainable Economic Development in the 21st Century*, Pacific Institute for Studies in Development, Environment & Security, Berkeley, 1990.

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McKim, Tracy K., *Toward Sustainable Development: Sustainable Participation and the Role of Law*, dissertation, UCSD, 1993.

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Markandya, Anil, ed., *Policies for Sustainable Development: Four Essays*, Food and Agriculture Organization of the United Nations, Rome, 1994.

Meadows, Donella H. et al., *The Limits to Growth*, Universe Books, New York, 1972. The best-selling summary of a report commissioned by the Club of Rome, developing a systems dynamics model of world resources and population. The book gave scientific weight to conclusions that present growth trends in population, industrialization, pollution, food production and resource depletion could not be sustained, and motivated many individuals to begin considering questions of sustainability.

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Merchant, Carolyn, *Radical Ecology: The Search for a Livable World*, Routledge, New York, 1992. A summary of current approaches to environmental activism, intended for a general audience. Includes discussion of mechanistic and ecological worldviews, the different grounds for environmental ethics, ecofeminism, social ecology. The book's last chapter provides a brief overview of current debates on sustainable development.

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provide general background in these fields without discussing sustainability directly. The bibliography goes through 1988, but many works are from the 1970s. It is compiled from a fairly mainstream environmental perspective, and contains little about cities, urban form, urban issues, or politics.

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Mikesell, Raymond Frech, *Economic Development and the Environment: a Comparison of Sustainable Development with Conventional Development Economics*, Mansell, New York : Mansell, 1993.

— and Williams, Larry, *International Banks and the Environment: From Growth to Sustainability, An Unfinished Agenda*, Sierra Club Books, San Francisco, 1992. A clear and elegantly written overview of the evolution of multilateral development banks and the impacts of their recent projects on the environment. Williams is Director of the Sierra Club's International Program, and the book is clearly intended to help increase pressure for bank reform. Unfortunately it was written just before a major World Bank reorganization to create a program for Environmentally Sustainable Development, and hopefully will be updated to take such changes into account.

Mitlin, Diana, "Sustainable Development: A Guide to the Literature", in *Environment and Urbanization*, Vol. 4, No. 1, April 1992. One of the best discussions of the literature, highlighting differences in philosophy advocates from the countries of the North and those of the less-developed nations of the South. According to Mitlin, northerners tend to focus on concepts of ecological sustainablility, while southerners are often more concerned with achieving development that is both equitable and ecological. She further divides authors from the South into two camps: those who argue that economic growth and sustainable development are incompatible and want to re-examine fundamental economic concepts, and those who believe that economic growth can provide the resources to improve people's lives and end current patterns of natural resource exploitation.

— , *Human Settlements and Sustainable Development: the role of human settlements and of human settlement policies in meeting development goals and in addressing the issues of sustainability at global and local levels*, United Nations Centre for Human Settlements, Nairobi, 1990.

Munasinghe, Mohan, *Environmental Economics and Sustainable Development*, World Bank Environment Paper Number 3, The World Bank, Washington, 1993.

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Mvududu, Sara C., *Gender, Environment, and Sustainable Development: Zimbabwe's Case*, Zimbabwe Women's Resource Centre and Network, Harare,
1993.

National Commission on the Environment, *Choosing a Sustainable Future*, Island Press, Washington, D.C. 1993. This official report of a commission appointed by President Clinton and chaired by Russell Train contains lots of italics, boldface and sidebars, but says little new. After many broad statements about economic and environmental goals being "inextricably linked," the Commission's recommendations are surprisingly weak (or perhaps not). It endorses free trade with the usual "safeguards", advocates less polluting cars, emphasizes market mechanisms to promote environmental goals, calls for a gas tax increase of $.20 per year for five years, and recommends adoption of a carbon tax. The report makes little mention of social justice, equity, and consumption issues, or urban development problems generally.

Newson, Malcolm David, *Land, Water, and Development: River Basin Systems and their Sustainable Management*, Routledge, New York, 1992.

Norberg-Hodge, Helena and Goering, Peter, eds., *The Future of Progress: Reflections on Environment & Development*, The International Society for Ecology and Culture, Berkeley, 1992. A wonderful collection of essays questioning current notions of "progress" and "development." Contributors include Vandana Shiva, Edward Goldsmith, Nicholas Hildyard, Wiert Wiertsema, and Martin Khor.

Norgaard, Richard B., *Development Betrayed: The End of Progress and a Coevolutionary Revisioning of the Future*, Routledge, New York, 1994. Believing that "it is impossible to define sustainable development in an operational manner," Norgaard proposes to reframe the challenge as one of the sustainable "coevolution" of human and natural systems. His emphasis is on the process of coevolution rather than any sustainable end-state. This book presents a sweeping critique of the dominant traditions of liberal individualism, modernity, economics and science, and suggests a view of the future as "an evolving patchwork quilt" of changing values and beliefs.

—, "Sustainable Development: A Co-evolutionary View," in *Futures*, Vol. 20, No. 6, 1988, pp. 606-620. This article addresses many aspects of sustainable development and proposes a coevolutionary model in which knowledge, values, organizations, technology and information evolve in organic fashion towards greater sustainability. Norgaard also proposes five dimensions of sustainability for a given geographical region: 1) sustainability of internal agricultural and industrial practices, 2) dependency on non-renewable inputs from outside, 3) cultural sustainability vis-a-vis the exchange of information with the surrounding world, 4) impact of the region on global climate change, and 5) political stability and contribution to global peace.

—, "Co-evolutionary Development Potential," in *Land Economics*, Vol. 60, No. 6, 1984, pp. 160-173.

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— and Warford, Jeremy J., *World Without End: Economics, Environment and Sustainable Development*, Oxford University Press, New York, 1993. This in-depth text on "environmental economics," published for The World Bank, endorses the concept of economic growth and discusses how the environment can be better valued within economic frameworks. The authors differ from "the anti-growth school" in believing that "limits can be avoided...if imaginative policies are devised and implemented." The book focuses its attention on the developing world, and omits discussion of redistribution, exploitation, and overconsumption.

Pezzey, John, *Economic Analysis of Sustainable Growth and Sustainable Development*, The World Bank Department of the Environment, Working Paper No. 15, Washington, D.C. 1989.

—, *Sustainable Development Concepts: An Economic Analysis*, World Bank Environment Paper Number 2, The World Bank, Washington, D.C., 1992.

Pirages, Dennis Clark, ed., *The Sustainable Society: Implications for Limited Growth*, Praeger Publishers, New York, 1977. A good collection of essays from the late 1970s, discussing "the nature of the 'transition' from societies of rapid growth to postindustrial 'sustainable societies' in which rapid growth may well be the exception rather than the rule." Contributors include Herman Daly, Edward Renshaw, William Ophuls, and David Vogel (all men, unfortunately). Useful discussions of concepts such as property rights, redistribution, steady-state economics, and Rawlsian concepts of justice.

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— and Sage, Colin, eds., *Strategies for Sustainable Development: Local Agendas for the Southern Hemisphere*, Wiley, New York, 1994. This volume contains essays by members of the Environment Section at Wye College, London, outlining general controversies surrounding sustainable development as well as describing efforts in specific Third World countries such as the Philippines, Mexico, Ghana and Bolivia. For the most part these reviews conclude that serious efforts at sustainability are unlikely any time soon in these nations, given the magnitude of their indebtedness and social and economic problems.

Rees, William E., *The Ecological Meaning of Environment-Economy Integration*, UBC Planning Papers Discussion Paper #18, UBC, Vancouver, October 1989. Criticizes the artificial separation of the economy from the ecosphere, and addresses topics such as "human carrying capacity" and "the thermodynamics of growth."

—, *Defining "Sustainable Development"*, UBC Centre for Human Settlements, Vancouver, B.C., 1989.

—, Gen. ed., *Planning for Sustainable Development: A Resource Book*, University of British Columbia Centre for Human Settlements, Vancouver, 1989. This volume contains proceedings of a 1988 symposium, which in turn grew out of a series of courses taught in 1987-88 by Rees. Much of it reads like a verbatim transcript of workshop notes, but the beginning presents a direct and readable consideration of sustainability, with a nice first-person description of Brundtland's 1987 speech to the U.N. and Robert Mugabe's response as leader of the non-aligned movement.

—, *Sustainable Development and How to Achieve It*, UBC Planning Papers Discussion Paper #15, School of Community and Regional Planning, UBC, Vancouver, August 1988. This conference address gives a nice overview of the value and paradigm transition necessary for sustainable development, and defines SD as "any form of positive change which does not erode the ecological, social, or political systems upon which society is dependent."

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Repetto, Robert, ed., *The Global Possible: Resources, Development, and the New Century*, Yale University Press, New Haven, 1985. A senior economist at The World Resources Institute, Repetto is one of the leaders in the effort to develop an "ecological economics" that can lead toward sustainable development. This anthology contains articles by Hugh Thomas, George Woodwell, Kristin Shrader-Frechette, Jorge Hardoy and David Satterthwaite, focusing on economic, ethical and natural resource issues surrounding SD. In his overview piece, Repetto discusses how sustainability can be brought about through "proper resource pricing," "managing common resources," "demand management," "designing for efficiency," and "building management capability."

Rich, Bruce, *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*, Beacon Press, Boston, 1994. A discussion of how the

World Bank has historically helped finance unsustainable development, by a leading Bank critic.

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Royal Commission on the Future of the Toronto Waterfront (Canada), *Regeneration : Toronto's Waterfront and the Sustainable City*, City of Toronto, 1992.

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—, *Human Scale*, Coward, McCann & Geoghegan, New York, 1980. A 519-page manifesto for a radically decentralized, sustainable society of small-scale communities, local self-reliance, and bioregional awareness.

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Schneider, Hartmut, ed., *Environmental Education : an Approach to Sustainable Development*, Organisation for Economic Co-operation and Development, Washington, 1993.

Serageldin, Ismail, *Sustainability and the Wealth of Nations: First Steps in an Ongoing Journey*, Preliminary Discussion Draft, The World Bank, Washington, D.C., September 30, 1995. An important conceptualization of how the World Bank can broaden its definitions of "capital" in ways that make sustainable development possible, by the Bank's Vice President for Environmentally Sustainable Development.

—, *Nurturing Development: Aid and Cooperation in Today's Changing World*, The World Bank, Washington, D.C. 1995.

—, *Water Supply, Sanitation, and Environmental Sustainability: The Financing Challenge*, The World Bank, Washington, D.C., 1994.

—, *Toward Sustainable Management of Water Resources*, The World Bank, Washington, D.C., 1995.

—, Cohen, Michael A.; and Leitmann, Josef, *Enabling Sustainable Community Development*, The World Bank, Washington, D.C., 1995.

— and Steer, Andrew, eds., *Making Development Sustainable: From Concepts to Action*, The World Bank, Washington, D.C., 1994. A report edited by the head of the World Bank's new program for Environmentally Sustainable Development and the head of its Environment division, laying out philosophical approaches to sustainability with particular emphasis on economic and financial aspects of sustainable development.

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Shea, Cynthia Pollock, *Employment and Sustainable Development: Opportunities for Canada*, International Institute for Sustainable Development, Winnipeg, 1994.

Shiva, Vandana, ed., *Close to Home: Women Reconnect Ecology, Health and Development Worldwide*, New Society Publishers, Philadelphia, 1994. This collection of articles chronicles the struggles of Third World women to create livable communities in countries such as Sri Lanka, the Philippines, Thailand, and India. Contributors share a strong critique of industrial capitalism and patriarchal structures.

Simonis, Udo Ernst, *Beyond Growth: Elements of Sustainable Development*, Edition Sigma, Berlin, 1990.

Singh, Naresh C. and Titi, Vangile, *Empowerment for Sustainable Development: Towards Operational Strategies: Engaging Stakeholders in Support ofSsustainable Development*, International Institute for Sustainable Development, Winnipeg, 1994.

Sitarz, Daniel, ed., *Agenda 21: The Earth Summit Strategy to Save Our Planet*, Earthpress, Boulder, Colorado, 1993. This volume offers a 300-page abridgment of the Agenda 21 document agreed upon at the 1992 Earth Summit in Rio. Main themes of Agenda 21 include "the quality of life on earth," "efficient use of the earth's natural resources," "the protection of our global commons," "the management of human settlements," "chemicals and the management of waste," and "sustainable economic growth." Within each section, Agenda 21 offers many bulletted lists of recommended actions for national and local governments.

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Smith, E., Sustainable Development Through Northern Conservation Strategies, University of Calgary Press, Calgary, 1990.

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Steady, Filomina Chioma, *Women and Children First: Environment, Poverty, and Sustainable Development*, Schenkman Books, Rochester, Vermont, 1993. An anthology of writings that acknowledge women's fundamental role as managers and protectors of natural resources, their disproportionate poverty and disempowerment, and their efforts to take action towards sustainable development through grass-roots movements. Includes discussions of women's situations in nations such as Senegal,

Egypt, India, Kenya and Costa Rica, as well as a strong article by Vandana Shiva on "The Impoverishment of Women, Children and the Environment."

Sterner, Thomas, *Economic Policies for Sustainable Development*, Kluwer Academic Publishers, Dordecht, The Netherlands, 1994.

Stone, Roger D. and Hamilton, Eve, *Global Economics and the Environment: Toward Sustainable Rural Development in the Third World*, Council on Foreign Relations Press, New York, 1991. Summarizes the findings of a colloquium of experts convened in January 1991 by the Council on Foreign Relations and the World Resources Institute. In somewhat paternalistic fashion, this report spells out a series of steps that the nations of the south will have to take to curb military spending, revise land tenure patterns, reduce population growth, improve methods of taxation, and overcome tendencies to subsidize cities at the expense of the rural poor. Does also criticize nations of the North for taking a net $50 billion from poor countries every year.

Stivers, Robert L., *The Sustainable Society: Ethics and Economic Growth*, Westminster Press, Philadelphia, 1976. One of the first works to specifically mention the word "sustainable" (which Stivers credits to a 1974 World Council of Churches conference). A Lutheran theologian, Stivers emphasizes ethical issues surrounding development, in particular the treatment of the world's poor, and sees advocates of a "sustainable society" as representing a strong critique of notions of growth and progress, which he views (like sociologist Robert Nisbet) as among the most central metaphors in Western thought. Stivers cites E.F. Schumacher, Herman Daly, Donella Meadows et al., and *The Ecologist* as particular influences on the current thinking about sustainability.

Thibodeau, Francis R. and Field, Herman H., eds., *Sustaining Tomorrow: A Strategy for World Conservation and Development*, University Press of New England, Hanover, New Hampshire, 1984.

Tisdell, C.A., *Environmental Economics: Policies for Environmental Management and Sustainable Development*, Edward Elgar, Brookfield, Vermont, 1993.

Tolba, Mostafa Kamal, *Sustainable Development: Constraints and Opportunities*, Butterworths, Boston and London, 1987.

Trainer, Ted, *Abandon Affluence!*, Zed Books, London, 1986. The author issues a strong call for less materialistic ways of living, and argues that development as usually conceived is inherently unsustainable.

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sustainability as well as specific applications for management of environmental resources. Contributors generally reject "radical" deep ecology perspectives in favor of modifications to current economic structures.

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United Nations Economic Commission for Latin America and the Caribbean, *Sustainable Development: Changing Production Patterns, Social Equity and the Environment*, United Nations Economic Commission for Latin America and the Caribbean, Santiago, Chile, 1991.

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van den Bergh, Jeroen and ven der Straaten, Jan, eds., *Toward Sustainable Development: Concepts, Methods, and Policy*, Island Press, Washington, 1994.

van Kooten, G. C., *Land Resource Economics and Sustainable Development: Economic Policies and the Common Good,* UBC Press, Vancouver, 1993.

Vaggi, Gianni, ed., *From the Debt Crisis to Sustainable Development: Changing Perspectives on North-South Relations*, Macmillan Press, New York, 1993.

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Weizsacker, Ernst U. von and Jesinghaus, Jochen, *Ecological Tax Reform: a Policy Proposal for Sustainable Development*, Zed Books, Atlantic Highlands, N.J., 1992.

Welford, Richard, *Environmental Strategy and Sustainable Development: the Corporate Challenge for the Twenty-first Century*, Routledge, New York, 1995.

Willers, Bill, "Sustainable Development: A New World Deception," in *Conservation Biology*, Vol. 8., No. 4, December 1994. The author believes that sustainable development is a code word for "perpetual growth," being used by large corporate and governmental entitities to sugar-coat the creation of a new world order. He argues that overconsuming lifestyle of the First World is well beyond sustainability, and agrees with Daly and Costanza that fundamental notions of economic growth must be challenged.

Williams, Colin C. and Haughton, Graham, eds., *Perspectives Towards Sustainable Environmental Development*, Aldershot, Brookfield, USA, 1994.

Williams, Maurice J. and Petesch, Patti L., *Sustaining the Earth: The Role of Multilateral Development Institutions*, Overseas Development Council, Washington, D.C. 1993.

Williams, Nancy M. and Baines, Graham, eds., *Traditional Ecological Knowledge: Wisdom for Sustainable Development*, Centre for Resource and Environmental Studies, Australian National University, Canberra, 1993.

The World Bank, *Making Development Sustainable: The World Bank Group and the Environment, Fiscal 1994*, Washington, D.C. 1994. This extensive compendium of new environmental initiatives by the World Bank includes discussion of many programs affecting land use and agricultural practices. It is not yet clear the degree to which these are actually affecting sustainability in the countries involved.

— , *Mainstreaming the Environment: The World Bank Group and the Environment Since the Rio Earth Summit*, Washington, D.C., 1995.

—, *Monitoring Environmental Progress: A Report on Work in Progress*, Washington, D.C., 1995.

—, *Environmental Accounting for Sustainable Development: Selected Papers from Joint UNEP/World Bank Workshops*, edited by Yusuf J. Ahmad, Salah El Serafy, Ernst Lutz, The World Bank, Washington, D.C., 1989.

World Commission on Environment and Development, *Our Common Future*, Oxford University Press, New York, 1987. The Brundtland Commission Report, with its frequently-cited definition of sustainable development. The report points out the interlocking nature of current crises and the need for considering the ecological dimensions of policy at the same time as many other dimensions. It also calls for "overriding priority" to be given to the needs of the world's poor, and for an acceptance of "the idea of limitations." On the whole the book is a very readable and even optimistic look at common global concerns, challenges, and opportunities.

—, *Energy 2000: A Global Strategy for Sustainable Development*, Zed Books, London, 1987.

World Conservation Union, *Caring for the Earth: A Strategy for Sustainable Living*, Gland, Switzerland, 1991.

Worster, Donald, *The Wealth of Nature: Environmental History and the Ecological Imagination*, Oxford University Press, New York, 1993. Worster offers an excellent critique of the concept of "sustainable development" in his essay "The Shaky Ground of Sustainable Development" (pp. 144ff), arguing that sustainability is essentially an ecological concept not well suited to economic interpretations; that the concept as defined by Brundtland is highly anthropocentric, seeing the natural world as existing to serve the needs of human beings; and that the concept as developed to date is not sufficiently critical of "the traditional world-view of progressive, secular materialism."

Zimmerman, Michael E., Callicott, J. Baird, Sessions, George, Warren, Karen J., and Clark, John, *Environmental Philosophy: From Animal Rights to Radical Ecology*, Prentice Hall, Englewood Cliffs, New Jersey, 1993. A reader providing background on different approaches to environmental philosophy, including pieces on deep ecology, ecofeminism, social ecology, and environmental ethics. Contains a number of implicit and explicit commentaries on sustainable development.

2. SUSTAINABLE URBAN DEVELOPMENT

Aberley, Doug, *Futures by Design: The Practice of Ecological Planning*, New Society Publishers, Philadelphia, 1994. Coming from a strongly ecological world view, the contributors to this anthology address subjects such as watershed planning, permaculture, ecological restoration, and ecological politics. Short pieces from Gary Snyder, Donella Meadows, Helena Norberg-Hodge, Raymond Dasmann, Jane Jacobs, Richard Register, Mark Roseland, and Janice Perlman are included. The emphasis is on theory and inspiration rather than specific case studies of cities or current planning efforts.

Alexander, Christopher et al., *A Pattern Language: Towns, Buildings, Construction*, Oxford University Press, New York, 1977. Although it does not deal with sustainability per se (and indeed was compiled before the term gained currency), this and other volumes of Alexander's work (e.g. *A New Theory of Urban Design; The Timeless Way of Building*) present a vision of communities which emphasizes wholeness, life and integration. Some of these "patterns" address environmental problems directly, while many others are concerned with promoting a healthy social ecology. Taken as a whole, this design-oriented language is perhaps the most sweeping attempt to date to envision a healthy and sustainable urban ecology.

Barringer, Richard, ed., *Toward a Sustainable Maine: The Politics, Economics and Ethics of Sustainability*, Natural Resources Council of Maine, Augusta, 1993. This volume presents the proceedings a conference with the same title held in March 1993, and includes discussion of measures to meet sustainability objectives such as reducing energy use and automobile use, by authors including Donella Meadows, William Ruckelshaus, Ronald Phillips, and Ellen Golden.

Beesley, Kenneth B., *Sustainable Development and the Rural-Urban Fringe: a Review of the Literature*, Institute of Urban Studies, Winnipeg, Manitoba, 1994.

Berg, Peter, Magilavy, Beryl, and Zuckerman, Seth, *A Green City Program for the San Francisco Bay Area & Beyond, Planet Drum Foundation*, San Francisco, 1990. This slim volume provides a quick overview of many ecological city themes, with specific reference to the Bay Area. Its vision is a light-hearted, joyful one, drawing its energy from the efforts of individual urban residents to make their cities more livable.

Bernstein, Janis D., *Land Use Considerations in Urban Environmental Management*, The World Bank, Washington, D.C., 1994. A clearly organized and useful overview of environmental issues in urban land use, including a comprehensive list of land use control mechanisms to meet objectives of environmental sustainability.

Blowers, Andrew, ed., *Planning for a Sustainable Environment. A Report by the Town and County Planning Association.* Earthscan Publications limited, London, 1993. A thorough consideration of urban planning aspects of sustainable development and other implications of the concept. Book contains many interesting ideas but in a rather dense and theoretical style. Topics covered include land use planning, energy policy, ecosystems and natural resources, pollution and waste, transport, regional planning, and economic development. This book is the product of a Sustainable Development Study Group containing many leading British researchers.

Breheny, M.J., ed., *Sustainable Development and Urban Form*, Pion, London, 1992.

Brown, Lester R. and Jacobson, Jodi L., *The Future of Urbanization: Facing the Ecological and Economic Constraints*, Worldwatch Paper 77, The Worldwatch Institute, Washington, D.C. May 1987. Although not as strong as later Worldwatch papers on similar subjects by Marcia Lowe, this report documents the scope of urban problems in cities around the world, and suggests some directions for "a new ethic of urban development" oriented around "the concept of the city as an ecosystem in which population size and urban form are matched to available resources."

Bruning, Nancy with Holtzclaw, John, *Cities Against Nature*, Children's Press, Chicago, 1992. This sensitively written primer on sustainable urban development is intended to give young readers an overview of the subject. The book is illustrated with photographs from around the world and encourages kids to design their own ecocity.

Cadman, David and Payne, Geoffrey, eds., *The Living City: Towards a Sustainable Future*, Routledge, New York, 1990. A series of papers based on presentations at the Seminar on Future Cities held at Oxford in April 1987, from both mainstream observers and Third World advocates. A number of authors propose a that alternative paths of city development will require a "new economy" based on social justice, a whole range of human needs, and sustainable use of resources.

Callenbach, Ernest, *Ecotopia*, Bantam Books, New York, 1975. This environmental utopia sets forth a vision of a harmonious and sustainable society created with Oregon, Washington, and northern California secede from the Union. Its later companion volume *Ecotopia Emerging* provides further detail of how this society comes about. Though written in highly popularized style, complete with predictable romances, these books paint a remarkably complete picture of an ecological society.

Calthorpe, Peter, Michael Corbett, Andres Duany, Elizabeth Plater-Zyberk, Stefanos Polyzoides, and Elizabeth Moule, *The Ahwahnee Principles,* Local Government Commission, 1991. A very useful list of principles of sustainable design, relating to the development of cities, towns and neighborhoods, as developed by leading new urbanist planners.

Canadian Urban Institute, *Urban Environmental Policy Options*, Working Paper Series WP-2, 1991. Contains a concise list of principles of sustainability as pertaining to urban environments.

Carlson, Daniel with Wormser, Lisa and Ulberg, Cy, *At Road's End: Transportation and Land Use Choices for Communities*, Island Press, Washington, 1995. This handbook by staff members of the Surface Transportation Policy Project discusses ways that better and more sustainable regional transportation and land use can be brought about, especially given opportunities under the 1991 U.S. Intermodal Surface Transportation Efficiency Act. Provides numerous examples and contacts.

Carnoy, Martin and Shearer, Derek, *Economic Democracy: The Challenge of the 1980s*, M.E. Sharpe, Inc., White Plains, 1980. A good overview of concepts appropriate for a sustainable regional economy such as economic democracy, local control, diversity of ownership, and social responsibility.

Carpenter, Richard A., "Ecology meets Economics: A Guide to Sustainable Development," in *Environment*, 27:5, June 1985.

Castro, Juan A. de., *The Internalization of External Environmental Costs and Sustainable Development*, United Nations Conference on Trade and Development, Geneva, Switzerland, 1994.

Center for Politics and Policy, The Claremont Graduate School, *The Power of Convening: Collaborative Policy Forums for Sustainable Development*, California Institute of Public Affairs, Sacramento, 1990. Proceedings of an international workshop held at Claremont College in October, 1989, sponsored by the World Conservation Union. Papers focus on non-adversarial forums to focus on policy questions. Contains an interesting article by Anthony Judge on the metaphor of sustainable development.

Coates, Gary J., ed., *Resettling America: Energy, Ecology and Community*, Brick House, Andover, Massachusetts, 1981. A good anthology of progressive solutions to energy, environmental and social problems, with discussion of alternative communities, compact, pedestrian-oriented development, renewable energy, ecological agriculture, and Buddhist approaches to life.

Cooper-Marcus, Clare, and Sarkissian, Wendy, *Housing As If People Mattered: Site Design Guidelines for Medium-Density Family Housing*, University of California Press, Berkeley, 1986. Beyond just setting forth site design guidelines for one sort of housing, this book presents a vision of how residential areas in general can become more humane and livable, part of a city that really meets the needs of its residents. This work is based on intensive study of U.S., European and Australian housing designs, and considers topics such as landscaping, open space, play areas, parking,

access to dwellings, opportunities for personalization, building form, security and management.

Community Environmental Council, *The Bottom Line: Restructuring for Sustainability*, Santa Barbara, California, 1990; (805-963-0583). This informative policy paper discusses a "least-cost" strategy to sustainable urban development, based on concepts developed by energy experts Amory Lovins and Roger Sant. The authors of this report argue that when ecological impact and resource depletion costs are factored in, the least-cost alternative will generally be the one which helps bring about sustainable patterns of development and resource use.

—, *Sustainable Community Indicators: Guideposts for Local Planning*, Santa Barbara, CA, 1995. This 55-page paper presents results from two workshops held by the Gildea Resource Center in December 1994, looking at how sustainability indicators can help California communities identify and monitor economic, social and environmental goals. Indicator programs in Seattle, Santa Monica and Cambridge MA are discussed specifically. Available from CED, 930 Miramonte Drive, Santa Barbara CA 93109; (805) 963-0583.

Context Institute, *Eco-Villages and Sustainable Communities*, 1991. This 213-page compendium of information on ecological grass-roots communities was compiled for Gaia Trust by the staff of *In Context* magazine. It includes several-page descriptions of dozens of eco-projects around the world, including co-housing developments in Denmark, intentional communities in the United States, and innovative ecological developments such as Auroville in India. Available from the Context Institute, Box 11470, Bainbridge Island, WA 98110, USA; phone (206) 842-0216; fax (206) 842-5208.

Corbett, Michael N., with Corbett, Judy and Klein, John, *A Better Place to Live: New Designs for Tomorrow's Communities*, Rodale Press, Emmaus, Pennsylvania, 1981. Building on Ian McHarg's *Design With Nature*, Corbett lays out a new vision of garden city development, of which his Village Homes project in Davis, California is an example. This popularly written, illustrated paperback explores concepts such as location, energy, drainage, landscaping, and on-site food production, and develops the concept of the "appropriate planning area" as a new tool for urban planning.

Cossey, Keith M., *Co-operative Strategies for Sustainable Communities: Community-Based Development Organizations*, Rural and Small Town Research and Studies Programme, Dept. of Geography, Mount Allison University, Sackville, N.B., Canada, 1990.

Council of Europe, *The challenges facing European society with the approach of the year 2000: role and representation of women in urban and regional planning aiming at sustainable development : reports and conclusions of the colloquy*, Council of Europe Press, Strasbourg, 1994.

— , *The challenges facing European society with the approach of the year 2000: strategies for sustainable development in urban regions in Europe.* Council of Europe Press, Strasbourg, 1994.

— , *The Challenges facing European society with the approach of the year 2000: the outlook for sustainable development and its implications on regional/spatial planning*, Council of Europe Press, Strasbourg, 1993.

Deelstra, T.; van Emden, H.M.; de Hoop, W.H.; and Jongman, R.H.G., *The Resourceful City: Management Approaches to Efficient Cities Fit to Live In*, Royal Netherlands Academy of Arts and Sciences, Amsterdam, 1989. Proceedings of a 1989 symposium, briefly summarizing efforts taken under Unesco's Man and Biosphere Programme, including projects in Hong Kong, Frankfurt, Rome, Gotland, New Guinea, Buenos Aires, Seoul.

Downton, Paul F. and Munn, David, *Urban Ecology Annotated Bibliography*, The Centre for Urban Ecology, Adelaide, Australia, 1993 (fax/phone 61-8 232 4866). This 165-page bibliography contains entries for 33 topics, including architecture, ecological design, energy, food production, local government, transport, art and utopias. Many publications listed are Australian or British in origin, and the emphasis is on publications contributing to the vision of sustainability rather than focusing on sustainability per se. Nevertheless, this is perhaps the single best bibliography yet on the subject.

Eichler, Margit, ed., *Change of Plans: Towards a Non-Sexist Sustainable City*, Garamond Press, Toronto, 1995.

Elkin, Tim and McLaren, Duncan, with Hillman, Mayer, *Reviving the City: Towards Sustainable Urban Development*, Friends of the Earth, London, 1991. A good overview of sustainable urban development issues, but with most emphasis on energy and pollution, and relatively little on land use.

Elsenaar, Peter M. W. and Fanoy, Jeroen A., "Urban Transport and Sustainable Development in the Netherlands", in *ITE* journal. Vol. 63, no. 8, Aug. 1993.

Engwicht, David, *Reclaiming Our Cities & Towns: Better Living with Less Traffic*, New Society Publishers, Philadelphia, 1993. One of the most stirring manifestos against automobiles, in which the author, an Australian freeway fighter, details how cars destroy the urban environment and lays out proposals for a more ecological, human-oriented approach to urban design.

Environmental Enterprise Center, *EverGreen Community Environmental Success Stories*, Victoria, British Columbia, 1994; (604-361-2613). This compendium provides brief descriptions of programs that have successfully improved the environment of

American and Canadian cities, as well as addresses and contact names. It was advertised as a subscription service in 1994. Recent attempts to contact the Center have been unsuccessful, and it may no longer be in business.

European Conference of Ministers of Transport, *Urban Travel and Sustainable Development,* Organization of Economic Cooperation and Development, Paris, 1995.

Farallones Institute, *The Integral Urban House: Self-Reliant Living in the City*, Sierra Club Books, San Francisco, 1979. This classic 1970s exploration of urban sustainability, by a team led by architect Sim Van der Ryn, emphasizes energy conservation, solar energy, urban agriculture, water conservation, and "integral design." Though the project focuses on a specific "integral urban house" in Berkeley, the book is a compendium of useful theory and fact concerning these subjects.

Gertler, Len, *Habitat and Land*, University of British Columbia Press, Vancouver, 1978. The first in a series of reports issued by the Centre for Human Settlements, as a follow-up to the 1976 U.N. Habitat conference. Provides a good summary of the land policy experience in France, Sweden, Singapore, India, Denmark, the Netherlands, and other countries, with emphasis on various means to recapture the unearned increment in land value. Such policies can help set the basis for sustainable land use.

Girardet, Herbert, *The GAIA Atlas of Cities: New Directions in Sustainable Urban Living*, Anchor Books/Doubleday, New York, 1992. This stunningly illustrated, highly entertaining "atlas" gives a quick overview of urban history, problems and futures, with emphasis on the megacities of the Third World. The book's final section, "Healing the City," summarizes themes such as urban greening, energy efficiency, recycling, alternative transport, and traffic calming.

Global Cities Project, *Building Sustainable Communities: An Environmental Guide for Local Government*, The Center for the Study of Law and Politics, San Francisco, 1991 Copies available from The Global Cities Project, 2962 Fillmore St., San Francisco CA 94123; (415) 775-0791; fax: (415) 775-4159. This series of handbooks provides detailed, specific suggests on things that local governments can do to make their communities more sustainable. Different volumes of this series cover subjects such as water conservation, solid waste, toxics, transportation, energy, land use, air quality, greenhouse gases, urban forestry, open space, water quality, and environmental management. Each handbook contains more than 20 different initiatives on the given topic, as well as draft city council resolutions and ordinances. Many examples are given of successful programs, primarily from cities in California. The target audience is urban planners and local government officials.

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

Gordon, Deborah, *Steering a New Course: Transportation, Energy, and the Environment*, Island Press, Washington, D.C., 1991. A thorough review of the current transportation situation in the U.S., chronicling the rise of the automobile and the decline of mass transit, and examining the prospects for alternative fuels, ultra-efficient vehicles, non-automobile transportation strategies, and economic incentives for reduced car use.

Greenbelt Alliance, *Reviving the Sustainable Metropolis: Guiding Bay Area Conservation and Development into the 21st Century*, Greenbelt Alliance, San Francisco, 1989?. This 26-page report summarizes historical efforts at regional planning and emphasizes principles for creating vigorous central business districts and compact residential communities. The emphasis is on the creation of a greenbelt and urban limit lines; revitalization of metropolitan centers and subcenters; efficient land use within these urban areas; and community design processes to create livable neighborhoods. The authors outline the vision of "a constellation of towns and cities that, by virtue of their physical arrangement and interdependent organization, can continue to offer those who live here a satisfying life — environmentally and economically — ten, fifty, and even one hundred years from now."

Hall, Peter, *Can Cities Be Sustainable?*, paper prepared for the Second Annual World Bank Conference on Environmentally Sustainable Development, Washington, D.C. September 1994. A highly interesting analysis of current urban land use and transportation trends, primarily for European countries, with extensive discussion of how more sustainable patterns can be attained.

Hardoy, Jorge E., Mitlin, Diana, and Satterthwaite, David, *Environmental Problems in Third World Cities*, EarthScan Publications, London, 1992. Includes a large chapter on "Sustainable Development and Cities," focusing on environmental problems in Third World urban areas, and some discussion of the role of international agencies. The focus is on environmental and infrastructure issues, rather than transportation, land use, equity, or other social issues.

—, *Environment and Urbanization* (journal), Institute for Environment and Development, London, 1989-. This publication has provided a steady stream of articles on the subject of sustainable urban development, with a particular emphasis on Third World cities. Volume 4, Number 1 (April 1992) focused on "Sustainable Development and the Global Commons: A Third World Reassessment," and Volume 4, Number 2 (October 1992) focused on "Sustainable Cities: Meeting Needs, Reducing Resource Use, and Recycling, Re-use and Reclamation."

Hart, John, *Saving Cities, Saving Money: Environmental Strategies That Work*, Resource Renewal Institute, Sausalito, CA 1992. This highly readable paperback summarizes innovative government programs presented at RRI's first international environmental workshop held March 1991 in San Rafael. The book describes existing programs that have helped cities conserve energy, reduce transportation needs, or develop an overall

sustainable city vision. Cities showcased include San Jose, California; Freiburg, Germany; Zurich, Switzerland; and Toronto, Canada.

Hayden, Dolores, *Redesigning the American Dream: The Future of Housing, Work, and Family Life*, W.W. Norton, New York, 1984. Although it does not address the topic of sustainability per se, this feminist critique of the built environment suggests many directions for making homes, neighborhoods and entire cities better able to fit the needs of many people, especially women.

Hayes, Denis, *Repairs, Reuse, Recycling — First Steps Toward a Sustainable Society*, Worldwatch Institute, Washington, D.C., 1978. One of the earliest discussions of sustainable materials use, with consideration of many actual efforts toward this end, by the organizer of Earth Day 1970 and 1990.

Hester, Randolph T., Jr., *Community Design Primer*, Ridge Times Press, Mendocino, California, 1990. One important element of sustainable urban development is likely to be the involvement of local communities in the planning process. This manual for community design professionals and activists contains guidelines based on surveys of nearly 50 active practitioners, as well as case studies and exercises that challenge the reader to develop his or her own community design skills.

Holmes, Deirdre Elske, *Sustainable City Planning: Principles and Processes Toward Green City Building*, UCLA (Dissertation), 1995.

Hough, Michael, *City Form and Natural Process: Towards a New Urban Vernacular*, Routledge, New York, 1984. Citing "an urgent need for an alternative basis for urban landscape form that is in tune with the growing awareness of, and concern for, the issues of energy, environment and natural resource conservation," Hough calls for a new vision of "urban ecology" and an "alternative design language" tied to natural factors such as climate, water, plants, wildlife and agriculture. The emphasis of this readable, illustrated volume is very much on landscape design rather than discussion of architecture, transportation, housing, or social issues.

Jacobs, Allan and Appleyard, Donald, "Toward an Urban Design Manifesto," *APA Journal*, Winter 1987. A list of principles for good urban design very much in harmony with others developed by Kevin Lynch, Calthorpe et al., and Weissman and Corbett.

International Society of City and Regional Planners, *Cultural Identities and Unity: Towards Planning for Sustainable Development at a Supra-national Level,* (Final Report of 1992 Conference in Cordoba, Spain), International Society of City and Regional Planners, The Hague, 1993.

Katz, Peter, *The New Urbanism: Toward an Architecture of Community*, McGraw-Hill, New York, 1994. This nicely produced, stunningly illustrated book provides many

examples of the work of Peter Calthorpe, Andres Duany, Elizabeth Plater-Zyberk, and other "new urbanist" planners. Although such planning is often seen as an important part of sustainable urban development, many of these projects adopt fairly conventional design approaches. In his afterward, Vincent Scully suggests that the movement might better be called "the new suburbanism."

Kunstler, James Howard, *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape*, Simon & Schuster, New York, 1993. Kunstler offers one of the best critiques of the American landscape in years, and suggests a few directions for improvement, relying heavily on "new urbanist" ideas. Sustainability is not specifically discussed, but this work effectively sets the stage for such discussions.

Lovins, Amory B., *Soft Energy Paths: Toward A Durable Peace*, Friends of the Earth, San Francisco, 1977. A classic manifesto outlining a potential transition to renewable energy sources appropriate for a sustainable society.

Lowe, Marcia D., *Alternatives to the Automobile: Transport for Livable Cities*, Worldwatch Paper 98, The Worldwatch Institute, Washington, D.C., October 1990. A sweeping indictment of the automobile, with considerations of many alternatives that can improve the well-being of cities, such as measures to improve public transport, walking and bicycling. As usual with Worldwatch papers, this one takes a strongly global perspective and presents many examples of policies that are working to reduce automobile traffic in the world's cities.

—, *Shaping Cities: The Environmental and Human Dimensions*, Worldwatch Paper 105, The Worldwatch Institute, Washington, D.C., October 1991. An excellent, concise overview of ways that cities can be made more sustainable, including discussions of urban form, transportation, energy use, water use, housing, land use, and social justice issues, with examples from around the globe.

Lyle, John Tillman, *Regenerative Design for Sustainable Development*, John Wiley & Sons, New York, 1994. Covering both theoretical and practical aspects of ecological design, this volume emphasizes how sustainable development relies on the interaction of numerous systems working in harmony with one another. Specific topics covered include solar design, water conservation, waste assimilation, and building construction.

Lynch, Kevin, *A Theory of Good City Form*, MIT Press, Cambridge, 1981. Though not focused on urban sustainability, this volume provides the best available overview of theories of urban form and design. Lynch also includes extensive discussion of the ideal values underlying good city form, which are fairly similar to those of sustainable city activists though with less of an ecological emphasis, and describes his own personal utopian urban form, which is basically a patchwork of urban communities separated by well-defined green space.

, "City Design and City Appearance," in *Principles and Practice of Urban Planning*, International City Managers Association, 1968. Includes a brief list of ideal urban values according to Lynch.

McCamant, Kathryn and Durrett, Charles, *Co-Housing: A Contemporary Approach to Housing Ourselves*, Second Edition, Ten Speed Press, Berkeley, 1994. New forms of shared housing can help knit human communities together and lead towards more sustainable lifestyles, and cohousing is perhaps the best known such alternative currently. This influential work provides an overview of cohousing projects in Demark and the U.S., by two of the leading designers of cohousing communities.

McHarg, Ian, *Design With Nature*, Falcon Press, Philadelphia, 1969. This classic work offers an overview of ecological site analysis and selection, showing how overlay maps and other tools can help take into account factors such as topography, vegetation, sun, wind, drainage, and agricultural potential.

Maclaren, Virginia White, *Sustainable Urban Development in Canada: From Concept to Practice*, ICURR Press, Toronto, 1992.

Meier, Richard L., "The Way to Sustain Poor Cities," in *Environment and Urbanization*, Vol. 5, No. 2, October 1993. The author presents a "flow-through model" of the community ecosystem, and argues for a broad approach to sustainable development combining the efforts of industrial countries and the Third World.

Mitlin, Diana and Satterthwaite, David, *Human Settlements and Sustainable Development*, United Nations Centre for Human Settlements, Nairobi, 1990. Commenting that "only a tiny proportion of the literature considers human settlements aspects of sustainable development," the authors seek to develop "a human settlements approach to sustainable development," after discussing recent interpretations of both "development" and "sustainability." This approach concentrates on issues of shelter, water supply, sanitation and drainage, garbage collection, transport, energy, building materials, and land use management. The tone of this paper is relatively academic, and it provides a useful theoretical framework but few specifics. In his forward, UNCHS director A. Ramachandran describes sustainable development as an effort "to combine and, thus, to resolve the apparently competing demands of economic growth, social equity and eco-system viability".

Morehouse, Ward, ed., *Building Sustainable Communities: Tools and Concepts for Self-Reliant Economic Change*, Bootstrap Press, New York, 1989. The main contributors to this book, Bob Swann, Shann Turnbull, and George Benello, are active members of the E.F. Schumacher Society, and the book itself was published as a project of that alternative forum known as The Other Economic Summit. The authors advocate "bottom up" economic transformation, and discuss mechanisms such as community land trusts, community self-management, and community banking and currency systems.

Morris, David, *Self-Reliant Cities: Energy and the Transformation of Urban America*, Sierra Club Books, San Francisco, 1982. Looks at the ways changes in energy sources and technologies have influenced the growth of cities, and how more "humanly scaled energy systems" can help lead to more ecological cities. Touches on transportation, government, urban finance, and means for cities to gain greater independence and self-reliance.

Mumford, Lewis, *The Culture of Cities*, Harcourt, Brace and Company, New York, 1938. One of the many works by Mumford outlining his philosophies of urban development, this one providing background on his ideal image of urban development.

Newman, Peter and Kenworthy, Jeff, with Robinson, Les, *Winning Back the Cities*, Australian Consumers' Association, Marrickville, New South Wales, 1992. This booklet from two of the leading authorities on the relationship between automobile dependence and urban form presents examples of attractive and successful communities where automobile use has been substantially reduced.

—, *Cities and Automobile Dependence: A Sourcebook*, Gower Technical, Brookfield, Vermont, 1989.

Nozick, Marcia, *No Place Like Home: Building Sustainable Communities*, Canadian Council on Social Development, Ottawa, 1992. In this paperback volume, Nozick focuses on ways to build self-sufficient local communities, following the principles of E.F. Schumacher and others. Although much of the book consists of theoretical discussions of alternative development themes, it does include some brief descriptions of community empowerment projects.

Patricios, Nicholas N., ed., *International Handbook on Land Use Planning*, Greenwood Press, New York, 1986. An extremely comprehensive and thorough discussion of land use planning in Asian, African and Latin American countries, with a nice introduction and international comparison. Provides useful background with which to consider specific mechanism for sustainable land use patterns.

Pollock, Cynthia, *Mining Urban Wastes: The Potential for Recycling*, Worldwatch Paper 76, The Worldwatch Institute, Washington, D.C., April 1987.

Rees, William E. and Roseland, Mark, "Sustainable Communities: Planning for the 21st Century," *Plan Canada*, 31:3, May 1991. The article provides a brief review of the background of the sustainable development concept and surveys some main approaches to the development of more sustainable cities, focusing on improved land use patterns, reduced automobile dependency, local initiatives to cut CO2 emissions, and reduced consumption of resources. A number of international initiatives toward these directions are cited.

Register, Richard, *Ecocity Berkeley: Building Cities for a Healthy Future*, North Atlantic Books, Berkeley, 1987. This visionary look at how ecological cities can be created goes beyond most other writings on the subject to suggest how a built-out, gridded American city (in this case Berkeley, California) can be reshaped into a collection of urban villages surrounded by restored natural areas. Register sets forth basic principles of ecocity building ("life, beauty, equity"), and discusses many design strategies for attaining them. One of the most long-term, visionary approaches to the topic.

Renner, Michael, *Jobs in a Sustainable Economy*, Worldwatch Paper 104, The Worldwatch Institute, Washington, D.C., September 1991. Sustainable cities will require a sustainable economic base, and this report provides an excellent, concise summary of ways that existing economies can move in this direction. Renner discusses pollution abatement and control, energy efficiency, renewable resource use, use of railroads instead of highways for transport, and more ecological manufacturing. Useful tables summarize energy use and toxics produced by industrial sector.

Replogle, Michael A., "Sustainable Transportation Strategies for Third-World Development, in *Transportation Research Record*, No. 1294, 1991.

—, "Transportation Strategies for Sustainable Development", in World Conference on Transport Research, *Transport Policy, Management & Technology towards 2001*, Vol. 3, Western Periodicals Co., Ventura, CA, 1989.

Richardson, Nigel, *Land Use Planning and Sustainable Development in Canada*, Canadian Environmental Advisory Council, Ottawa, 1989. A report commissioned by the CEAC, giving a concise history of land use planning in Canada, and discussion international examples of sustainable planning such as river restoration in the U.K., the New Zealand "green city" program, and the New Jersey Pinelands Commission. Defines sustainable urban development as "a process of change in the built environment which fosters economic development while conserving resources and promoting the health of the individual, the community and the ecosystem" (p. 14).

Roseland, Mark, *Toward Sustainable Communities: A Resource Book for Municipal and Local Governments*, Government of Canada, Ottawa, 1992 (available from the National Round Table on the Environment and the Economy; 613-992-7189). This popularly-written paperback offers brief descriptions of a great many books, organizations, and local initiatives contributing to sustainable urban development. Many of the examples given are Canadian, although there is also a considerable amount of material from the U.S. and Europe.

Russell, Richard Dana, *Sustainable Design and the Building/Development Process Principles, Participants, Conflicts, and Strategies*, dissertation, UCB?, 1988.

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Community Principles:

- All planning should be in the form of complete and integrated communities containing housing, shops, work places, schools, parks and civic facilities essential to the daily life of the residents.

- Community size should be designed so that housing, jobs, daily needs and other activities are within easy walking distance of each other.

- As many activities as possible should be located within easy walking distance of transit stops.

- A community should contain a diversity of housing types to enable citizens from a wide range of economic levels and age groups to live within its boundaries.

- Businesses within the community should provide a range of job types for the community's residents.

- The location and character of the community should be consistent with a larger transit network.

- The community should have a center focus that combines commercial, civic, cultural and recreational uses.

- The community should contain an ample supply of specialized open space in the form of squares, greens and parks whose frequent use is encouraged through placement and design.

- Public spaces should be designed to encourage the attention and presence of people at all hours of the day and night.

- Each community or cluster of communities should have a well defined edge, such as agricultural greenbelts or wildlife corridors, permanently protected from development.

- Streets, pedestrian paths and bike paths should contribute to a system of fully-connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees and lighting; and by discouraging high speed traffic.

- Wherever possible, the natural terrain, drainage, and vegetation of the community should be preserved with superior examples contained within parks or greenbelts.

- The community design should help conserve resources and minimize waste.

- Communities should provide for the efficient use of water through the use of natural drainage, drought tolerant landscaping and recycling.

- The street orientation, the placement of buildings and the use of shading should contribute to the energy efficiency of the community.

Regional Principles:

- The regional land use planning structure should be integrated within a larger transportation network built around transit rather than freeways.

- Regions should be bounded by and provide a continuous system of greenbelt/wildlife corridors to be determined by natural conditions.

- Regional institutions and services (government, stadiums, museums, etc.) should be located in the urban core.

- Materials and methods of construction should be specific to the region, exhibiting continuity of history and culture and compatibility with the climate to encourage the development of local character and community identity.

Implementation Principles:

- The general plan should be updated to incorporate the above principles.

- Rather than allowing developer-initiated, piecemeal development, local governments should take charge of the planning process. General plans should designate where new growth, infill or redevelopment will be allowed to occur.

- Prior to any development, a specific plan should be prepared based on the planning principles. With the adoption of specific plans, complying projects could proceed with minimal delay.

- Plans should be developed through an open process and participants in the process should be provided visual models of all planning proposals.

APPENDIX B: THE HANOVER PRINCIPLES OF DESIGN FOR SUSTAINABILITY

The Hanover Principles were developed by the City of Hanover, Germany in response to being designated as the site of the world exposition in the year 2000.

1. Insist on the rights of humanity and nature to coexist in a healthy, supportive, diverse, and sustainable condition.

2. Recognize interdependence. The elements of human design interact with and depend on the natural world, with broad and diverse implications at every scale. Expand design considerations to recognize even distant effects.

3. Recognize relationships between spirit and matter. Consider all aspects of human settlement including community, dwelling, industry, and trade in terms of existing and evolving connections between spiritual and material consciousness.

4. Accept responsibility for the consequences of design decisions upon human well-being, the viability of natural systems, and their right to co-exist.

5. Create safe objects of long term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creations of products, processes, or standards.

6. Eliminate the concept of waste. Evaluate and optimize the full life-cycle of products and processes, to approach the state of natural systems in which there is no waste.

7. Rely on natural energy flows. Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and safely for responsible use.

8. Understand the limitations of design. No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility in the face of nature. Treat nature as a model and mentor, not an inconvenience to be evaded or controlled.

9. Seek constant improvements by sharing knowledge. Encourage direct and open communication between colleagues, patrons, manufacturers, and users to link long-term sustainable considerations with ethical responsibility, and re-establish the integral relationship between natural processes and human activity.