TOWARD SUSTAINABLE COMMUNITIES:
A Planning Framework for Municipal and Local Governments

by

MARK ROSELAND

B.A., Wesleyan University, 1978
M.A.L.S., Wesleyan University, 1979

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES
School of Community and Regional Planning

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

September 1992

© Mark Roseland, 1992
In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

(Signature)

Department of Community & Regional Planning

The University of British Columbia
Vancouver, Canada

Date October 15, 1992
Abstract

Some municipal and local governments are expanding their role in sustainable development, but little is known about the nature and extent of these initiatives. This study develops an urban-relevant understanding of sustainable development, then explores the role of North American human settlements in achieving sustainable development and the community-level planning implications of that role. It proposes a framework for sustainable community development, then identifies and evaluates the current range of relevant municipal and local government initiatives.

The study data consist of case studies and examples of specific municipal and local government initiatives. Data sources were libraries, computerized databases, and networking. Hundreds of references and initiatives were identified, documented and reviewed. The focus of the data search was on the range of initiatives being practiced or proposed by municipal and local governments.

The study develops the argument that sustainable communities require unprecedented and simultaneous emphasis on the efficient use of urban space (e.g., intensifying urban land use, increasing infrastructural efficiency); on reducing consumption of material and energy resources (e.g., generally minimizing the consumption of essential natural capital, encouraging regional self-reliance); on improving community livability (e.g., community development, healthy communities); and on organizing administrative and planning processes which can deal effectively, sensitively and comprehensively with the attendant socioeconomic complexities.

The initiatives are categorized according to these criteria. Efficient Use of Urban Space includes transportation planning and traffic management, and land use and growth management. Reducing Resource Consumption encompasses atmospheric change and air quality, energy conservation and efficiency, waste reduction and recycling, and water and sewage. Improving Community Livability includes initiatives to green the city, develop a sustainable economy, and enhance both local community livability and global community responsibility. Administration for Sustainability encompasses investment and purchasing, leadership by example, environmental administration, and extending beyond municipal and local government.

The study concludes that the elements for moving toward sustainable communities are being put in place but not, as yet, the necessary synthesis. The criteria of efficient use of urban space, reducing resource consumption, improving community livability, and administration for sustainability are necessary conditions for sustainable community development.
# Table of Contents

Title Page

Abstract ii

Table of Contents iii

List of Tables v

List of Figures vi

Acknowledgements vii

I. Introduction 1

  Statement of Purpose 1

  Problem Statement and Research Objectives 3

  Methods 4

  Scope of the Study 6

  Nature and Order of Presentation 7

II. The Meaning of Sustainable Development 12

  The Meaning of Sustainable 15

  The Meaning of Development 19

  Is Planning Theory Relevant to Sustainable Development? 22

  Greener Pastures 25

  The Meaning of Sustainable Development 33

III. Toward Sustainable Communities 39

  The Unsustainable Community 41

  The Sustainable Community 42

  Sustainability by Design 45

  Local Governments for Sustainable Communities 54

  A Framework for Sustainable Community Development 57
IV. Municipal and Local Government Sustainable Development Initiatives 58

Introduction 58

Efficient Use of Urban Space
4-A. Transportation Planning and Traffic Management 59
4-B. Land Use and Growth Management 64

Reducing Resource Consumption
4-C. Atmospheric Change and Air Quality 68
4-D. Energy Conservation and Efficiency 74
4-E. Waste Reduction and Recycling 79
4-F. Water and Sewage 83

Improving Community Livability
4-G. Greening the City 86
4-H. Economic Development 89
4-I. Community Development 93

Administration for Sustainability
4-J. Investment and Purchasing 97
4-K. Leadership by Example 100
4-L. Environmental Administration 103
4-M. Beyond Municipal and Local Government 106

V. Conclusions and Discussion 108

General Conclusions 120

Suggested Areas for Further Research 122

Toward Sustainable Communities 125

References 130

Annotated Bibliography: Sustainable Development and Sustainable Communities 153

Appendix 1: Detailed Descriptions of Sustainable Community Initiatives 166

Appendix 2: Tools for Designing Sustainable Community Development Initiatives 202
List of Tables

2-1 Selected Global Economic Indicators 13
2-2 Selected Global Environmental Indicators 14
2-3 The Four Traditions of Planning Theory 23
3-1 Local Government Styles of Response With Respect to Global Warming 55
4-A Transportation Planning and Traffic Management 62
4-B Land Use and Growth Management 66
4-C Atmospheric Change and Air Quality 72
4-D Energy Conservation and Efficiency 77
4-E Waste Reduction and Recycling 81
4-F Water and Sewage 85
4-G Greening the City 88
4-H Economic Development 92
4-I Community Development 95
4-J Investment and Purchasing 98
4-K Leadership by Example 102
4-L Environmental Administration 105
4-M Beyond Municipal and Local Government 107
List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>A Planning Framework for Sustainable Community Development</td>
<td>9</td>
</tr>
<tr>
<td>1-2</td>
<td>Typology of Initiatives</td>
<td>10</td>
</tr>
<tr>
<td>3-1a</td>
<td>Before Development</td>
<td>46</td>
</tr>
<tr>
<td>3-1b</td>
<td>After Conventional Development</td>
<td>47</td>
</tr>
<tr>
<td>3-1c</td>
<td>After Creative Development</td>
<td>48</td>
</tr>
<tr>
<td>3-2</td>
<td>An Urban Cooperative Block</td>
<td>49</td>
</tr>
<tr>
<td>3-3</td>
<td>A Sustainable City Vision</td>
<td>51</td>
</tr>
<tr>
<td>3-4</td>
<td>A Nodal Vision of Urban Development</td>
<td>52</td>
</tr>
</tbody>
</table>
Acknowledgements

This study could not have been completed without the inspiration and support of my research committee. I am particularly obliged to my research supervisor, William E. Rees, and to Peter Boothroyd for reading and commenting on a seemingly endless series of dissertation drafts. I am also grateful to Brahm Wiesman of the University of British Columbia's School of Community and Regional Planning, Councilmember Nancy Skinner of the Berkeley, California City Council, Michael Repogle of the Institute for Transportation and Development Policy in Washington, D.C., and Jeb Brugmann of the International Council for Local Environmental Initiatives for reviewing parts of the manuscript.

Thanks also to my many friends and colleagues, especially Mike Beazley, Dianna Colnett, Dorli Duffy, Julia Gardner, Julian Griggs, Donna Sanford, and Mathis Wackernagel for unfailing encouragement and support, and to Renée Roseland for graciously tolerating the years I seemed married only to this study.

Finally, I must acknowledge the municipal and local government politicians, staff and citizen activists around the world who developed the wide array of initiatives that make this study possible and who shared their data and their time with me. Your efforts to create a sustainable future have sustained me as well.
Chapter One: Introduction

Chapter 1 Introduction

Statement of Purpose

The purpose of this study is to stimulate and inform discussion about the community role in sustainable development and to broaden our understanding of the opportunities for sustainable community development activity. The study aims first to develop an urban-relevant understanding of sustainable development, then to explore the role of North American human settlements in achieving sustainable development and the community-level planning implications of that role. To examine the extent to which communities in North America can contribute to achieving sustainable development, it proposes a framework for sustainable community development and then identifies and documents the current range of relevant municipal and local government initiatives.

Much of the debate over the meaning of sustainable development focuses on the tension between the economic necessity for material growth and the ecological reality of limits. In Chapter Two I look closely at the meaning of the "sustainable" component of sustainable development and argue that from the ecological perspective "sustainability" requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding further irreversible damage to any single significant asset.

The debate over the meaning of "development" is at least as contentious as the debate over "sustainable." I argue that the "development" component of sustainable development can be described in terms of a social change process for fulfilling human needs, advancing social equity, expanding organizational effectiveness, and building capacity toward sustainability.

From this perspective, sustainable development can be seen as having the following components: 1) it is a social change process for fulfilling human needs and advancing social equity; 2) it requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding irreversible damage to any single significant asset; and 3) it is a process of expanding organizational effectiveness and building capacity toward sustainability.

1 Throughout this study the term "community" is used to refer to geographic communities (as opposed to communities of interest, race, etc.) represented by a municipal or local government.
sustainability. This definition of sustainable development has profound political, social and economic implications, which are discussed in Chapter Two.

In Chapter Three I explore the planning implications of sustainable development for North American communities and the municipal and local governments that represent them. While there has been considerable attention in recent years to thinking globally (e.g., the Montreal Accord on stratospheric ozone protection), relatively little attention has been devoted to examining local activity within this global context. Our communities as presently planned and developed are not sustainable in a global ecological sense. A typical North American city of 100,000 inhabitants imports 200 tons of food, 1000 tons of fuel, and 62,000 tons of water every day; it exports 100,000 tons of garbage and 40,000 tons of human waste each year (Morris 1990). Indeed, it is these unsustainably "developed" cities of the world that produce most of the world's solid and liquid wastes, consume most of the world's fossil fuels, emit the majority of ozone depleting compounds and toxic gases, and give economic incentive to the clearing of the world's forests (UNEP 1990).

Seemingly ordinary local planning and development decisions have a significant impact on global environmental sustainability. Although local governments are not the only agencies charged with community planning and development, they are the only locally elected, representative and accountable bodies responsible for community decision-making. This makes them critical players in the movement toward sustainable communities.

In September 1990, the World Congress of Local Governments for a Sustainable Future was held at the United Nations in New York City. Local government officials from some 45 countries around the world gathered at this historic event to discuss the role of local government in addressing global environmental problems. They recognized that local governments have been timid to act not only because resources at the local government level have been scarce, but even more because they have been inhibited by a narrow and ineffectual conception of the domain of local government concern (UNEP 1990).

In this context of growing concern over global environmental problems, the purpose of this study is to stimulate and inform discussion about the community role in sustainable development and to broaden our understanding of the opportunities for sustainable community development activity. This study demonstrates that a vision of sustainable communities is beginning to emerge and that creative, transferable solutions to seemingly intractable sustainable development challenges are being developed by municipal officials and citizen organizations in communities across North America. However, as yet no major community
has come forward to embrace the image of itself as a sustainable community and use that image to build its future.

This study aims to develop a framework which could itself contribute to sustainable community development. It attempts in part to bridge the gap between conventional community development concerns (of, e.g., local decision-making and self-reliance, cooperative endeavor and broad participation in community affairs) with more recent sustainability concerns. It shows that local governments can enable both self-reliance and sustainability by turning liabilities into assets (e.g., waste heat into electricity cogeneration) and by making a connection between local production and local consumption which contributes toward the internal development of the community.

The movement toward sustainable communities is guided by community leaders who have participated in the initiatives described in this study. Sustainable communities of the future are being constructed by social invention today.

Problem Statement and Research Objectives

Problem Statement

Sustainable development has important implications for urban form, for the material basis of urban life, and for community social relationships that must be expressed as practical measures in planning North American communities. Some municipal and local governments (e.g., Toronto, Vancouver) are expanding their role in sustainable development, but little is known about the nature and extent of these initiatives. A recent study published by the Intergovernmental Committee on Urban and Regional Research (Maclaren 1992) notes that:

"... there has been little analysis of the methods for and implications of adopting sustainable development practices at the local level. In the absence of such research, municipalities attempting to resolve pressures in the urban environment are lacking in guidance about what sustainable development initiatives are possible..."

Research Objectives

The research objectives of this study are to:

1) develop an urban-relevant understanding of sustainable development, grounded in the broader theory of sustainable development;
2) explore the role of North American human settlements in achieving sustainable development and the community-level planning implications of that role;

3) propose a framework for sustainable community development; and

4) determine what sustainable development initiatives are possible at the local level, by identifying and documenting the current range of municipal and local government initiatives, primarily in North America, which are contributing to sustainable community development.

Methods

Information and Data Sources

The information employed in the study consists of case studies and examples of specific municipal and local government initiatives related to sustainable development. Documentary evidence was the primary source for the municipal and local government initiatives cited. Documentation included books; journal articles; memoranda and other communiques; agendas and other written reports of events; administrative documents such as proposals, progress reports, and other internal documents; formal studies or evaluations; published and unpublished conference presentations; and newscippings and other articles appearing in the mass media. Data sources for this study were primarily libraries, computerized databases, and networking (e.g., attending key conferences, contacting authors of key reports).

While there appears to be rapidly growing interest in this field, there has been little related research on the subject of this study, namely the planning implications of sustainable development per se at the community level. However, just as the field of "community planning" comprises a broad range of sub-fields, e.g., transportation planning, land use planning, economic development planning, etc., so the field of "sustainable communities" comprises a similarly broad range of sub-topics.

Extensive searches for municipal and local government initiatives explicitly aimed toward achieving "sustainable development" or "sustainable communities" – including both academic and professional databases – provided virtually no results. Consequently, as there are substantial literatures on several of the related sub-topics categorized in Chapter Four (e.g., transportation planning, energy conservation), the data search yielded only municipal and local government initiatives specific to those areas.
Data Collection Methods

Three kinds of data collection methods were employed in the research:

1. Hard copy searches for descriptions of relevant municipal and local government initiatives were conducted through extensive scrutiny of planning and environmental journals and books in the UBC Library, e.g., Environmental Abstracts, Environmental Periodicals Bibliography, newscorplings and other mass media articles.

2. Computer literature/database searches were conducted both through a) library sources, e.g., UBCLIB, Comprehensive Dissertation Index, Dissertation Abstracts International, Ecological Abstracts, Enviroline, Environmental Bibliography, Social SCISEARCH (SSCI), and through b) database searches of key professional organizations, e.g., International City Management Association (ICMA), Intergovernmental Committee on Urban and Regional Research (ICURR).

3. Networking (e.g., attending conferences and contacting authors of reports) focused on sustainable development and local government was the most productive data collection method. Key conferences included the US National Public Hearing on Sustainable Development (Los Angeles 1989), the First International Ecocity Conference (Berkeley 1990), US National Task Force on Sustainability (Washington, DC 1990), the World Congress of Local Governments for a Sustainable Future (United Nations 1990), Implementing Sustainable Development in Municipalities (Toronto 1991), Green Strategies for Communities (Whistler 1991), World Cities and Their Environment: Congress of Municipal Leaders (Toronto 1991), and the Second International Ecocity Conference (Adelaide, Australia 1992). Interviews and correspondence with authors of key reports also provided much data, particularly administrative documents, that would be difficult or impossible to find using other methods.

Data Analysis and Interpretation

The focus of the data search was on the range of initiatives being practiced or proposed by municipal and local governments. There was no attempt to quantify the number of blue box recycling programs in Canada or otherwise determine the popularity of particular initiatives. Rather, the intent of the search was to ascertain the extent of social innovation in regard to sustainable community development.
Initiatives were selected on the basis of "good practice." Sustainable community development is more an approach than a distinct aspect of local government; therefore "good practice" should permeate all aspects of local government (ACC 1990). Initiatives were sought which aimed to 1) span all service areas; 2) relate to a local government's influence as a service provider and regulator, as an enabler, and as a major user of resources; and 3) be developed and applied consistently throughout the community (this is important because of the interconnected nature of sustainable community development goals).

Other criteria for selecting initiatives were innovation, leverage, transferability, and potential effectiveness. Initiatives were sought which 1) demonstrate a novel approach to sustainable community development; 2) have leverage value vis-a-vis the components of the sustainable development framework elaborated in this study; 3) appear readily transferable to other jurisdictions (i.e., they are not unique to a particular micro-climate or culture); and 4) are likely to be effective.2

The range of initiatives identified here is not representative of municipal practice in the sense that a more conventional survey of municipal practice might achieve (see, e.g., Maclaren 1992). However, the intent of this study is not to represent the state of municipal practice but rather to identify the range of social innovation pertaining to sustainable community development. Hundreds of references and initiatives were identified, documented and reviewed in assembling this study; based upon this body of evidence the study can be considered representative of the current range of sustainable community development initiatives.

Scope of the Study

This research is limited geographically. The study focus is primarily on North American (i.e., Canadian and US) communities, although it includes many examples of municipal initiatives from Europe as well as a few from other parts of the world. There is an inherent danger in comparing local government initiatives beyond national borders, as illustrated by energy policy. In some cases, such as Denmark and Sweden, energy considerations have been integrated into the land use planning process within the framework

---

2 As discussed below, few data are presently available by which to judge the effectiveness of most of these initiatives. Potential effectiveness was judged on the basis of comments made in the literature and in interviews with knowledgeable practitioners and observers.
of a strong national commitment to energy efficiency. Where there is no overriding national priority for energy conservation, commitment to energy conscious land use planning tends to be sporadic. In the US and the UK, for example, the pattern is one in which some planning authorities have made valiant efforts to include an energy dimension in their policies while others continue to afford it low priority or ignore it altogether (Owens 1990). Nevertheless, there is much to be gained by surveying the initiatives of local governments regardless of their national context.

As stated above, the field of "sustainable communities" comprises a broad range of sub-topics, much as the field of "community planning" comprises a broad range of sub-fields. Each of these sub-topics could easily be the subject of its own dissertation (e.g., solar aquaculture technology for decentralized neighbourhood waste treatment; municipal procurement policies for recyclable materials; etc.), and it would be unrealistic to attempt to study each one comprehensively in a single research project. My purpose in this work is to view a broad set of topics holistically so as to develop an understanding of the planning implications of sustainable development per se at the community level.

A Cautionary Note

To date, few data are available by which to judge the success of most of the initiatives identified here. They have by and large only been implemented in the the last few years or even months; many are not actually yet in place (e.g., City of Vancouver 1990), and are therefore largely untested. What little data exist on those initiatives that have been implemented (e.g., Irvine, California's 46% reduction of CFC emissions in 1988-89 – see Appendix 1) cannot be independently confirmed.

Nature and Order of Presentation

The remainder of this study is presented in four chapters, references, an annotated bibliography, and two appendices. Chapter Two examines more closely the meaning of the terms "sustainable," "development," and "sustainable development." Economic and environmental perspectives on growth and development are contrasted in light of the Brundtland Commission's popularization of the term sustainable development and the concept of "natural capital" is explained. Next, the question of whether planning theory is relevant to sustainable development is addressed, followed by a survey of the paradigms associated with the steady state, appropriate technology, the conserver society, community
economic development, ecofeminism, social ecology, the green movement, bioregionalism, deep ecology, new physics, native world views, and the Gaia hypothesis. Each of these paradigms reflects wisdom that addresses, at least in part, principles that have been relatively neglected by planning theory. Drawing upon the full range of literature cited, "sustainable development" is defined, as discussed above, as having the following components: 1) it is a social change process for fulfilling human needs and advancing social equity; 2) it requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding irreversible damage to any single significant asset; and 3) it is a process of expanding organizational effectiveness and building capacity toward sustainability. The chapter concludes with a discussion of the implications of this interpretation of sustainable development.

Chapter Three explores the role of human settlements in achieving sustainable development and considers the implications of sustainable development for planning North American communities, focusing on the postwar pattern of Western urban development. It examines the characteristics of the unsustainable community, the sustainable community, sustainability by design, and the role of local government in moving toward sustainable communities. Based upon this analysis, it proposes a planning framework for sustainable community development. It develops the argument that sustainable communities require unprecedented and simultaneous emphasis on the efficient use of urban space (e.g., intensifying urban land use, increasing infrastructural efficiency); on reducing consumption of material and energy resources (e.g., generally minimizing the consumption of essential natural capital, encouraging regional self-reliance); on improving community livability (e.g., community development, healthy communities); and on organizing administrative and planning processes which can deal effectively, sensitively and comprehensively with the attendant socioeconomic complexities. These latter are crucial to coordinating and balancing the other three aspects (see Figure 1-1).
Chapter Four synthesizes the data collected on municipal and local government sustainable development initiatives into a typology. As discussed under Methods above, extensive searches for municipal and local government initiatives explicitly aimed toward achieving "sustainable development" or "sustainable communities" provided virtually no results. Yet, substantial literatures on several of the related sub-topics strongly indicated the existence of a range of initiatives which could be usefully set in a typology. The typology is presented in accordance with the criteria developed in Chapter Three, as follows (see Figure 1-2).

Efficient Use of Urban Space includes the two distinct but integrally related categories of transportation planning and traffic management (Table A), and land use and growth management (Table B). Reducing Resource Consumption encompasses atmospheric change and air quality (Table C), energy conservation and efficiency (Table D), waste reduction and
recycling (Table E), and water and sewage (Table F). Improving Community Livability
includes initiatives to green the city (Table G), develop a sustainable economy (Table H),
and enhance both local community livability and global community responsibility (Table I).
Administration for Sustainability encompasses investment and purchasing (Table J),
leadership by example (Table K), environmental administration (Table L), and extending
beyond municipal and local government (Table M).

Figure 1-2  Typology of Initiatives

Efficient Use of Urban Space
  Transportation Planning and Traffic Management
  Land Use and Growth Management

Reducing Resource Consumption
  Atmospheric Change and Air Quality
  Energy Conservation and Efficiency
  Waste Reduction and Recycling
  Water and Sewage

Improving Community Livability
  Greening the City
  Economic Development
  Community Development

Administration for Sustainability
  Investment and Purchasing
  Leadership by Example
  Environmental Administration
  Beyond Municipal and Local Government

Each Table is preceded by an introduction to the topic, based upon the literature. The
Tables themselves are based upon the detailed descriptions of the initiatives provided in
Appendix 1.
Chapter Five presents general conclusions with respect to the research objectives of the study, and suggests areas for future research. The framework developed in the study indicates that characteristics of municipal planning for sustainable development can be illustrated by examining a variety of specific measures based in real practice. While a commitment to sustainable development may not require every particular community to enact the exact measures identified in Chapter Four, it does require simultaneous initiatives in each category of the framework proposed in Chapter Three: efficient use of urban space, reducing resource consumption, improving community livability, and administration for sustainability. These are necessary conditions for sustainable community development.

Whether they are also sufficient conditions for sustainable community development is a more difficult and debatable question; while it would be premature to make this claim at this point, the framework described here – in contrast to the temptation to think that the mere existence of a blue box recycling program makes a community sustainable – is certainly a major step toward determining sufficient conditions for sustainable community development.

References, an annotated bibliography, and two appendices follow Chapter Five. The annotated bibliography reviews some of the important literature cited in my discussion of sustainable development (Chapter Two) and its implications for communities (Chapter Three); it also includes literature reviews pertaining to each of the elements of my typology (Tables 4-A through 4-M). Appendix 1 consists of detailed descriptions of the municipal and local government initiatives synthesized in the Tables of Chapter Four; Appendix 2 describes tools to aid in designing sustainable community development initiatives.
Chapter 2  The Meaning of Sustainable Development

The literature on "sustainable development" has grown so rapidly that already at least 80 different definitions of sustainable development or some part of it have been identified (Mitlin and Satterthwaite 1991). Most of these are broadly consistent with the definition of the (Brundtland) World Commission on Environment and Development report, Our Common Future: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987: 43). However, different interpretations of the term have very different implications for public policy, community and regional planning, and for the planned use of natural resources (including global life support systems, renewable and non-renewable resources).

The debate over the meaning of sustainable development is illustrated by the contrasting indicators of our global well-being cited by economists and ecologists (see Tables 2-1 and 2-2.) As Brown (1991) notes, these particular leading economic indicators are overwhelmingly positive, while all the principal environmental indicators are consistently negative.

It is well known that one of the reasons for such widespread disparity in these measures is reliance on faulty national accounting systems (e.g., GNP) which ignore or give a positive value to the environmental debts the world is incurring (see, e.g., Daly and Cobb 1989, Jacobs 1991, Henderson 1981). These disparities are rooted in sharply contrasting views of the world – economics and ecology are "two disciplines with intellectual frameworks so different that their practitioners often have trouble talking to each other" (Brown 1991).

Neoclassical economic responses to global environmental problems are generally based on faith in the power of technological progress, reliance on market forces, and growthist assumptions that there is no social development without an increasing GNP (see, e.g., Block 1990, Dasgupta and Heal 1979, Pezzey 1989, and Simon and Kahn 1984). Economic prescriptions which emphasize economic growth, deregulation, and free trade assume that freeing world markets allows the "hidden hand" of the marketplace to achieve the desired objectives. These responses have been criticized in detail elsewhere for their inability to produce satisfactory solutions (see, e.g., Daly and Cobb 1989, Jacobs 1991, Pearce et al 1989, and Rees 1992).
Table 2-1  Selected Global Economic Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Economy</td>
<td></td>
</tr>
<tr>
<td>Gross World Product</td>
<td>Global output of goods and services totalled roughly $20 trillion in 1990, up from $15.5 trillion in 1980 (1990 dollars)</td>
</tr>
<tr>
<td>International Trade</td>
<td>World exports of all goods – agricultural commodities, industrial products, and minerals – expanded 4 percent a year during the eighties, reaching more than $3 trillion in 1990.</td>
</tr>
<tr>
<td>Employment</td>
<td>In a typical year, growth of the global economy creates millions of new jobs, but unfortunately job creation lags far behind the number of new entrants into the labor force.</td>
</tr>
<tr>
<td>Stock Prices</td>
<td>A key indicator of investor confidence, prices on the Tokyo and New York stock exchanges climbed to all-time highs in late 1989 and early 1990, respectively.</td>
</tr>
</tbody>
</table>

Source: Brown 1991

In contrast, ecological responses to global environmental problems are generally based on some notion of ecological limits (e.g., carrying capacity). As Rees (1992) argues, "some of the most substantive challenges to conventional thinking come from recent efforts to specify the limiting ecological conditions for sustainable development... Recognition of ecological constraints would obviously place unaccustomed boundaries on this debate... certain basic ecological requirements for sustainability are not negotiable. Industrial society is constrained by biophysical realities which, if heeded, provide objective criteria for sustainability."

Despite this concern with limits, alternative development approaches can also involve growth, but a different kind of growth than that assumed under the economic perspective:

"growth in human activity directed to working with, rather than against, nature and the sun; growth in appropriate technology; growth in satisfaction from meaningful work; growth in community organization. This perspective on growth is fundamentally different from that of the high-tech-oriented neoclassicists who claim that because of human ingenuity, because of the unlimited potentials for resource substitution, and because of increased efficiency of resource use, there are no limits to consumption. But it is the neoclassical perspective that still dominates thinking about growth, and unfortunately, sustainable development" (Boothroyd 1991).
Table 2-2  Selected Global Environmental Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Environment</td>
<td></td>
</tr>
<tr>
<td>Forests</td>
<td>Each year the earth's tree cover diminishes by some 17 million hectares, an area the size of Austria. Forests are cleared for farming, harvests of lumber and firewood exceed sustainable yields, and air pollution and acid rain take a growing toll on every continent.</td>
</tr>
<tr>
<td>Land</td>
<td>Annual losses of topsoil from cropland are estimated at 24 billion tons, roughly the amount on Australia's wheatland. Degradation of grazing land is widespread throughout the Third World, North America, and Australia.</td>
</tr>
<tr>
<td>Climate System</td>
<td>The amount of carbon dioxide, the principal greenhouse gas in the atmosphere, is now rising 0.4 percent per year from fossil fuel burning and deforestation. Record hot summers of the eighties may well be exceeded during the nineties.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Air pollution reached health-threatening levels in hundreds of cities and crop-damaging levels in scores of countries.</td>
</tr>
<tr>
<td>Plant and Animal Life</td>
<td>As the number of humans inhabiting the planet rises, the number of plant and animal species drops. Habitat destruction and pollution are reducing the earth's biological diversity. Rising temperatures and ozone layer depletion could add to losses.</td>
</tr>
</tbody>
</table>

Source: Brown 1991

The World Commission on Environment and Development

In December 1983, amidst growing concern over declining ecological trends and the seeming incompatibility of economic and environmental perspectives, the UN Secretary-General responded to a United Nations General Assembly resolution by appointing Gro Harlem Brundtland of Norway as Chairman of an independent World Commission on Environment and Development. The mandate of the Brundtland Commission, as it became known, was threefold (WCED 1987):
Chapter Two: The Meaning of Sustainable Development

- to re-examine the critical issues of environment and development and to formulate innovative, concrete, and realistic action proposals to deal with them;
- to strengthen international co-operation on environment and development and to assess and propose new forms of co-operation that can break out of existing patterns and influence policies and events in the direction of needed change; and
- to raise the level of understanding and commitment to action on the part of individuals, voluntary organizations, businesses, institutes and governments.

For the next few years the Commission studied the issues and listened to people at public hearings on five continents, gathering over 10,000 pages of transcripts and written submissions from hundreds of organizations and individuals. In April 1987 the Commission released its report, *Our Common Future*. At the core of the report is the principle of "sustainable development." The Commission's embrace of sustainable development as an underlying principle gave political credibility to a concept many others had worked on over the previous decade. The Commission defined sustainable development as meeting "the needs of the present without compromising the ability of future generations to meet their own needs." This simple, vague definition has been criticized by some and hailed by others (Starke 1990).

The term [sustainable development] has been criticized as ambiguous and open to a wide range of interpretations, many of which are contradictory. The confusion has been caused because "sustainable development," "sustainable growth" and "sustainable use" have been used interchangeably, as if their meanings were the same. They are not. "Sustainable growth" is a contradiction in terms: nothing physical can grow indefinitely. "Sustainable use" is applicable only to renewable resources: it means using them at rates within their capacity for renewal (IUCN 1991).

*The Meaning of "Sustainable"

Since the publication of *Our Common Future* in 1987, intense debate has been generated in many countries over the meaning of the Commission's call for "sustainable development." In the context of other significant global reports on the environment over the last two decades (e.g., *Limits to Growth*, Global 2000), a major contribution of the World Commission was its explicit recognition that poverty is a major source of environmental degradation.1 For example, the collection and use of firewood by families in developing countries is sometimes considered a major reason for deforestation. While this connection may seem reasonable

---

1 In the words of the Brundtland Commission, "... poverty itself pollutes the environment... Those who are poor and hungry will often destroy their immediate environment in order to survive... poverty itself is a major global scourge" (WCED 1987, p. 28).
Chapter Two: The Meaning of Sustainable Development

enough at first glance, it is not accurate – the main causes of deforestation are actually large-scale lumbering, agricultural expansion, overuse of existing agricultural land, burning of forests to encourage fodder growth, over-grazing and rapid urban growth (Pietila 1990).

Although the Commission provided no analysis of the causes of poverty, it's concern about poverty lead it to the argument that economic growth must be stimulated. However, the major flaw of the Commission's well-intended but misguided analysis (and the likely reason Our Common Future has been embraced by governments and corporations as much as by environmentalists) is that it downplays the extent to which both poverty and environmental degradation result from wealth.

The threat of atmospheric change, for example, clearly illustrates the role of wealth in global environmental damage. Fossil-fuel-based carbon emissions (e.g., carbon dioxide) are a leading source of atmospheric and potential climate change (e.g., global warming). The wealthy, energy-intensive quarter of the world's population is responsible for nearly 70 percent of these carbon emissions. It is a simple fact of atmospheric science that the planet will never be able to support a population of 8 billion people generating carbon emissions at even the rate of Western Europe today. Yet North Americans generate carbon emissions at twice the rate of Western Europeans (Flavin 1990).

Some critics (e.g., Trainer 1990) were dismayed that the Commission chose economic growth and all its attendant social and environmental impacts (e.g., its tendency to exploit both labour and the environment) over a consciously appropriate development strategy for the Third World (e.g., adequate housing and clean water rather than export plantations and automobile factories). For others, the principal weakness of Our Common Future is that its call for growth was addressed not only to the developing countries but also to the industrialized countries. The Commission went so far as to call for a five- to ten-fold increase in world industrial output – without any analysis to show whether such economic expansion is ecologically possible (Rees 1992).²

Canada's official response to Our Common Future typifies the mainstream interpretations of sustainable development. It states that "sustainable economic development does not require the preservation of the current stock of natural resources or any

² The Commission called for a "new era of growth," by which is meant "more rapid economic growth in both industrial and developing countries, freer market access for the products of developing countries, lower interest rates, greater technology transfer, and significantly larger capital flows" (WCED 1987, p.89).
particular mix of human, physical and natural assets. Nor does it place artificial limits on economic growth, provided that such growth is both economically and environmentally sustainable" (National Task Force on Environment and Economy 1987). In the debate over the meaning of sustainable development, this mainstream view has come under increasing scrutiny.

Global resource depletion and pollution are forcing recognition that existing patterns of development and resource use are not sustainable (Rees 1990). Even conservative neoclassical economists are recognizing that the "sustainable" component of development requires that human activities today do not deplete what can be termed "environmental capital." The total stock of environmental assets which comprise this environmental capital may usefully be divided into three categories (Mitlin and Satterthwaite 1991):

- non-renewable resources, such as minerals and fossil fuels;
- the finite capacity of natural systems to produce "renewable resources" such as food crops, forestry products and water supplies – which are renewable only if the natural systems from which they are drawn are not overexploited; and
- the capacity of natural systems to absorb the emissions and pollutants which arise from human actions without side effects which imply heavy costs passed onto future generations (such as activities that release chemicals which deplete the atmosphere's ozone layer and greenhouse gases which may cause serious climatic imbalances).

"No one can doubt that the stock of non-renewable resources are finite. No one can doubt that eco-systems (individually and collectively within the biosphere) have limits in their capacity to absorb pollutants. There is agreement that some environmental assets are irreplaceable – for instance areas ... of outstanding natural beauty. The debate centres on which environmental assets are irreplaceable and the extent to which current (and projected) future levels of resource use degrade the capital stock of environmental assets for future generations, the extent to which one resource can be substituted for another (for instance, a synthetic substance replacing a natural one) and the extent to which pollutants derived from human activities are damaging the biosphere."

Pearce et al (1989) argue that "future generations should be compensated for reductions in the endowments of resources brought about by the actions of present generations" (p.3), suggesting that each generation should leave the next a stock of assets at least as great as that which they inherited themselves. There are two possible interpretations of this condition: "weak sustainability," which aggregates all types of assets, and "strong sustainability," which differentiates between assets which are "natural" and those which are not, arguing that whatever the level of human-made assets, an adequate stock of environmental (or natural) assets alone is critical in securing sustainability (Daly 1989).
Chapter Two: The Meaning of Sustainable Development

The weak sustainability interpretation reflects the neoclassical economic assumption that natural and non-natural assets are substitutable and that natural assets can be liquidated as long as subsequent investment provides an equivalent endowment to the next generation (Rees 1992). Yet in some cases, natural and non-natural assets are clearly not substitutable. For example, a sawmill cannot be substituted for a forest since the sawmill (non-natural capital) needs the forest (natural capital) in order to function (Daly 1989).

The weak sustainability interpretation also assumes that other forms of capital (e.g., manufactured, financial, or human capital) can be converted back into natural capital. This interpretation does not take into account irreversible processes such as the extinction of species or the destruction of ecosystems.

All this suggests that the weak sustainability interpretation is grossly insufficient; even Pearce et al agree that natural capital stock should only be destroyed if the benefits of doing so are very large or if the social costs of conservation are unacceptably large (Pearce et al 1990: 16). Yet this begs the key question: are we capable of knowing the social costs and benefits of destroying or conserving natural capital stock? Ecological economists can put a price on resources such as timber and fisheries; but the value of ecological process resources such as carbon absorption or photosynthesis cannot easily be quantified and monetized (Rees 1991).

The very concept of economic "trade-offs" depends upon being able to put a price on the items traded. Resources that cannot be quantified or monetized also cannot be priced. It may be theoretically possible to trade-off some value of a fishery for some value of a timber harvest, but it may not be possible to price the value of the ozone shield.

The economic benefits of destroying natural capital stock or the social costs of conservation may seem large, but only as a function of our inability to adequately assess such costs and benefits. So-called rational economic analysis has extended beyond its rational limits (Rees 1991). This suggests that it is time for a different kind of framework for planning and decision-making, guided by the understanding that natural capital stock should not be destroyed.

"The pace of global ecological change suggests that human activity may already be undermining essential ecosphere functions. In these circumstances, it would be a 'sound risk-averse strategy' for society simply to accept, that while technically inestimable, the life support values of remaining stocks of natural capital are greater than any stock-depleting development values however large the latter might be. Given the threat to global security associated with irreversible disruptions of the ecosphere, and the
increasing probability of such events under prevailing development approaches, we are confronting a category of strong catastrophic risk which 'should, in the limit, not be undertaken at any price.' In short, if the potential benefits of conservation can be shown to approach infinity, the costs are irrelevant..." (Rees 1991)

In terms of the life-support functions of natural capital, destruction of any single significant natural asset can be likened to destruction of any single bodily organ or system. The destruction of the ozone layer may have the same consequences, in planetary terms, as destruction of the immune system has for the human body; global warming may be analogous to a high fever.

We do not ask those who suffer from heart disease to "trade" normal brain functioning for a healthier heart. Such choices are the stuff of literature's great tragedies; they only become more tragic if we insist upon this approach to deciding complex societal choices.

Like a thermometer registering a fever, the accumulating trends of ecological decline (e.g., decrease in stratospheric ozone, increase in greenhouse gases, extinction of species, loss of biodiversity, etc.) are the indicators of our condition. The message is clear: sustainability means there is an "ecological bottom line."

"The ecological bottom line for sustainable development can be stated as an economic metaphor: humankind must learn to live on the 'interest' generated by remaining stocks of living 'natural capital.' Any human activity dependent on the consumptive use of bioresources cannot be sustained indefinitely if it not only consumes annual production, but also cuts into capital stocks."³ (Rees 1991)

To summarize, sustainability requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding irreversible damage to any single significant asset.⁴

The Meaning of "Development"

Despite the problems of the Brundtland Commission's analysis discussed above, the environmental problem of poverty (as well as the social, political and moral problem of

³ Rees also notes that "this shifts the emphasis of environmental policy from pollution control ... to managing consumption. In thermodynamic (rather than mechanical) terms, all material economic production is actually consumption." (Rees 1991)

⁴ The phrase "adequate per capita stock of environmental assets" is used advisedly. Some authors (e.g., Mitlin and Satterthwaite 1991) use the phrase "a constant stock of environmental assets"; however, the stock would only remain "constant" if populations and living standards also remained constant.
poverty) remains. The Commission was surely right in insisting that any acceptable strategy for reducing environmental abuses must also confront poverty. Environmental organizations and activists, especially in Canada and the United States, have tended to focus narrowly on specific campaigns of one kind or another, and may find it difficult to see how their work should fit into the larger social, political and economic context. Yet the current popularity of the term "sustainable development" requires those concerned with environmental protection to cooperate with others in meshing environmental critiques, goals and strategies with those of peace, social justice, equality and economy, etc. (Gibson 1991).

"Development" is generally believed to be the only solution to poverty and malnutrition in the Third World and, according to economic statistics, appears to have been a remarkable success (see Table 2-1). Between 1950 and 1990 the global economy expanded fivefold, per capita income more than doubled, and material consumption soared (Postel 1991).

In fact, however, the last 40 years of economic development has been a process of "bringing Third World countries within the orbit of international trade by influencing them to eliminate subsistence agriculture and artisan modes of production catering for a largely local market and to replace them with capital-intensive plantations and factories geared to the international market." It achieves precisely the same goals as its predecessor, colonialism: to obtain access to cheap raw materials, cheap labour, and a captive market for manufactured goods from the industrialized nations. Development has led to the emergence of a middle class consisting largely of government officials, traders and manufacturers, some of whom enjoy considerable affluence. But that class represents only a fraction of the total population of the Third World. "Specific policies designed to encourage economic development have caused increasingly serious social and ecological problems that have undoubtedly worsened the plight of most Third World people" (Goldsmith and Hildyard 1988).

There have been some successes: life expectancy has risen, and humanitarian issues – refugee and child relief, and disease control – are now dealt with more effectively. Environmental reclamation measures are also growing, at both local and regional levels. But these are all "repair" efforts, rather than a correction of the root causes of poverty, debt and environmental destruction (Barnaby 1988).

Even the institutions that have spearheaded development (e.g., the World Bank, UNFAO, USAID) admit their policies have been a failure. This is principally because these policies:
Chapter Two: The Meaning of Sustainable Development

1) destroy culturally in-built population-control strategies, inevitably causing a population explosion;

2) encourage the import of manufactured goods (forcing local artisans out of business and into urban slums) and the consequent accumulation of debt; and

3) encourage deforestation, cash crops, displacement and urban migration to satisfy the demands of the international market system (Goldsmith and Hildyard 1988).

As a result of this failure, development agencies have proposed to replace conventional development with more sensitive types of "other development" (e.g., "rural development," "eco-development"), of which "sustainable development" is the most recent.

Critics of the development system (e.g., Gran 1987) define development as "a social change process that involves four basic elements: advancement in material or service output (the growth factor); equitable spread and equity of benefits among participants; expansion of organizational effectiveness; and capacity building toward sustainability."

"Democracy is an inherent part of the process. If we can end monopoly of economic, political or cultural resources, then equity, sustainability, efficiency and the environment all gain. Development so defined is participatory development; for people to prosper anywhere they must participate as competent citizens in the decisions and processes that affect their lives. Development is thus about the quantity and quality of empowerment and participation of people... Development so defined is not the purview of neoclassical economists. Indeed they are a large part of the problem" (Gran 1987).

For our purposes, the "development" component of sustainable development can be described as a social change process for fulfilling human needs, advancing social equity, expanding organizational effectiveness, and building capacity toward sustainability.

The latter two elements are self-explanatory. Human needs, in this context, refer to both material and non-material needs. Material or basic needs include those physical necessities of life such as adequate food, water, and shelter. Non-material needs relate more to broader "quality of life" issues such as health; political and spiritual freedom; human rights; clean, healthy and accessible natural environments; and meaningful work. Social equity includes both future (intergenerational) and current equity. Future equity depends largely upon achieving sustainability, i.e., maintaining ecological integrity. Current equity refers to the relations between the Industrialized Minority – the world’s affluent – and the world’s poor, both between and within countries; it requires not only maintaining ecological integrity but also meeting the full range of human needs, expanding organizational effectiveness, and building capacity toward sustainability.
Chapter Two: The Meaning of Sustainable Development

The goals of this process can initially be taken as those contained in the United Nations Universal Declaration of Human Rights. Article 25, Section 1, reads: "Everyone has the right to a standard of living adequate for the health and well-being of himself and his [sic] family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his [sic] control" (quoted in Sieghart 1986). Most western observers would also insist that the right to vote within representative government structures be considered a minimum requirement of any development strategy.

Is Planning Theory Relevant to Sustainable Development?

In light of the preceding discussion, what can sustainable development proponents and practitioners hope to learn from planning theory? The answer depends largely upon 1) how sustainable development is interpreted, and 2) how planning theory is interpreted.

As discussed above, the range of definitions, or interpretations, of sustainable development is quite broad. Like sustainable development, planning theory also suffers from an abundance of interpretation. There may well be as many definitions of planning theory as there are planning theorists. It is not the purpose of this discussion to go into an extensive discussion of what constitutes planning theory, but the subject of our inquiry demands that the question be addressed. A highly regarded planning theorist (Burchell 1988) describes the field as follows:

Planning theory ... is a theory represented by a procedural rational model which is both simultaneously under attack yet reemerging as a defaultingly accepted explanatory structure for the actions of practitioners.

The planning field has responded to the breakdown of the rationality model in four different ways (Alexander 1988): 1) the ritual response – not recognizing the breakdown and clinging instead to the old model, 2) the avoidance response – usually involves a substitution of other, more descriptive decision-making models, 3) the abandonment response⁶ – which

---

⁵ In principle, Canada has already agreed to this priority, as a signatory to the United Nations Universal Declaration of Human Rights.

⁶ An example of the abandonment grouping is this statement that "...we do not need a complete general theory of planning and we do not even need to agree on the definition of the field" (Mandelbaum 1988).
rejects both the rational model and any other similarly general construct as unnecessary, and
4) the search response – which offers other, more radical models as replacements for the
rational paradigm.

John Friedmann's 1987 treatise, Planning in the Public Domain (Friedmann 1987),
currently the major text in planning theory, takes a broad view of the field:

The major object of planning theory is to solve the "meta-theoretical problem of how to
make technical knowledge in planning effective in informing public actions."

Focusing on the link between knowledge and action, Friedmann argues (p.39) that "a
comprehensive exploration of the terrain of planning theory must cull from all the relevant
disciplines those elements that are central to an understanding of planning in the public
domain."7

Friedmann has framed two centuries of planning theory into four traditions. Social
Reform and Social Mobilization, the two older traditions, reach back to the first half of the
nineteenth century. Policy Analysis and Social Learning originated in the period between
the Great Depression and World War II. Friedmann contends that depending upon
education, tasks, and predilection, planners can identify who they are or their resultant
efforts through one of these traditions (see Table 2-3).

<table>
<thead>
<tr>
<th>Table 2-3</th>
<th>The Four Traditions of Planning Theory8</th>
</tr>
</thead>
</table>
| **Social Reform:** includes the disciplines of sociology, institutional economics, and
  pragmatism. It recognizes the state as the vehicle of social action. Planning is a
  scientific endeavor to make state action more effective. The economy can be adjusted to
  serve representative needs through business-cycle analysis, input/output analysis,
  economic policy models, and others. |
| **Policy Analysis:** includes the disciplines of systems analysis, welfare and social choice,
  and policy science. It concentrates on decision making as a means of identifying the best
  possible courses of social action. Planning is a decision process which emphasizes stages
  that begin with the identification of goals that will structure the decision and ends
  with program analysis, which evaluates the correctness of the decision. This is the
  rational model participated in by technical planners who view themselves as social
  engineers serving the existing power base. |

7 Friedmann offers three conceptual definitions of planning. Planning attempts to link scientific and
technical knowledge either (1) to actions in the public domain; (2) to processes of societal guidance; or
(3) to processes of social transformation (pp. 38-39). These definitions, which emerge from one of the
four historical traditions of planning thought, lead to very different choices for planning action.

8 These summaries of Friedmann's traditions are adapted from Burchell (1988).
Social Learning: includes the field of organization development. It is an effort to minimize the contradictions between what we know and how we act. Planning attempts through social experimentation to change social behavior. This is accomplished by doing: knowledge is validated practice, and theory is enriched from lessons learned from experience. Planners and client actors are involved in nonhierarchical exchanges of information to further learning.

Social Mobilization: includes neo-Marxism, the Frankfurt School (of critical theory), and a category Friedmann calls utopians, social anarchists, and radicals. It is a view of the primacy of action from below. Planning is a political activity which attempts to change the status quo of oppression and alienation under capitalism. Social mobilization emphasizes the politics of disengagement and confrontation. The planner's role is one of community organization, advocacy presentation and interpretation of data, and representation within and cooptation of the decision-making process.

The knowledge that we must act to achieve a more sustainable form of development has been with us for many years. But the great question that plagues sustainable development proponents is how do we achieve sustainable development, or, in the language of planning theory, how should this knowledge properly be linked to action? If we accept that this question, of knowledge and action, is the core concern of all the traditions of planning theory (Friedmann 1987, pp. 73-74), then planning theory by definition is, or should be, relevant to sustainable development.

By this point, however, it is also apparent that the question we are attempting to answer, is planning theory relevant to sustainable development? is of little value in its present form. Familiarity with planning theory leads instead to the question, which planning theory traditions are relevant to sustainable development? Familiarity with sustainable development, on the other hand, leads to the question, which concerns of sustainable development are relevant to planning theory? Our question, then, ought to be stated thus: which planning theory traditions are relevant to which concerns of sustainable development?

Sustainable development per se has only recently emerged as a distinct subject of inquiry; therefore it remains to be seen how planning theory can contribute to it. We can, however, examine which planning theory traditions historically offer the most guidance for sustainable development concerns, an exercise which reveals three interesting points.

First, the most conventional, narrow interpretations of sustainable development primarily emphasize fulfilling material human needs, maintaining environmental assets for future generations (e.g., conservation), and future equity. The most relevant planning theory traditions from this perspective, social reform and policy analysis, have much to offer in regard to fulfilling material human needs, but are virtually mute on all the other
sustainable development components discussed above: advancing social equity, maintaining environmental assets for future generations, avoiding irreversible damage to any single significant asset, expanding organizational effectiveness, and building capacity toward sustainability. Given that social reform and policy analysis are the two dominant traditions in planning theory (constituting the heart of the "rational paradigm"), we can begin to see why planning theory has been slow to identify sustainable development concerns and give them appropriate prominence.

Second, only the social learning and social mobilization traditions – not the dominant traditions in planning theory – offer guidance in regard to current equity, expanding organizational effectiveness, and building capacity.

Third, despite the dimly-acknowledged contributions of the social learning and social mobilization traditions, there are still significant gaps in planning theory as it pertains to sustainable development, especially in the areas of future equity, building capacity toward sustainability, maintaining environmental assets for future generations, and avoiding irreversible damage to any single significant environmental asset. Planners concerned with these aspects of sustainable development will have to look to "greener" pastures for relevant theoretical guidance.

**Greener Pastures**

Planners concerned with future equity, building capacity toward sustainability, maintaining environmental assets for future generations, and avoiding irreversible damage to any single significant environmental asset will have to look to "greener" pastures for relevant theoretical guidance. "Fortunately, there is no shortage of 'unscientific' (but otherwise rational) concepts relevant to sustainable development. Authors in many disciplines have begun to articulate new worldviews and development principles that transcend the conventional emphasis on hard technology, material growth, and the marketplace as the wellspring of all social value" (Rees 1992).

Here I briefly survey the paradigms associated with the steady state, appropriate technology, the conserver society, community economic development, ecofeminism, social ecology, the green movement, bioregionalism, deep ecology, new physics, native world views,
and the Gaia hypothesis. Each of these paradigms reflects wisdom that addresses, at least in part, principles that have been relatively neglected by the four planning theory traditions. To attempt such a broad survey in such a short space I must of necessity overgeneralize, but I believe the view that emerges from this survey is worth that risk.

Steady State: The steady state economy is defined as an "economy in which the total population and the total stock of wealth are maintained constant at some desired levels by a 'minimal' rate of maintenance throughput." The need for a steady state economy is based on the fact that "the world is finite, the ecosystem is a steady state. The human economy is a subsystem of the steady state ecosystem. Therefore at some level and over some time period the subsystem must also become a steady state" (Daly 1973).

In this framework growth in material throughput is only allowed as a temporary passage from one steady state to another. The steady state framework implies a stable economy which could be achieved through conservation, increasing the durability of goods and creating closed-loop production systems. The emphasis is on recycling and the use of biodegradable products to minimize externalities, without necessarily reducing consumption by the Industrialized Minority. The framework suggests ways to correct the weaknesses of the current economic system but does not require major transformation in our philosophy or the predominant power structure. It also presumes that any type of technology which would allow a constant population to reach a steady state would be acceptable.

Appropriate Technology: E.F. Schumacher in 1973 coined the term "intermediate technology" to signify "technology of production by the masses, making use of the best of modern knowledge and experience, conducive to decentralisation, compatible with the laws of ecology, gentle in its use of scarce resources, and designed to serve the human person instead of making him [sic] the servant of machines" (Schumacher 1973). The central tenet of appropriate technology (AT) is that a technology should be designed to fit into and be compatible with its local setting. Examples of current projects which are generally classified as AT include passive solar design, active solar collectors for heating and cooling; small windmills to provide electricity; roof-top gardens and hydroponic greenhouses; permaculture; and worker-managed craft industries. There is general agreement, however, that the main goal of the AT movement is to enhance the self-reliance of people on a local

---

9 An earlier version of this set was published previously in Gardner and Roseland (1989).

10 Also known as alternative, renewable, soft, intermediate, radical, liberatory, and human-scale technology.
Characteristics of self-reliant communities which AT can help facilitate include: 1) low resource usage coupled with extensive recycling; 2) preference for renewable over nonrenewable resources; 3) emphasis on environmental harmony; 4) emphasis on small-scale industries; and 5) a high degree of social cohesion and sense of community (see, e.g., Darrow 1981; Olkowski 1979; Mollison 1978, 1979; RAIN 1981). Communities that could be said to be practicing AT include the Amish of Lancaster County, Pennsylvania and the Menonites of southern Ontario (Foster 1987).

**Conserver Society:** In September, 1977, the Science Council of Canada reported to the Minister of State for Science and Technology on the implications of a conserver society for Canadians (Science Council of Canada 1977). Principles emphasized in the report have much in common with notions of the steady state and appropriate technology. They include economy of design; diversity, flexibility and responsibility; and respect for the regenerative capacity of the biosphere. Conservation of energy and materials, mainly through recycling and innovative technologies rather than reduced consumption, was a major thrust of conserver society thinking. Human needs were considered in terms of increased employment opportunities based on industrial growth in the technology sector. Locus of control was not an important theme in the Conserver Society philosophy.

**Community Economic Development:** The concept of community economic development suffers from much the same abundance of interpretation that afflicts sustainable development. At their finest, however, the distinguishing features of community economic development are characterized by the following definition from the Social Planning and Research Council of British Columbia (Clague 1986):

> Community Economic Development is concerned with fostering the social, economic and environmental well-being of communities and regions through initiatives taken by citizens in collaboration with their governments, community agencies and other public and private organizations, that strengthen local decision-making and self-reliance, cooperative endeavor and broad participation in community affairs.

Other observers describe CED in less flattering terms, arguing that in response to external funding priorities, community development organizations have lost their original focus on the creation of local employment opportunities and local control and generation of capital in low-income communities (Surpin and Bettridge 1986). Examples of CED range from small business counseling and import substitution ("buy local") programs to worker cooperatives, community development corporations, and community land trusts. Boothroyd (1991) argues that "[w]hether CED is practiced in hinterland resource towns, urban ghettos, obsolescent
manufacturing cities, or Native communities reserves, the general objective is the same: to take some measure of control of the local economy back from the markets and the state."

Ecofeminism: Ecology and feminism meet in the critique of hierarchy and domination. Ecofeminism’s strength is its historical analysis of the common domination of women and of nature, which argues that the domination of women by men stems from the same source as the domination of nature by man, that patriarchy and ecological destruction are inextricably linked phenomena (see, e.g., Ruether 1975, Daly 1978, Griffin 1978). Some ecofeminists argue that patriarchal thinking is perilous for both ecology and humanity in the nuclear age. Others see practical applications of ecofeminist thinking in self-knowledge and awareness as well as protest and civil disobedience (Plante 1986). However, "[d]espite an impressive number of publications, conferences, and speakers, there is no practical organization or defined agenda. Ecofeminism is still an idea" (Brown 1988).

Social Ecology: Social ecology focuses its critique on domination and hierarchy per se: the struggle for the liberation of women, of workers, of blacks, of native peoples, of gays and lesbians, of nature (the ecology movement), are ultimately all part of the struggle against domination and hierarchy. Social ecology is the study of both human and natural ecosystems, and in particular of the social relations that affect the relation of society as a whole with nature. Social ecology advances a holistic worldview, appropriate technology, reconstruction of damaged ecosystems, and creative human enterprise. It combines equity and social justice considerations with energy efficiency and appropriate technology. Social ecology goes beyond environmentalism, insisting that the issue at hand for humanity is not simply protecting nature but rather creating an ecological society in harmony with nature. The primary social unit of a proposed ecological society is the ecocommunity, a human-scale, sustainable settlement based on ecological balance, community self-reliance, and participatory democracy.

Social ecology envisions a confederation of community assemblies, working together to foster meaningful communication, cooperation and public service in the everyday practices of civic life, and a "municipalist" concept of citizenship cutting across class and economic barriers to address dangers such as global ecological breakdown or the threat of nuclear war. Cooperation and coordination within and between communities is considered able to transcend the destructive trends of centralized politics and state power. The city can

---

11 Social ecology is a term with various meanings in various places, e.g., a branch of urban sociology. The social ecology referred to here, however, is focused primarily around the writings of Murray Bookchin.
function, social ecology asserts, as "an ecological and ethical arena for vibrant political culture and a highly committed citizenry" (Bookchin 1987).

The Green Movement: The Greens believe in the "four pillars" of ecology, social responsibility, grassroots democracy, and nonviolence (Capra and Spretnak 1984). These pillars translate into principles of community self-reliance, improving the quality of life, harmony with nature, decentralization, and diversity. From these principles, the Greens question many cherished assumptions about the rights of land ownership, the permanence of institutions, the meaning of progress, and the traditional patterns of authority within society. The Greens recognize that their movement will have to take different forms in different countries (Capra and Spretnak 1984). Starting in the mid-1970s in New Zealand (where it was called the Values Party), France (Les Vertes) and West Germany (Die Grünen), the Green movement soon spread to many other developed countries in Europe and North America. In countries with proportional representation, such as the former West Germany, Green politicians have been elected to seats in the Bundestag. In North America, however, Greens admit their involvement in federal political campaigns is primarily a way to educate the populace and build the movement. Local campaigns may be considered more serious bids for power, as with the New Haven, Connecticut Greens who ran a slate of Green candidates for city council (Tokar 1987). Most North Americans still think Green simply means being pro-environment, but for Germans being Green means being feminist, supporting civil liberties, working for solidarity with Third World peoples, and standing for an end to the arms race (Swift 1987).

Bioregionalism: The central idea of bioregionalism is place. Bioregionalism comes from bio, the Greek word for life, as in "biology" and "biography," and regio, Latin for territory to be ruled. Together they mean "a life-territory, a place defined by its life forms, its topography and its biota, rather than by human dictates; a region governed by nature, not legislature" (Sale 1985). A bioregion is about the right size for human-scale organization: it is a natural framework for economic and political decentralization and self-determination.

Bioregional practice is oriented toward resistance against the continuing destruction of natural systems, such as forests and rivers; and toward the renewal of natural systems based

12 Greens in the U.S. have generally expanded this list to include an explicit emphasis on decentralization (see, e.g., Tokar 1987).

13 Tokar (1987) adds freedom, equality, and democracy to the list.
on a thorough knowledge of how natural systems work and the development of techniques appropriate to specific sites (Dodge 1981).

While bioregionalism as a movement is relatively new, its precursors date back at least a century. Like social ecology, it is rooted in classical anarchism. The implications of bioregional social organization are clearly for local political control by communities on their own behalf combined with broader allegiance to an institutional structure that governs according to an ecological ethic. Bioregionalism considers people as part of a life-place, as dependent on natural systems as are native plants or animals. By virtue of the emphasis it places on natural systems, perhaps, bioregionalism sometimes appears weak in terms of human systems.

Deep Ecology: As distinct from "shallow ecology" or reform environmentalism, deep ecology is concerned, according to its proponents, with the root causes of our environmental crisis. Deep ecologists hold dear the principle that nonhuman life has value in itself, independent of the usefulness of the nonhuman world for human purposes, and argue that humans have no right to reduce the richness and diversity of life forms except to satisfy vital needs. They advocate a substantial decrease in human population, and a lessening of human impact on the nonhuman world. While major changes in economic, technological, and ideological policies would result from adoption of deep ecology principles, most remain more implicit than specific. "The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living" (Devall and Sessions 1985). Proponents of deep ecology believe they have "an obligation directly or indirectly to implement the necessary changes" required to realize their principles (Devall and Sessions 1985). This emphasis on direct action has inspired, in particular, the Earth First! organization in the western U.S. states, which has focused on saving wilderness areas from road-building, logging and development. Of the frameworks reviewed here, deep ecology is the only one that intentionally deprecates material human needs. Strong opponents of deep ecology, such as Murray Bookchin, draw attention to deep ecology's potential to contravene the principle of social self-determination.

14 Elements of bioregionalism can be traced back to the writings of, for example, Kropotkin, Geddes, and Mumford.

15 Inspired by Norwegian philosopher Arne Naess, deep ecology was popularized in North America by academics Bill DeVall and George Sessions, novelist Edward Abbey and Earth First! activist Dave Foreman.

30
Chapter Two: The Meaning of Sustainable Development

Native Worldview: Although the subject of considerable debate, many observers (see, e.g., McNeely and Pitt 1985) argue that sustainable patterns of resource use and management have been reflected in the belief and behaviour systems of indigenous cultures for centuries. These systems traditionally have been based in a worldview that does not separate humans from their environment (Callicott 1982):

The Western tradition pictures nature as material, mechanical, and devoid of spirit..., while the American Indian tradition pictures nature throughout as an extended family or society of living, ensouled beings. The former picture invites unrestrained exploitation of non-human nature, while the latter provides the foundations for ethical restraint in relation to non-human nature.

The World Commission on Environment and Development recognized how much industrialized cultures have to learn about sustainability from traditional peoples, and at the same time, how vulnerable the latter are to encroachment by the former (WCED 1987). A Native Chief speaking at a symposium on sustainable development at the University of British Columbia suggested that mainstream Canadian society could learn sustainable ways from his people by looking at "Nuu-chah-nulth history, culture, and traditions and practices, and find(ing) out how they managed to survive for thousands of years before European contact" (Smith 1989).

Gaia Hypothesis: In the early 1970s British scientist James Lovelock first proposed the revolutionary principle that the Earth is alive. He named his hypothesis of this newly recognized organism Gaia, after the Earth goddess of ancient Greece. In March 1988 the prestigious Chapman Conference – convened by the American Geophysical Union and drawing together leading physicists, biologists, and climatologists – took as its theme the Gaia Hypothesis, marking the coming of age of the Gaia principle as a respectable subject within the scientific establishment.

According to the Gaia Hypothesis, life shapes and controls the environment, rather than the other way around. The two have evolved together such that every life form, from microbe to humans, is involved – simply by its own life processes – in homeostatic systems that have evolved to operate on a global scale. Just as a living creature keeps its temperature and chemistry in balance, so Gaia – all of life – maintains harmonious conditions on Earth. Lovelock speaks of the "vital organs" and the "skin" of Gaia: soil, algae, wetlands, rainforests. If humanity is to attain a sustainable relationship with Gaia,

---

16 The author wishes to thank Dr. Julia Gardner for this discussion of native worldviews.
we have to seek fuller knowledge of how her systems work and learn to respect them (Barnaby 1988). To date the emphasis of this holistic hypothesis remains on this systemic level, and issues of human needs, equity, and social self-determination have not directly been addressed.

New Physics.\(^{17}\) Recent advances in physics point to the emergence of the framework of self-organization. This framework identifies serious inadequacies in the traditional, mechanistic approach to science, in recognizing that any system cannot be understood simply as the sum of its parts, that system behaviour is not entirely predictable, and that in open systems processes are not reversible. Instead, the emphasis is on evolutionary instability and complex systems dynamics. These factors can, in the face of even a minor disturbance, lead to the unexpected emergence of higher levels of organization (Prigogine and Stengers 1984). Systems that function to reproduce themselves are called autopoietic and are also self-organizing. Consideration of the biosphere as an autopoietic system closely approximates the Gaian hypothesis.

The principles of the new physics (also referred to as "Green Science") have not attained a high profile in their application to social systems and they do not point to a particular strategy, yet they hold the potential for new insights. The notion of co-evolution of a system with its environment supports a more wholistic perspective on "development" and the integration of human and non-human nature; the recognition of the volatility of complex systems suggests a rationale for a simpler social structure; and the theme of autopoietic processes recommends a greater respect for the life support system of the biosphere – the point of science becomes "not to control nature but to appreciate it" (Tudge 1989). Most important, perhaps, are the capabilities the self-organization framework presents for "dealing with self-transcendence, the reaching out beyond the boundaries of one's own existence, the joy of creation" (Jantsch 1980).

Comparing the Planning Paradigms

Comparison of these alternative planning paradigms with Friedmann's planning theory traditions reveals two overwhelming conclusions. First, the alternative planning paradigms are exceedingly rich in material relevant to sustainable development concerns, whereas Friedmann's four traditions of planning theory are relatively impoverished and uninspired

---

\(^{17}\) The label, "The New Physics," was coined by Capra (1982). The author again wishes to thank Dr. Julia Gardner for this discussion of new physics.
in relation to sustainable development. Second, the alternative paradigms are particularly strong in the sustainable development areas where Friedmann's planning theory traditions are particularly weak: future equity, building capacity toward sustainability, maintaining environmental assets for future generations, and avoiding irreversible damage to any single significant environmental asset.¹⁸

Rees (1992) notes that

"... while the mainstream sees sustainable development in terms of marginal adjustments to the status quo, a true alternative is congealing around new values associated with spiritual and personal development, harmony with nature, community, and mutual reciprocity. However central to human and ecosystems health, such intangibles are intractable to technical analysis and have been all but neglected by mainstream approaches...

"To the modern mind, high on the rhetoric of global expansion, the alternative literature seems politically naive and economically simplistic. However, alternative concepts are often more firmly rooted in the soil of real human and ecosystems behavior than is the dominant paradigm. This should be kept in mind as we contemplate the present prognosis for sustainable development... serious analysis and interpretation of sustainable development places it beyond the reach of mere technological adjustment and extensions of neoclassical analysis. Developing sustainability may require profound changes in existing power relationships, a reordering of cultural values, massive institutional reforms, and reconsideration of the social role of economic growth."

The Meaning of "Sustainable Development"

Many people use the term "sustainable development" to mean either environmental protection or else sustained economic growth (presumably to pay for, among other things, environmental protection). As noted previously, even the Brundtland Commission accepted the need for a five- to ten-fold increase in world industrial output as essential for sustainable development.

Environmental protection is like foam padding – it offers some protection from a fall. We congratulate ourselves if we double our spending to double the thickness of the foam, because we assume thicker foam means more protection. However, we only get more...

¹⁸ This finding has significant pedagogical implications for the education and training of professional planners and other municipal officials who increasingly must address sustainable development issues and concerns in their work. It indicates that much of what is currently taught in the name of planning theory is of limited value in addressing sustainable development, and that planners concerned with these aspects of sustainable development must look elsewhere for relevant theoretical guidance. This implies that planning theory educators should re-evaluate their syllabi to expose their students to this body of literature. As Rees (1992) argues, sustainable development requires appropriate philosophy more than appropriate technology.
protection if we fall the same distance. Meanwhile, unsustainable development constantly increases the distance we're likely to fall. Sustainable development must therefore be more than merely "protecting" the environment: it requires economic and social change to reduce the need for environmental protection.

Boothroyd (1991) describes the common (mis)use of "sustainable development" as follows:

"The recent widespread endorsement of 'sustainable development' reflects not the emergence of a new dominant paradigm in policy circles but rather a continuation of the growth-with-trickle-down paradigm. Indeed, many business and political leaders now use the terms 'sustainable growth' and 'sustainable development' interchangeably. This view of sustainable development is held not only by those who see their sole task as stimulating growth but also by many of those who see their task as alleviating poverty. Most national and international development agencies have implicitly or explicitly defined sustainable development as sustainable growth, rather than as living within our means, and poverty alleviation as a matter of insuring that the poor receive some benefits from this growth, rather than as a process of redistributing consumption-power from the rich to the poor."

Zethoven (1991) has identified three major strands of thought within the sustainable development debate: shallow, intermediate, and deep sustainable development. The shallow perspective regards species and ecosystems as actual or potential resources to be protected on the grounds of their instrumental value to humans. Future generations are morally insignificant, and environmental assets are substitutable for human-made assets.

Intermediate sustainable development recognizes intrinsic value in the natural world and adopts the non-substitutability thesis, or constant natural capital concept (that the next generation should inherit a stock of environmental assets no less than the stock inherited by the previous generation). However, by encouraging economic growth which is not based on sound ecological principles and practices, it prejudices both environmental equity and intergenerational equity.

Deep sustainable development also recognizes intrinsic value in the natural world and rejects the substitutability thesis. It differs from the intermediate perspective by rejecting economic growth as a means of securing environmental and intergenerational equity. "Economic growth is criticized as indiscriminate, inequitable, unrestricted, and lacking a notion of sufficiency... the economy is a subset of global and regional ecosystems. Those who adopt this position acknowledge that the entropy law rather than the market is the ultimate regulator of economic activity and that unlimited growth policies contravene this law. Only policies which recognize the entropy process, that is, those which are aimed at appropriate and finite development, can be considered sustainable" (Zethoven 1991).
Chapter Two: The Meaning of Sustainable Development

Like other political objectives of its kind (e.g., democracy), we all agree with the need for sustainable development and disagree over what it entails. However, if we accept the basic argument described thus far, that "sustainable" requires living within our ecological means (i.e., by not depleting natural capital) and "development" is a goal-oriented social change process, then "sustainable development" has a core meaning which remains however it is interpreted. There are three elements to this (Jacobs 1991):

- **Environmental considerations must be entrenched in economic policy-making.** Environmental and economic objectives must be placed within a common framework in which a variety of parallel objectives can be recognized. In particular, we must learn to live on the "interest" generated by remaining stocks of living "natural capital" (Rees 1991), and we must recognize that growth at the expense of sustainability actually makes us poorer rather than richer (Daly and Cobb 1989).

- **Sustainable development incorporates an inescapable commitment to social equity.** This requires not simply the creation of wealth and the conservation of resources, but their fair distribution both between and within countries, including at least some measure of redistribution between North and South. Sustainability also requires the fair distribution of environmental benefits and costs between generations.

- "**Development** does not simply mean "growth," as represented by faulty measures of economic performance such as increases in Gross National Product (GNP). Development implies qualitative as well as quantitative improvement.

In sum, sustainable development must be a different kind of development. It must be a pro-active strategy to develop sustainability.

As noted in Chapter One, much of the debate over the meaning of sustainable development focuses on the tension between the economic necessity for material growth and the ecological reality of limits. In the twenty years since *The Limits to Growth* (Meadows et al 1972) was published, few researchers have seriously explored the implications of this concept for social organization. Ryle (1988) notes that "ecological limits may limit political choices, but they do not determine them." The heart of the growth issue is simply that "underlying the social democratic advocacy of economic expansion is the fact that within a capitalist market framework, 'growth' is indeed the prerequisite of much else: especially, of the provision of welfare services and the creation of jobs, and of national economic status vis-à-vis other capitalist powers. Thus the critique of growth becomes a critique of capitalism.
and the market... an alternative would have to find new, non-market-based means of providing employment and of meeting welfare needs" [emphasis added].

At the same time, transforming the market framework to reflect true environmental and social costs is essential for wise and long-term planning. For example, the prices Americans pay for energy "externalize" annual costs in terms of corrosion ($2 billion), health impacts ($12-82 billion), crop losses ($2.5-7.5 billion), radioactive waste ($4-31 billion), military expenditures ($15-54 billion to safeguard Persian Gulf oil supplies in 1989), employment lost by importing rather than producing oil ($30 billion), and subsidies (roughly $50 billion in tax credits and research funding) (Hubbard 1991).

Together, transforming the market framework and finding alternatives to it constitute the core challenge of sustainable development: ecological restructuring.

One key to ecological restructuring in many areas would be a comprehensive environmental tax code that would place fees on carbon emissions from the burning of coal, oil, and natural gas, thereby slowing global warming; penalize the use of virgin materials, thus encouraging recycling and reuse; charge for the generation of toxic waste, fostering waste reduction and the development of safer products; tax emissions of sulphur and nitrogen oxides, curbing acid rain; and impose levies on overpumping groundwater, encouraging efficient water use (Postel 1991; see also von Weizäcker 1992, Repetto and Dower 1992).

An environmental tax code should be considered part of a broader effort aimed at ecological restructuring or conversion. Although the conversion literature is almost entirely devoted to the conversion from a military to a civilian economy, it provides penetrating insights into the conversion to an ecologically sustainable economy as well.

In particular, "the features embedded in the conversion concept can help smooth the transition to a sustainable society by addressing misunderstandings about tension between the goals of full employment and a healthy environment. An ecologically inspired restructuring of the economy would involve a transition from activities that contribute most to global warming, ozone depletion, and other threats to human health and the environment. To be sustainable, an economy must rely more on renewable energy, emphasize conservation and efficiency, minimize waste and hazardous materials generation, maximize recycling, and

19 Of the $50 billion in subsidies, $26 billion goes to fossil fuels, which supply 85 percent of the roughly 80 quadrillion BTUs consumed in the U.S. each year; $19 billion subsidizes nuclear power, which supplies about 7 percent of U.S. energy consumption; and $5 billion supports renewable energy sources, which supply about 8 percent of U.S. energy consumption (Hubbard 1991).
generally rely on environmentally benign products and production technologies. Oil and coal producers, auto manufacturers, timber companies, and branches of the chemical industry (such as the plastics packaging industry) would unquestionably be among those most affected by such a transformation" (Renner 1990: 23).

Renner (1990) suggests that, in general terms, "the most effective approach might be to create the overall framework and provide the incentives for the production of socially useful products for which there is an obvious need but little or no effective market demand. The centerpiece of such a policy would be an alternative research and capital investment agenda to create initial market demand" (p.61).

Beyond the overall framework provided by public policy, it is probably best to leave the actual implementation to local and regional groups and authorities. A decentralized, locally controlled effort not only tends to be much more sensitive to individual communities' strengths and weaknesses, but is also more likely to be both effective and politically popular. "To be effective, a conversion policy needs to be tailored to the specific needs of individual regions and to invest local and regional governments with sufficient authority and wherewithal in the entire endeavor. This implies a reversal of current trends. In short, conversion policy cuts right to the heart of governance structures" (Renner 1990: 61-62).

Drawing upon the full range of literature cited in this chapter, sustainable development can be seen, as noted in Chapter One, as having the following components: 1) it is a social change process for fulfilling human needs and advancing social equity; 2) it requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding irreversible damage to any single significant asset; and 3) it is a process of expanding organizational effectiveness and building capacity toward sustainability.

This definition of sustainable development has profound political implications since it implies constraints on the capacity of individuals, companies and nations to use resources which they have the right to use within present law (Mitlin and Satterthwaite 1991). The social and economic implications of sustainable development are also profound, particularly with regard to social equity. As Boothroyd (1991) explains,

---

20 "The program might include measures to support the development of nonpolluting, appropriate-scale production technologies, enhance renewable sources of energy, boost energy efficiency and reforestation, strengthen public transportation, provide affordable housing and preventative health care, and improve educational services..." (Renner 1990: 61).
"The common approach to dealing with the sustainability imperative and its equity implications is to seek ways to increase the efficiency of resource use and human labour without polluting the environment, and to seek ways to ensure the poor benefit from growth without changing the distribution systems that create the poor in the first place. This non-compassionate approach to sustainable development simply adds environmental considerations to the growth-with-trickle-down policies that have guided national and international development for two centuries.

Few seem to appreciate the radical implications of a commitment to development which is truly sustainable or to take a truly compassionate view of equity. That is to say, few seem willing to accept that a move to sustainability means ending growth in overall material and energy consumption, and that a move to compassionate sustainability, therefore, means that those of us who are richer will have to do with less in order that those who are poorer can not only survive but live in decency." (p.475)

The definition of sustainable development put forward here also contrasts sharply with the Brundtland Commission's call for a five- to ten-fold increase in world industrial output. Despite the Commission's optimism, the combination of depleted resource stocks (e.g., fossil fuels, fisheries, forests) with degraded life-support systems (e.g., ozone depletion, global warming, acid rain) together make it highly doubtful that both the developed countries and the Third World can greatly increase their consumption without destroying major life-support systems. The missing element in the Brundtland Commission's analysis is a concept of sufficiency, or "enoughness" (Bender 1975).

Society will eventually have to come to grips with the unaccustomed reality that beyond a certain point growth based on the consumption of essential ecological resources is "uneconomic growth that impoverishes rather than enriches" (Daly and Cobb 1989). Given that North Americans are among the world's most inefficient and wasteful consumers of materials and energy (WCED 1987), it is incumbent upon us to find ways of living more lightly on the planet. For North Americans to contribute to global sustainability will require major shifts in the lifestyles of the affluent. A wide variety of approaches are called for, including appropriate technology, recycling, and waste reduction. At a minimum, we will have to increase the efficiency of our resource and energy use. More likely, as Boothroyd (1991) argues, we will also have to reduce our present levels of materials and energy consumption. In either case, this will require a more globally conscious kind of local development than we are accustomed to.

---

21 Daly and Cobb (1989, p. 76) also note that the Brundtland definition of sustainable development fails to distinguish "needs" from extravagant luxuries or impossible desires: "If 'needs' includes an automobile for each of a billion Chinese, then sustainable development is impossible."
Chapter 3 Toward Sustainable Communities

During the period that environmentalism became a force in North American public life, our cities and communities have sprawled without consideration for resource efficiency. Infrastructure has been constructed—housing, roadways and sewage systems, for instance—which encourages disregardful resource consumption. Water sources have been taxed or polluted. Built environments have been designed which alter micro-climates and promote photochemical smog formation. Environmental services, such as public transit systems, have been left without public support. Our settlements have not only become less and less habitable for humans and most other species. They now stand as the geographic point sources of most regional and global environmental problems, and threaten even the most distant wild areas saved by environmental advocates (Brugmann 1992).

The definition of sustainable development put forward in the previous chapter acknowledges ecological limits to material growth. Recognition of ecological limits to material growth as embodied in the constant natural capital requirement for "strong sustainability" has profound implications for urban form, for the material basis of urban life, and for community social relationships in the 21st Century. If the basic science is correct, we have no choice but to shift to more sustainable patterns of resource use and development. The longer we wait, the greater the risk of having to impose rigid regulations in times of crisis. The sooner we make these shifts, the more options we will have to create mechanisms of adjustment which are socially acceptable and economically feasible.

Nearly half of the world's people will live in urban areas by the turn of the century (WCED 1987). The way these urban areas are developed will largely determine our success or failure in overcoming environmental challenges and achieving sustainable development. Cities provide enormous, untapped opportunities to solve environmental challenges, and local governments must and can pioneer new approaches to sustainable development and urban management. They must also assume the responsibility and marshall the resources to address the environmental problems facing their communities (Toronto Declaration 1991).

Although common environmental themes unite the world's communities, the communities of the developing (Southern) world face distinctly different challenges than those faced by the communities of the developed (Northern) world. From the perspective of sustainable development, the basic problem with Northern cities is that they are unsustainable, whereas the basic problem with Southern cities is that they are underdeveloped. Most Northern city dwellers are adequately housed and fed, but they meet their needs by consuming at rates the planet cannot afford and polluting at rates the planet cannot tolerate.
Most Southern city dwellers cannot meet their basic needs for food, clean water, clean air, fuel, transport and an environment free of disease-causing agents. While this dichotomy is not entirely clear cut – i.e., there is poverty in many Northern cities, and many Southern cities live beyond their means in terms of consumption of natural resources such as firewood and water – it helps illuminate the essential challenge of urban sustainability both North and South: meeting basic needs without depleting or degrading environmental capital (Holmberg, Bass, and Timberlake 1991).

The cities of the industrial world, with their inadequate urban policies and technology, set the standard to which city managers in low-income countries aspire – low density single family dwellings, cars, expressways, waste creation, air conditioning and profligate water use (White and Whitney 1990). Although the WCED wrote very little about them, the role of the cities of the industrial world deserves much more scrutiny in the context of human settlements and the environmental crisis, precisely because their impact on the world's changing ecosystems is so enormous.

Approaches to accounting for the environment in urban economic development illustrate the differences between traditional environmental economics and a more ecological approach. Traditional environmental economics perceives environmental problems in terms of a deteriorating local environment, e.g., land-fills approaching capacity from the growing waste stream. Solutions are cast in terms of finding efficient trade-offs between economic growth and environmental quality and finding policy instruments that will internalize the costs of pollution to those firms causing the problems. In contrast, the ecological ("strong sustainability") approach reveals new facets of the problem that are invisible to conventional economic policy models. Here attention is on the total relationship between the human population of the urban region, prevailing levels of ecologically significant consumption, and the sustainability of the resource base (Rees 1992a).

A recent publication from the International Institute for Environment and Development (Hardoy and Satterthwaite 1992) illustrates the general idea:

"One way to consider the impact of a city on natural resources and eco-systems is to consider what William Rees has termed its 'ecological footprint': the land area and the natural capital on which it draws to sustain its population and production structure. Cities demand a high input of resources – water, fossil fuels, land and all the goods and materials that their populations and enterprises require. The more populous the city and the richer its inhabitants, the larger its 'ecological footprint' is likely to be in terms of its demand on resources and, in general, the larger the area from which these are drawn."
Although some of our cities may appear to be sustainable, analysis of the "ecological footprint" of industrial cities shows that they "appropriate" carrying capacity (Wackernagel 1991) not only from their own rural and resource regions but also from "distant elsewhere" (Rees 1992a) – in other words, they "import" sustainability. The flip side or importing sustainability is exporting ecological degradation, or unsustainability:

"A wealthy city can export many of its environmental problems. Good environmental quality can be maintained in its own region by appropriating the ecological resources of other cities or societies by drawing natural resources from distant producer regions (including those in other continents) where their production or extraction cause serious problems of environmental degradation. Most cities in Europe, North America, and Japan can only have forests, parks, and nature reserves nearby because such land need not be utilized to meet the demand for food and other natural resources arising from city-consumers and entrepreners; such food and natural resources are imported. Here, as in many other city-based environmental problems, the separation of 'urban' and 'rural' often obscures a detailed understanding of causes and of the options available for addressing the problems" (Hardoy and Satterthwaite 1992).

The following sections consider the implications of sustainable development for planning North American communities, focusing on the postwar pattern of Western urban development.

The Unsustainable Community

Most North American cities were built using technologies which assumed that abundant and cheap energy and land would be available forever. Communities therefore grew inefficiently, and became dependent on lengthy distribution systems. Cheap energy influenced the construction of our spacious homes and buildings, fostered our addiction to the automobile, and increased the separation of our workplaces from our homes (Environment Council of Alberta 1988). As described by Calthorpe (1989),

"The current round of suburban growth is generating a crisis of many dimensions: mounting traffic congestion, increasingly unaffordable housing, receding open space, and stressful social patterns. The truth is, we are using planning strategies that are forty years old and no longer relevant to today's culture. Our household makeup has changed dramatically, the work place and work force have been transformed, real wealth has shrunk, and serious environmental concerns have surfaced. But we are still building World War II suburbs as if families were large and had only one breadwinner, as if jobs were all downtown, as if land and energy were endless, and as if another lane on the freeway would end congestion."

Urban sprawl is one legacy of abundant fossil fuel and our perceived right to unrestricted use of the private car whatever the social costs and externalities. Per capita gasoline consumption in US and many Canadian cities is now more than four times that of European
cities, and over 10 times greater than such Asian cities as Hong Kong, Tokyo, and Singapore. The biggest factor accounting for these differences in energy use appears to be not the size of cars or the price of gasoline, but the efficiency and compactness of land use patterns (Newman and Kenworthy 1989). One conclusion of a study prepared for the US Government was that "sprawl is the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption, and many types of personal costs... This cost difference is particularly significant for that proportion of total costs which is likely to be borne by local governments" (Real Estate Research Corporation 1974).

Other local and regional consequences of sprawl, such as congestion, air pollution, jobs-housing location "imbalance," and longer commuting times are now commonly recognized. Yet, until recently, few researchers acknowledged that the land use pattern of North American cities also has serious global ecological ramifications. For example, residents of most Canadian cities annually produce about 20 tons of carbon dioxide per capita, placing Canada among the top three or four nations in terms of per capita contribution to potential climate change. In contrast, citizens of Amsterdam produce only 10 tons of carbon dioxide per capita per year. Sprawl, exclusionary zoning and low density account for much of this difference. According to recent research at the International Institute for Applied Systems Analysis, if North American cities modeled future development on cities like Amsterdam, future carbon dioxide emissions here would only be half as much as current gloomy projections now indicate (Alcamo 1990).

The Sustainable Community

The postwar pattern of Western urban development is not only ecologically unconscionable but economically inefficient and socially inequitable. In contrast, sustainable development implies that the use of energy and materials be consistent with production by such "natural capital" processes as photosynthesis and waste assimilation (Rees 1990a,b). To some authors this implies increasing community and regional self-reliance to reduce dependency on imports (RAIN 1981, California Office of Appropriate Technology 1981, Morris 1982). The benefits would be reduced energy budgets, reduced material consumption, and a smaller, more compact urban pattern interspersed with productive areas to collect energy, grow crops, and recycle wastes (Van der Ryn and Calthorpe 1986).
Chapter Three: Toward Sustainable Communities

Cities with low "automobile dependence" are more centralized; have more intense land use (more people and jobs per unit area); are more oriented to non-auto modes (more public transit, foot traffic, and bicycle usage); place more restraints on high-speed traffic; and offer better public transit (Newman and Kenworthy 1989). This suggests a new approach to transportation and land use planning in North America. In the absence of comprehensive planning, transportation has, almost by default, guided land use. Instead, land use planning should guide transportation, and transportation should be designed to accommodate and support planned growth, inducing the needed changes in urban form (Cervero 1991; Replogle 1990).

The ideal urban form for a particular locale will depend to some extent on the nature of the energy supply options: for example, higher densities make most efficient use of district heating and public transport networks, while lower densities may make solar energy more viable. The location, gross density and form of new development should therefore be determined in conjunction with programs for energy supply and conservation technologies (Owens 1990). This principle is illustrated by a recent San Jose, California study which compared development pressures with or without a "greenbelt" to constrain development. Without it, 13,000 exurban homes would be developed which, compared to an equivalent number of units downtown and along the transit corridor, would require at least an additional 200,000 miles of auto commuting plus an additional three million gallons of water every day, as well as 40 percent more energy for heating and cooling (Yesney 1990).

Another study, by Montgomery County, Maryland, found that continued growth in an automobile-dependent pattern would produce traffic congestion levels high enough to choke off economic development. However, an anticipated doubling of population and employment could be accommodated without excessive traffic problems if most new growth were clustered in pedestrian- and bicycle-friendly centers focused on an expanded rail transit and busway system. Through such strategies, the share of County work trips made by non-auto alternatives could double to 50%, resulting in only half the level of energy use and air pollution compared to the sprawled, automobile strategy (Replogle 1990).

As these examples demonstrate, the pattern of growth is more important than the amount of growth in determining the level and efficiency of resource use and traffic congestion. They also show that working with established principles to reorient existing resources can contribute to such sustainability objectives as more efficient use of urban space, reduced consumption of resources, and improved community livability.
Chapter Three: Toward Sustainable Communities

Movement toward sustainable communities requires a new kind of "ecosystem" thinking about human settlements. As described by Brugmann and Hersh (1991),

In this century, the city has been imagined by sociologists, planners, and engineers as a bazaar, a seat of political chaos, an infernal machine, a circuit, and, more hopefully, as a community, the human creation "par excellence." These different ways of thinking about cities, their social forces, their market behaviours, their reliance on materials and processes from the natural world, both shape and constrain the programmes and policies that local governments put forward to serve the needs of urban people.

The city can also be imagined as an ecosystem. Such a concept provides a tool to understand the complex relations between human activities and the environment, and how communities can organise their activities to both meet human needs and benefit the environment...

Like a natural system such as a pond or forest, an urban ecosystem transforms energy (human labour, capital, fossil fuels) and materials (timber, iron, sand & gravel, information, etc.) into products that are consumed or exported, and into by-products. In natural systems by-products are recycled. We have designed and managed our cities so that these by-products often go unused as wastes. The impact of human activity on the environment can be highlighted by charting the dynamics of the system – the movement of materials and people, the flows of energy and capital, the locations where energy is stored or expended, the rates at which wastes are generated and recycled. By looking at the city as a whole, by analyzing the pathways along which energy and pollution move, we can begin to see how human activities create and direct pollution into local, regional, and global ecosystems. We can also see how these activities can be reorganised and reintegrated with natural processes to increase the efficiency of resource use, the recycling of "wastes" as valuable materials, and the conservation of energy.

Australian researcher Peter Newman notes (1990) that "the most unsustainable form of settlement yet developed – the low density suburb – has been a relatively recent phenomenon, motivated by a strong anti-urban Anglo-Saxon sentiment and facilitated by the automobile. Social organisation for ecological sustainability will need to reverse this settlement pattern." His analysis of settlement patterns and sustainability suggests that sustainable settlements require making cities more urban and making the countryside more rural.

Making cities more urban can be accomplished by "re-urbanising" city centres and sub-centres; re-orienting transport infrastructure away from the automobile; removing subsidies on the automobile; and providing a more public-oriented urban culture, assisted by attractive urban design (townscapes, streetscapes, malls and squares) and by "traffic calming" measures to facilitate bicycle and pedestrian use of residential areas and major roads. Making the

1 In discussing energy-efficient land use, some analysts use the term "reurbanization" to refer to increasing the intensity of activity within present urban boundaries and "hardening" the urban fringe (reducing sprawl), thereby making more effective use of existing services, reducing infrastructure costs, and relieving pressures on adjacent agricultural lands.
Chapter Three: Toward Sustainable Communities

countryside more rural can be accomplished by means such as protecting and encouraging sustainable agriculture in rural areas and moving towards bioregionalism (e.g., air- and watershed management) as the basis of local government boundaries and responsibilities.

*Sustainability By Design*

The drawings which follow articulate some critical elements of making cities more urban and making the countryside more rural. They also illustrate how efficient land use, reduced resource consumption, and improved community livability can be achieved simultaneously.

Yaro et al (1988) have developed practical planning standards which rural New England towns can adopt to protect their distinctive character while at the same time accommodating economic growth. Illustrating actual sites in western Massachusetts, their drawings show each site before development, after conventional development, and after what the authors call "creative development" (see Figure 3-1). In both development schemes, the same number of units have been added. While many aspects differ between the two development approaches, the most critical is that the conventional approach dramatically alters the land use pattern (e.g., agricultural lands are lost to suburban sprawl), while the creative approach absorbs growth without destroying future options (e.g., agricultural "capital" remains intact).
FIGURE 3-1a Before Development

CAPTION: Before development, after conventional development, and after "creative development." In both development schemes, the same number of units have been added.

FIGURE 3-1b  After Conventional Development
FIGURE 3-1c  After Creative Development
Chapter Three: Toward Sustainable Communities

FIGURE 3-2  An Urban Cooperative Block

CAPTION: An existing single family neighbourhood (above) has been transformed into an urban cooperative block (below) – an urban "village cluster" which could include a community house, common back yards, common parking, and common resources.

PERMISSION: Reprinted with permission from the Shared Living Resource Center, a non-profit organization dedicated to creating supportive shared living communities that integrate housing with cooperative living, ecological design and affordability. Shared Living Resource Center, 2375 Shattuck Ave., Berkeley, CA 94704, 415/548-6608.
Norwood (1990) illustrates a similar concept, but within the setting of a typical suburban block (see Figure 3-2). Variations on this theme are increasingly popular in new private market developments. In this case an existing single-family neighbourhood, characterized by under-utilized back yards, garages, attics, basements, and bedrooms, has been transformed into what the author calls an "urban cooperative block." The urban cooperative block concept could be organized around one or more small or home businesses; it could be designed to "recycle" obsolete corporate/industrial parks, shopping centres, and office complexes; or, as shown here, it could be the centre of a "village cluster" typical of the popular Danish cohousing communities, with a community house, common back yards, common parking, and common resources. Many forms of ownership are possible, ranging from a condominium corporation to a non-profit corporation with resident control, a limited equity cooperative, a community land trust, or a mutual housing association. Potential economic advantages include lowering housing costs through creating additional infill units and/or bedrooms, renting rooms and units, and allowing cottage industries or home businesses. By improving affordability, this model has the potential of serving a diversified and intergenerational cross-section of the population.

Figure 3-3 illustrates a similar concept, but this time the setting is in a downtown core. Many ideas for urban sustainability are illustrated in this drawing, such as mixed-use zoning; streets devoted to walking, cycling, and public transport; heavy reliance on renewable energy sources; rooftop gardens and greenery; and separate "waste" containers for compost and trash. Note the integration of work and home, which reduces the need for travel. As described earlier, a recent San Jose, California study compared the impacts of 13,000 units of this kind of development downtown and along the transit corridor to an equivalent number of exurban homes. It found that the kind of development pictured here saved at least 200,000 miles of auto commuting plus an additional three million gallons of water every day, and required 40 percent less energy for heating and cooling (Yesney 1990).

Calthorpe's "Pedestrian Pocket" is another variation on this theme, at the level of a compact neighbourhood. The "Pedestrian Pocket" is defined as a balanced, mixed-use area within a quarter-mile or a five-minute walking radius of a transit station. The functions within this 50 to 100-acre zone include housing, offices, retail, day care, recreation, and parks. Up to two thousand units of housing and one million square feet of office space can be located within three blocks of the transit station using typical residential densities and four-story office configurations (Kelbaugh 1989).
FIGURE 3-3  A Sustainable City Vision

CAPTION: This sustainable city vision emphasizes mixed-use zoning, pedestrian-, bicycle- and transit-friendly streets, renewable energy sources, and urban greenery.

PERMISSION: From a drawing by Diane Schatz, reprinted with permission from Rain Magazine, PO Box 30097, Eugene, OR 97403, 503/683-1504.
"The underlying concept behind drawing these circles [Map 3] is simply that distance requires energy and time to traverse. The greater the distance people have to travel, the higher the use of resources and the greater the production of pollution and waste of time. Therefore, we should build relatively compact centers. These areas will then work well with any public transit connecting them to other relatively high-use areas. Within and between the spots of higher activity people can find it easy and pleasant to walk and
Chapter Three: Toward Sustainable Communities

6. BERKELEY, 25 TO 90 YEARS HENCE

7. BERKELEY, 40 TO 125 YEARS HENCE

bicycle. This pattern of "spots" of development is based on the size of the human body and the speed of walking. It contrasts sharply with "strip" (one-dimensional or linear development) and "sprawl" (two-dimensional or flat development) created by and for things that weigh 10 to 40 times as much and travel up to 50 times as fast: automobiles" (Register 1987).

PERMISSION: Reprinted with permission from Register, Ecocity Berkeley (see References).
Figure 3-4 brings the discussion to the level of the urban region, using the city of Berkeley, California as an example. Although these maps may at first appear to show the history of Berkeley, they actually demonstrate a sustainable future development pattern for this urban region. The first map in this set shows Berkeley and its town and neighbourhood "centers." These centers were selected as a compromise between the "ideal" centers – according to the natural features of the landscape such as ridgelines and steep slopes – and the existing centers. Over time, urban development is concentrated near these centers while surrounded by nonurban lands. Once again, the key feature is the pattern of urban growth.

These drawings demonstrate a "nodal" rather than a "centralized" vision – a network of smaller, compact communities surrounded by nonurban land. As the city grows, and its "centers" become increasingly compact, the surrounding land can be reclaimed – as open space, forests, agricultural land, and wildlife habitat – to simultaneously benefit people and the environment.

Sustainability by design offers possibilities for making subdivisions and other new "developments" more "sustainable." The drawings above illustrate some ways in which efficient land use, reduced resource consumption, and improved community livability can be achieved simultaneously. Yet the limitation of such design "solutions," of course, is that they do not address the community-wide inefficient land use, overconsumption of resources, and deterioration in livability wrought by the last several decades of unsustainable development. Nor do they address administrative and planning processes which can deal effectively, sensitively and comprehensively with the attendant socioeconomic complexities created by changing our approach to community development. For urban areas to develop sustainability will require policies that extend beyond physical design, policies that are the responsibility of local government.

Local Governments for Sustainable Communities

Although local governments are not the only agencies charged with community planning and development, they are the only locally elected, representative and accountable bodies responsible for community decision-making. This makes them critical players in the movement toward sustainable communities. In the words of Peterborough, Ontario Mayor Sylvia Sutherland (1991):
"We in local government are closest to our communities. We are closest to the people who must participate in a very direct and active way if the transition to sustainability is to have any hope of success. We are uniquely situated to assist in the evolution of new social values and practices. We can encourage co-operation between the sectors of the community with a stake in the environment and in development and sustainability. We can act as a catalyst for local action beyond the boundaries of our own jurisdiction..."

Burlington, Ontario Alderman Jim Ryan (1992) concurs with Sutherland that sustainable development "requires that communities protect and enhance the environment upon which their future depends by changing the way they make decisions and by developing an ecological framework for planning sustainable communities. Translating the concept of sustainable development into action at the municipal level will require far-reaching institutional changes, changes in thinking, decision making, policy and process." Ryan continues:

"Sustainable development is a global imperative with an urban focus, because that is where the greatest growth is occurring and where the majority of our global and regional environmental problems originate. It calls for a fundamental change in the way we plan and manage our urban centres. Municipal officials as stewards of local communities have a vital role to play in effecting the necessary change."

There are a variety of ways that local governments can respond to sustainable development and global environmental concerns. For example, Gilbert (1991) has characterized eight styles of local government response with respect to potential climate change and global warming (see Table 3-1).

<table>
<thead>
<tr>
<th>Style</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Flout the law</td>
<td>Use illegally polluting vehicles.</td>
</tr>
<tr>
<td>2. Merely obey the law</td>
<td>Do no more, or less, than is required.</td>
</tr>
<tr>
<td>3. Set a good example within the administration</td>
<td>Intra-office recycling; use natural gas vehicles.</td>
</tr>
<tr>
<td>4. Advocate within jurisdiction</td>
<td>Encourage reduction, reuse, and recycling; promote transit and district heating.</td>
</tr>
<tr>
<td>5. Legislate within jurisdiction</td>
<td>Ban certain materials at landfill sites; local restrictions on automobile use.</td>
</tr>
</tbody>
</table>

7. Seek new legislative authority To tax automobile ownership; to ban sale of items made with CFCs.

8. Legislate outside jurisdiction Ban sale of items made with CFCs; ban use of many kinds of packaging.

In September 1990, the World Congress of Local Governments for a Sustainable Future was held at the United Nations in New York City. Local government officials from some 45 countries around the world gathered at this historic event to discuss the role of local government in addressing global environmental problems. They recognized that local governments have been timid to act not only because resources at the local government level have been scarce, but even more because they have been inhibited by a narrow and ineffectual conception of the domain of local government concern (UNEP 1990).

The result has been a lack of mobilization to address global problems that are largely rooted in local, day-to-day activity. Indeed, it is the world's industrial cities that produce most of the world's solid and liquid wastes, consume most of the world's fossil fuels, emit the majority of ozone depleting compounds and toxic gases, and give economic incentive to the clearing of the world's forests...

Fortunately, in the face of global challenges, many local governments have started taking singlehanded initiatives to address the root causes of environmental decline. From recycling systems and traffic reduction programs to local bans of CFCs and city-to-city Third World development partnerships, local governments are serving as laboratories for policy invention in the environmental arena...

While broad policy parameters are being formulated at the international level, local governments are developing the thousands of concrete changes in economic, political and social behaviour required to forestall an environmental crisis. The concrete innovations that they are testing are providing models for national level policies and programs (UNEP 1990).

This is the context for the present study, and illustrates why it is important to stimulate and inform discussion about the community role in sustainable development and to broaden our understanding of the opportunities for sustainable community development activity.
A Framework for Sustainable Community Development

What are the practical planning implications for North American (i.e., Canadian and US) communities of implementing sustainable development? Building upon the analysis of sustainable development in the previous chapter and analyzing the literature discussed in this chapter (see also the Annotated Bibliography), a set of criteria emerge which can be used to create a framework for sustainable community development.

Applying the concept of sustainable development to North American communities begins with unprecedented and simultaneous emphasis on the efficient use of urban space (e.g., intensifying urban land use, increasing infrastructural efficiency); on reducing consumption of material and energy resources (e.g., generally minimizing the consumption of essential natural capital, encouraging regional self-reliance); on improving community livability (e.g., community development, healthy communities); and on organizing administrative and planning processes which can deal effectively, sensitively and comprehensively with the attendant socioeconomic complexities (Rees and Roseland 1991). These latter are crucial to coordinating and balancing the other three aspects (see Figure 1-1).

Each of these criteria will be specifically addressed in the concluding chapter. The significance of these criteria for the postwar pattern of Western urban development, as typified by many North American cities and towns, is elaborated in the following chapter and in the Appendices.
Chapter 4  Municipal and Local Government Sustainable Development Initiatives

Introduction

This chapter synthesizes the data collected on municipal and local government sustainable development initiatives. These initiatives, which have been adopted, adapted or proposed by municipal and other governments in North America and elsewhere, satisfy the criteria of land use efficiency, reduced consumption of resources, improved community livability, and administration for sustainability. The initiatives are classified in Tables A through M according to which of the sustainable development criteria they most directly address. The Tables also indicate implementation mechanisms and jurisdictions in which these initiatives are being practiced or proposed.\(^1\) In countries where federal initiatives have resulted in several local government responses, the name of the country is given.

Efficient Use of Urban Space includes the two distinct but integrally related categories of transportation planning and traffic management (Table A), and land use and growth management (Table B). Reducing Resource Consumption encompasses atmospheric change and air quality (Table C), energy conservation and efficiency (Table D), waste reduction and recycling (Table E), and water and sewage (Table F). Improving Community Livability includes initiatives to green the city (Table G), develop a sustainable economy (Table H), and enhance both local community livability and global community responsibility (Table I). Administration for Sustainability encompasses investment and purchasing (Table J), leadership by example (Table K), environmental administration (Table L), and extending beyond municipal and local government (Table M).

Each Table is preceded by an introduction to the topic, based upon the literature. The Tables themselves are based upon the detailed descriptions of the initiatives provided in Appendix 1.

\(^1\) The jurisdictions are cited as examples; the listings are not intended to be comprehensive.
Efficient Use of Urban Space:
Transportation Planning and Traffic Management

The burning of fossil fuels in motor vehicles and the associated release of carbon dioxide is one of the prime contributors to atmospheric change. Beyond this, governments at every level are in fiscal crisis and mostly unable to adequately maintain and expand transportation infrastructure to keep pace with traffic growth. If we continue our present trends for the next few decades, we can also expect to see increasing congestion, longer commuting times, increasing demands for shorter work hours to compensate for longer traveling hours, and higher prices due to reduced worker productivity.

Efforts to relieve traffic congestion alone do little to reduce polluting emissions or the amount of fuel consumed. Cities must now stress reduction of single occupancy vehicle trips as the only sound way to achieve improved air quality, reduce the energy consumption that is contributing to atmospheric change, and relieve traffic congestion.

Transportation planning and traffic management initiatives are critical for sustainable urban development. These initiatives are usually motivated by goals to reduce the number of automobile trips; increase opportunities for non-auto transportation including bicycles, walking, rail, buses, and alternative vehicles; and reduce the use of gasoline and diesel fuel in conventional buses, autos and trucks.

Pucher (1988) has shown that "differences in travel behavior arise largely from public policy differences, especially from differences in automobile taxation. In addition, variations in transit subsidies, land use controls, and housing programs significantly influence travel choice, although sometimes only indirectly. The success of public transportation depends more on supportive urban development and automobile taxation policies than on transit subsidies."

A study of 32 major world cities, funded by the Australian Government, shows that there are very clear relationships between transport and urban form. Economic factors such as income and gasoline prices are less important than the direct policy instruments of
transportation planners and urban planners, such as the relative provision of infrastructure for automobiles and rapid transit, or the density of population and jobs. Cities with low "automobile dependence" are more centralized; have more intense land use (more people and jobs per unit area); are more oriented to non-auto modes (more public transit, foot traffic, and bicycle usage); place more restraints on high-speed traffic; and offer better public transit (Newman and Kenworthy 1989).

Ending the widespread employer practice of providing free or heavily subsidized parking to employees is a promising option for relieving both traffic congestion and air pollution. According to one estimate (Willson 1989), the effect of free parking induces more travel than would free gasoline. It is important to investigate variations of pricing policies which minimize regressive impacts, or to develop complementary policies which mitigate those effects. Cameron (1991) notes that studies of employer-paid parking indicate that middle- to upper-income groups are the principal recipients of these benefits. Even this is not a critical finding since the policy prescription for parking is simply to offer employees the cash equivalent of the parking space, which could be a progressive policy.

Transportation demand management (TDM) and transportation system management (TSM) consist of a wide range of measures aimed primarily at improving air quality and relieving traffic congestion. Gordon (1991) writes that "the goal of TDM strategies is to influence people to shift to more-efficient modes of transportation and to travel during off-peak hours. Some strategies attempt to manage transportation demand with regulations and pricing schemes, such as parking management and time-of-day charges for roads; others manage demand by promoting alternative-mode choices, such as ridesharing and telecommuting. In complementary fashion, TSM strategies aim to affect the supply of transportation services. The most successful policies integrate supply and demand strategies to create a transportation network that promotes efficient, low-polluting choices."

Specific TDM/TSM strategies include (Gordon 1991):
- parking measures
- ridesharing
- high-occupancy vehicle (HOV) facilities
- variable-pricing schemes (e.g., congestion or time-of-day pricing)
- telecommuting
- alternative work schedules
- bicycle and pedestrian use
- innovative land-use planning
• innovative transportation technologies (e.g., traffic-signal synchronization)

The initiatives in Table 4-A illustrate a range of strategies which address encouraging transit, managing transportation demand, emphasizing public (e.g., bus, rail) and alternative (e.g., bicycles, walking) transit, and reducing automobile dependency.
Table 4-A. **Efficient Use of Urban Space: Transportation Planning and Traffic Management**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip Reduction By-Laws</td>
<td>To reduce peak hour trips and increase the ratio of people to vehicles.</td>
<td>Require employers to implement a program, including appointment of a transportation coordinator and any reasonable combination of commute alternatives designed to achieve the required target.</td>
<td>Vancouver; Bellevue, WA; Montgomery County, MD; 37 California cities and counties; South Coast Air Quality Management District (California)</td>
</tr>
<tr>
<td>Automobile Restrictions</td>
<td>To reduce urban air pollution, traffic congestion.</td>
<td>Prohibit automobile use one or more day per week; fuel taxes.</td>
<td>Florence; Budapest; Santiago; Mexico City; Rome; Milan; Naples; Turin</td>
</tr>
<tr>
<td>Road Pricing</td>
<td>To reduce car traffic in urban centres; also being used to fund public transit.</td>
<td>All drivers entering the city centre are required to display a valid monthly transit pass or other sticker.</td>
<td>Singapore; Hong Kong; Holland; Stockholm; Oslo; Vancouver</td>
</tr>
<tr>
<td>Parking Measures</td>
<td>To favour high-occupancy vehicles over single-occupancy vehicles.</td>
<td>Preferential parking, parking pricing, parking offsets.</td>
<td>Ottawa; Vancouver; Portland, OR; Seattle, WA; Montgomery County, MD; Sacramento, CA</td>
</tr>
<tr>
<td>Public Transport Innovation</td>
<td>To provide an efficient and affordable public transport system.</td>
<td>Segregated bus lanes, express buses integrated with inter-district and feeder buses, 'boarding tubes' to cut boarding and deboarding times.</td>
<td>Curitiba (Brazil)</td>
</tr>
<tr>
<td>Free or Inexpensive Transit</td>
<td>To encourage use of public transit.</td>
<td>Transit is free within the downtown core.</td>
<td>Seattle; Portland, OR; Syracuse; Salt Lake City</td>
</tr>
<tr>
<td>Bicycle Transportation</td>
<td>To make bicycling a better transportation alternative.</td>
<td>Car-free bicycle routes; bicycle parking; shower and locker facilities in all new developments.</td>
<td>Copenhagen; Palo Alto, Davis, Berkeley, CA; Bordeaux (France); Groningen (Holland); Toronto; Vancouver</td>
</tr>
<tr>
<td><strong>Street Redesign and Traffic Calming</strong></td>
<td>To slow traffic speeds, reduce noise and exhaust, and make streets safer for pedestrians, children, seniors and bicyclists.</td>
<td>Woonerfen, or &quot;slow streets,&quot; with narrow lanes, curves, speed humps, shrubbery, slow speed limits, etc.</td>
<td>Delft, Groningen, Maastricht (Holland); Saarbrücken (Germany); Berkeley, CA</td>
</tr>
<tr>
<td><strong>Traffic Cells</strong></td>
<td>To restrain traffic and reduce accident figures.</td>
<td>Zone entire municipality for 30 KPH speed limit.</td>
<td>Saarbrücken (Germany)</td>
</tr>
<tr>
<td><strong>Telecommunications</strong></td>
<td>To encourage alternatives to commuting.</td>
<td>Determine tasks/jobs, provide training and/or equipment.</td>
<td>Portland, OR; Vancouver</td>
</tr>
<tr>
<td><strong>Transit Marketing</strong></td>
<td>To encourage use of public transportation.</td>
<td>&quot;Job ticket&quot; flash passes for all municipal employees; low-fare public transit &quot;environment pass&quot;; flash transit passes for hotel guests; &quot;transit credit card&quot; bills employers for actual transit usage; program enables employers to distribute tax-free transit vouchers.</td>
<td>Frankfurt, Freiburg, Hamburg (Germany); Basel, (Switzerland); Phoenix, AZ; Philadelphia</td>
</tr>
</tbody>
</table>
Efficient Use of Urban Space:
Land Use and Growth Management

To encourage people to use the transportation system more efficiently we need to adopt land use policies which reduce our needs for transportation and let us meet those needs in more energy-efficient ways.

Our needs for transportation arise directly from the way land is used in our communities. Through zoning and other techniques, land-use patterns and densities dictate travel volume, direction, and mode. In Canada and the US, our dispersed land use patterns are typified by the low density suburb.

The problem with the low density land use pattern is not just its high energy use. Newman (1991b) notes that this settlement pattern has a complimentary set of environmental problems that all stem from its dispersed land use:

- High per capita auto emissions (both smog and greenhouse gases are directly related to the amount of gasoline used);
- High per capita water use (e.g., for lawn irrigation);
- High land requirements in both the block size and the road system required to service it (road provision is much greater in low density areas than in medium density areas);
- High stormwater pollution from the extra urbanized land (low density areas have double the stormwater pollution of medium density areas);
- High domestic heating energy due to the lack of a shared insulating effect when buildings are grouped (50% differences are found);
- Poor recycling rates due in part to the large cost involved in collection compared to a compact housing system (European cities have four to six times the recycling rates of North America);
- High physical infrastructure costs (utilities, pipes, poles, roads, etc.); and
- High social infrastructure costs (cars are required for participation in social life).

Land use planning initiatives are often motivated by the recognition that transportation planning and traffic management initiatives, as discussed in the previous section, will
eventually be thwarted or simply overwhelmed by growth unless accompanied by long-term efforts to reduce the need for travel. Today there is also increasing recognition that to address problems such as air and water pollution, energy conservation, and infrastructure costs, land use planning initiatives are essential for moving toward sustainable communities.

Although denser land use could help solve many of the environmental, social, and aesthetic problems of sprawl, widespread misconceptions about even moderate increases in density often prevent communities from adopting compact land use strategies. As Lowe (1992) observes, augmenting the density of development does not in itself create a harsh physical environment. For example, Copenhagen and Vienna, moderate density cities with 19 people per acre and 29 people per acre, respectively, are widely associated with urban charm and livability, whereas low-density cities such as Phoenix (5 people per acre) often are dominated by unwelcoming, car-oriented commercial strips and vast expanses of concrete and asphalt.

The relationship between population density and automobile travel is further supported by a recent San Francisco area study (Holtzclaw 1991) in which odometer readings taken during biennial auto emissions (smog check) inspections were used to calculate the annual mileages for five communities within the San Francisco region. The study found that doubling residential or population density reduces the annual auto mileage per capita or per household by 20 to 30 percent. Using the Hertz Corporation's estimates of auto ownership and operating costs per mile, the average Nob Hill (177 households per acre) area family annually spends nearly $14,000 less on autos, uses 66 percent less gasoline, and emits 14 kg less hydrocarbons, 12 kg less nitrogen oxides, and 98 kg less carbon monoxide than the average Danville-San Ramon family (3.8 households per acre).

The initiatives in Table 4-B illustrate a range of strategies which emphasize land uses that create travel patterns effectively served by energy-efficient travel modes, such as public transit, bicycling, and walking.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proximity Planning</strong></td>
<td>To encourage access by proximity rather than access by transportation.</td>
<td>Developing policies and incentives; higher starting salary for new employees living closer to work.</td>
<td>Vancouver; Denver, CO</td>
</tr>
<tr>
<td><strong>Energy-Efficient Land Use Planning</strong></td>
<td>To control energy demand through land use management.</td>
<td>Energy conservation policies and commitments incorporated into comprehensive plan.</td>
<td>Portland</td>
</tr>
<tr>
<td><strong>Compact Community Policies</strong></td>
<td>To facilitate intensification.</td>
<td>Amend Official Plans, Zoning By-Laws and local building or development by-laws.</td>
<td>Peterborough (Ontario)</td>
</tr>
<tr>
<td><strong>Urban Villages</strong></td>
<td>To provide for minimal auto dependence and densities which make rail highly viable.</td>
<td>Mostly private developments; some public developments.</td>
<td>Arabella Park, Zamilla Park and Germering (Munich), Der Seepark (Freiburg), Kista (Stockholm); False Creek (Vancouver), River Place (Portland), Mission Bay (San Francisco)</td>
</tr>
<tr>
<td><strong>Urban Megaproject Planning</strong></td>
<td>To apply sustainable development concepts to an urban megaproject.</td>
<td>Minimize fossil fuel consumption; maximize solar access; natural storm water filtering; utilize waste heat; study solar aquatics potential; proximity planning policies; low parking standards; pro-cycling policies; composting space in basements; develop implementation strategy.</td>
<td>Toronto’s Railway Lands (not adopted by City)</td>
</tr>
<tr>
<td><strong>Land Stewardship</strong></td>
<td>To be the first guiding principle for land use planning.</td>
<td>Draft Official Plan Review Report states that &quot;the extent to which an individual realizes the economic benefit of a land use change should be balanced by the community's desire in preserving the environment or certain land forms in the landscape.&quot;</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Residential Intensification</strong></td>
<td>To create new residential units or accommodation in existing buildings or on previously developed, serviced land.</td>
<td>Creation of rooming, boarding and lodging houses; creation of accessory apartments; conversion of non-residential structures to residential use; infill; redevelopment.</td>
<td></td>
</tr>
<tr>
<td><strong>&quot;Commute-sheds&quot; for Jobs-Housing Balance</strong></td>
<td>To reduce traffic congestion and automobile emissions.</td>
<td>Subregional &quot;commute-sheds&quot; are designated as either job-rich or job-poor; planners try to redirect new jobs from job-rich to job-poor areas.</td>
<td></td>
</tr>
<tr>
<td><strong>Building Permit Allocation</strong></td>
<td>To manage growth.</td>
<td>Housing permits are allocated on a merit system that awards points for recreational amenities, landscaping and open space, design quality, impact on local infrastructure, and energy efficiency.</td>
<td></td>
</tr>
</tbody>
</table>

Regional Municipality of Halton (Ontario)  
Kingston, St. Catherines, Metro Toronto  
South Coast Air Quality Management District (California)  
Key West, FL
Reducing Resource Consumption:
Atmospheric Change and Air Quality

There are three key areas of atmospheric change that concern local governments: local air quality, ozone layer depletion, and potential climate change (e.g., global warming). Local air quality obviously varies according to local conditions, but shares causes and solutions with broader atmospheric change issues. Ozone layer depletion and climate change are discussed below.

Many scientists believe that the context for thinking about sustainable development for the next several decades will be global atmospheric change. Put simply, we are changing the composition of the earth's atmosphere. If the change continues at current rates, the world's weather may be significantly altered by the middle of the next century.

Climate Change

Global warming is one possible consequence of atmospheric change. In essence, we might be giving the planet a fever by increasing the Earth's natural "greenhouse effect." We know from personal experience that a fever allowed to rise unchecked poses serious health risks to the brain, the immune system, and many other key bodily functions. Likewise, an unchecked global fever poses serious health risks to food production systems (irrigation, growing seasons, crop failures, etc.) and many other key social and ecological functions that human civilization depends upon.

Although atmospheric change is a complex technical issue, most local decision-makers require only a few basic concepts in order to comprehend its implications at the community level and to design community strategies to reduce the threat of atmospheric change.

The greenhouse effect refers to heat retention in the earth's atmosphere. There has always been a natural greenhouse effect; without it the earth would be too cold for life. The problem now is what scientists call the enhanced greenhouse effect; in the last several
decades we have dumped additional quantities of "greenhouse gases" into the atmosphere which greatly increase its heat retention.

For the majority of North American local governments, the most significant greenhouse gases to address are chlorofluorocarbons (CFCs), methane, and carbon dioxide.

**Ozone Layer Depletion**

Scientists now believe that CFCs and other ozone-depleting compounds are largely responsible for the deterioration of the ozone layer that shields the Earth from the sun's harmful ultraviolet rays. These gases also contribute to the greenhouse effect, lingering 60-100 years in the atmosphere and, molecule for molecule, trapping 20,000 times more heat than carbon dioxide. Because it takes so long for ozone depleting chemicals to reach the atmosphere, the ozone depletions now being observed are actually the result of releases prior to the 1980s. Most CFCs and related chemicals are still on their way up.

In 1987, 32 nations signed an international agreement to limit the production of CFCs. This agreement, known as the Montreal Protocol on Substances that Deplete the Ozone Layer, was an important first step, but unfortunately even eliminating CFC production and use by 2000, as agreed to in London in the 1990 revision of the Protocol, is not sufficient to halt further destruction of the ozone layer. Recent reports suggest that damage to the ozone layer is accelerating and that ozone levels are dropping by some 8 percent per decade over North America (Stolarski et al 1991).

For this reason, many local governments are calling for stricter actions. Making *fast* progress toward eliminating the release of ozone depleting chemicals is important since their ozone depleting capacity lasts for so long.

**Methane**

Methane is released from rotting organic matter such as bogs, wetlands, and landfills. Local governments can construct methane gas collection systems for their landfills. When collected, methane can also be used as an energy source for the landfill or sewage plant, or sold to other users.

**Carbon Dioxide**

Carbon dioxide lingers for 100 years in the atmosphere and accounts for about half of the greenhouse effect. Carbon dioxide is fully integrated into our daily activities since it is
released largely from fossil fuel combustion and from burning forests and plants. While
deforestation may have contributed as much as 40% to the increase of carbon dioxide earlier in
the century, 80% of today’s carbon dioxide emissions are from fossil fuels – coal, oil, and
natural gas – and these will continue to be the most significant source (City of Vancouver
1990).

On a per capita basis, Canada and the U.S. are among the world’s largest consumers of
fossil fuels and among the largest producers of carbon dioxide. For example, despite its
relatively small population (one-half of one percent of the world’s population), Canada is
responsible for fully 2% of global greenhouse emissions. Other industrialized countries such
as Japan and the U.K., with comparable standards of living, produce only half as much
carbon dioxide per capita as do the U.S. and Canada (Flavin 1990). If North Americans are
to help in reversing climate change, we must reduce our carbon dioxide emissions and
contribute to the development of cleaner and more energy-efficient technologies.

Reducing atmospheric carbon dioxide emissions may require major long-term commitments
and social reorganization. The sections in this chapter on transportation, land use, energy,
and urban ecology are all directly concerned with the challenge of reducing our carbon
dioxide emissions.

The US Environmental Protection Agency has estimated that merely to stabilize
atmospheric concentrations of CO2 at the current level, carbon emissions must be cut by 50-80
percent by the middle of the next century. A recent global action plan calls for the
governments of all high- and medium-energy consuming countries to reduce their carbon
dioxide emissions by 70% by 2030. Scientists and policymakers meeting in Toronto in June
1988 offered a short-term goal: cutting them by 20 percent by 2005 (Flavin 1990; IUCN 1991;
Toronto Conference Statement 1988). Yet while international bodies and national
governments struggle to formulate policies to achieve this goal, it is at the community level
where most of these policies will be implemented.

In the face of such challenges, many local governments have started developing
initiatives to address the root causes of environmental deterioration and to contribute
solutions toward a sustainable future. While local governments must be sensitive to
potential costs associated with legislative programs, policies to reduce greenhouse gas
emissions can be designed to achieve revenue neutrality (see, e.g., Wexler 1992). Beyond
immediate cost concerns, however, local governments are beginning to recognize that net
fiscal, economic, and ecological benefits will accrue to those who get their environmental house in order.

The initiatives in Table 4-C illustrate a range of strategies which address improving local air quality, eliminating ozone-depleting compounds, and reducing emissions of carbon dioxide, methane, and other greenhouse gases.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ban on Ozone-Depleting Compounds</td>
<td>To ban the use, sale, and manufacture of ozone-depleting compounds within the jurisdiction</td>
<td>By-law to prohibit the use, sale and manufacture of nearly all ozone-depleting compounds; require all service stations and repair shops to capture and recycle CFCs.</td>
<td>Newark, NJ; Irvine, CA</td>
</tr>
<tr>
<td>CFC Recycling</td>
<td>To collect CFCs found in discarded refrigerators and air conditioners.</td>
<td>Municipal employees collect the appliances and send them to a company that stores the CFCs in sealed tanks; recycled CFCs are used to repair older appliances.</td>
<td>Montreal</td>
</tr>
<tr>
<td>Stratospheric Protection Accord</td>
<td>To ban the local use of ozone-depleting substances by early 1992 and require the recovery and recycling of CFCs from products such as refrigerator-coolant units.</td>
<td>24 North American municipalities joined together in the Accord.</td>
<td>Toronto, Los Angeles, and 22 other North American municipalities</td>
</tr>
<tr>
<td>Carbon Reduction Targets</td>
<td>To, e.g., reduce 1988 CO₂ emissions 20% by 2005.</td>
<td>Many measures, re: electricity, transportation, urban forestry, energy efficiency, etc.</td>
<td>Toronto, Vancouver, Ottawa</td>
</tr>
<tr>
<td>Airshed Quality Management</td>
<td>To substantially improve air quality.</td>
<td>Tightening restrictions on the use of private automobiles and on pollution-causing industrial and household activities; requiring diesel buses, most freight vehicles, and 40 percent of private automobiles to convert to cleaner fuels; anticipates total prohibition of gasoline fuels in automobiles by the year 2007.</td>
<td>Los Angeles (South Coast Air Quality Management District)</td>
</tr>
</tbody>
</table>
Reducing Resource Consumption:
Energy Conservation and Efficiency

Current practices for the development, conversion and use of energy resources – especially the burning of fossil fuels – contribute to global warming, acid rain, health dangers through air pollution and residuals deposition, and depletion of natural resources. These problems already exert significant negative worldwide economic, environmental and social impacts.

Furthermore, if the less developed countries increase their consumption to match that of the industrialized world, global stocks of petroleum will drop perilously low (Frosch and Gallopoulos 1989). Energy demand and use is a major contributor to the degradation of environmental resources, requiring far-reaching and far-sighted new management strategies if sustainable global development is to occur.

In this section, "energy conservation" refers to changes in personal and organizational behaviour that result in lower energy consumption. "Energy efficiency" refers to technological changes that allow us to do what we already do while using less energy. "Energy substitution" refers to using the most environmentally appropriate source of energy to do a necessary activity.

According to a US Environmental Protection Agency study, energy efficiency and renewable energy sources could play a major role in helping to slow and eventually stop global warming. If nations took full advantage of opportunities to improve energy efficiency, global fossil-fuel use and carbon dioxide emissions would grow slowly, if at all. And if, in addition, renewable energy sources were developed to their full potential, fossil-fuel use and carbon dioxide emissions could be cut well below today's levels, eventually approaching the 50-80 percent reduction necessary to stabilize the global climate (US EPA 1989).

"It has been calculated that increasing energy efficiency alone could reduce carbon dioxide emissions in several high-income countries by between 1% and 2% per annum. On
this basis the United States could readily cut its emissions by 60% by the year 2050" (IUCN 1991).

Urban areas in Canada and the US are significant users of energy. Energy conservation reduces utility bills, saving money for local government and for the consumer. Conservation measures are far more cost-effective than building new power plants. Money spent on conservation stays in the local economy and helps develop local business.

As described in earlier sections on transportation and land use, energy conservation should be an explicit objective of urban design. Conservation strategies can also be targeted at the residential, commercial and industrial sectors where large energy savings in lighting, heating, ventilating and air conditioning systems are possible (OECD 1990; Local Government Commission 1990). "Buildings in industrial countries typically devour 35-50 percent of national energy budgets, mostly for space heating and cooling, water heating, refrigeration, lighting, and cooking" (Lowe 1991).

Renewable energy sources have significant potential which is presently underutilized. From wind turbines and photovoltaic cells to liquid fuels derived from biomass, the renewable energy technologies that have been developed are of startling versatility. Most produce little or no pollution and hazardous wastes; they are immune to foreign disruptions like the 1973 Arab oil embargo, and they provide a hedge against inflation caused by the depletion of fossil-fuel reserves. "Their development would almost certainly result in a net increase in employment, as renewable-energy industries generally require more labor, per unit of energy produced, than coal, oil, and natural-gas industries" (Brower 1990).

City energy policy can promote more effective land use, energy efficiency, mass transit, and conservation of resources at the local level. To promote urban sustainability, cities can (City of San Jose 1991):

- Set examples as model energy consumers in the operation of municipal facilities, vehicle fleets, and mass transit systems.
- Plan, finance, and operate energy-efficient infrastructures for major water, waste water, and solid waste management systems.
- Regulate and plan for energy use through local land use policies that effect the patterns of residential, commercial and industrial development.
- Promote policies that improve air and water quality.
- Enforce the energy efficiency standards of building codes more stringently.
• Institute energy efficiency service programs (such as weatherization or appliance efficiency) aimed at various community sectors.

• Educate local residents and businesses by providing information on energy-efficient technologies, service providers, and financing opportunities.

• Adopt site standards for renewable and alternative energy resources.

• Use renewable resources such as solar, geothermal, hydroelectric, biomass, and wind at City-owned facilities.

• Advocate and facilitate the development and implementation of energy policies and programs by utilities and other levels of government.

The initiatives in Table 4-D illustrate a range of strategies which emphasize energy conservation, efficiency, and substitution (shifting away from dependence on fossil fuels toward renewable energy sources such as direct solar and photovoltaics).
Table 4-D. Reducing Resource Consumption: Energy Conservation and Efficiency Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least-Cost Utility Planning</td>
<td>To allow consideration of investments for energy conservation and demand management on an equal footing with investments for new generating capacity.</td>
<td>Strategic Corporate Plan treats conservation as an energy source.</td>
<td>Seattle; several other U.S. cities</td>
</tr>
<tr>
<td>Energy efficiency targets</td>
<td>To increase energy efficiency in all sectors of the City by, for example, 10%.</td>
<td>Municipal policy.</td>
<td>Portland, OR; Toronto; Vancouver</td>
</tr>
<tr>
<td>District heating and cogeneration</td>
<td>To combine heat and power production, reducing energy consumption and fuel emissions.</td>
<td>District-wide system of underground low-temperature hot water pipes supply space heating and domestic hot water to residential, commercial and institutional users.</td>
<td>Helsinki; Saarbrücken; Cornwall County (UK)</td>
</tr>
<tr>
<td>Municipal energy conservation campaign</td>
<td>To conserve energy.</td>
<td>Infrared photos of energy leakage sent to each home in town by municipal utility.</td>
<td>Osage, IO</td>
</tr>
<tr>
<td>Energy conservation retrofit ordinances</td>
<td>To conserve energy.</td>
<td>Requires all existing buildings to be brought up to an energy conservation standard at the time of sale.</td>
<td>San Francisco</td>
</tr>
<tr>
<td>Weatherization</td>
<td>To conserve energy.</td>
<td>Free home weatherization inspections and advice, plus low-interest loans.</td>
<td>Seattle</td>
</tr>
<tr>
<td><strong>Energy Audits and Loans</strong></td>
<td>To conserve energy.</td>
<td>Municipal utility promotes audits and arranges complete residential efficiency upgrades; also arranges for qualified contractors to do the work; cost includes grant and amortized hydro bill with immediate reduction in energy costs.</td>
<td>Sacramento, CA</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>
Reducing Resource Consumption:
Solid and Hazardous Waste Reduction and Recycling

Although the exact ingredients of local garbage vary by place and time, generally our garbage consists of about 65% commercial wastes and 35% residential wastes. "About 37% of the average waste stream is made up of paper and cardboard, 26% is yard and food wastes, 10% is glass, 10% is metals, 8% is plastics, and the remainder is miscellaneous wastes... Packaging materials account for a third of the volume of our waste" (Local Government Commission 1990).

Most North Americans generate about five pounds of solid waste each day – 90% of which ends up in landfills. Small wonder that many urban areas are running out or have run out of land disposal sites for solid wastes. Furthermore, high capital costs, public opposition to site selection, and uncertainties concerning the risks associated with emissions make incineration alternatives difficult to implement. To deal with solid wastes, waste reduction and recycling strategies will require major initiatives in many communities (OECD 1990).

Solid wastes which are not recycled contribute to incinerator emissions or to the production of methane in landfills. Either way, they contribute to atmospheric pollution. Much of these wastes are in the form of nondegradable, nonreturnable, and nonrecyclable food and beverage packaging. Household organic wastes which are not composted also contribute to the production of methane. In addition, our garbage represents the energy equivalent of millions of wasted barrels of oil and other nonrenewable natural resources.

Local governments need to develop comprehensive waste reduction strategies, focusing first on source reduction, then on reuse, recovery and recycling. Only when these approaches are exhausted should local governments turn to other, less environmentally sound alternatives.

Hazardous and toxic materials in the waste stream are also a great concern in many communities. Urgent action is needed to reduce the amount and increase the recycling of hazardous waste and to ensure the proper disposal of what is left. This has prompted some
local governments to provide businesses with technical assistance to reduce their hazardous and toxic wastes.

An essential part of a comprehensive waste reduction strategy is a procurement policy to purchase recycled and/or reusable products (see section 4-J).

The initiatives in Table 4-E illustrate a range of strategies which address waste reduction, reuse, recovery, and recycling.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Reduction Targets</td>
<td>To recycle, compost, or avoid production in 10 years (1998) of 60% of the total combined residential and commercial waste which would otherwise be generated within the City.</td>
<td>Public education, curbside collection of recyclables and yard waste, commercial and apartment recycling, mixed waste processing, and possibly developing a food waste composting facility.</td>
<td>Seattle</td>
</tr>
<tr>
<td>Packaging restrictions</td>
<td>To encourage a recyclable and compostable waste stream.</td>
<td>Ordinance restricting nondegradable, nonreturnable and nonrecyclable food and beverage packaging – including national brands – originating at retail food establishments.</td>
<td>Minneapolis</td>
</tr>
<tr>
<td>&quot;Precycling&quot; campaigns</td>
<td>To educate consumers to consider waste before they buy.</td>
<td>Media, public events, etc.</td>
<td>Berkeley</td>
</tr>
<tr>
<td>Municipal composting</td>
<td>To reduce yard wastes and to sell dry sewage sludge as a soil amendment.</td>
<td>Centralized composting program for 60,000 tons of yard waste per year.</td>
<td>San Jose</td>
</tr>
<tr>
<td>Municipal garbage composting</td>
<td>To reduce waste.</td>
<td>Municipal garbage composting facility with 185,000 tons/yr capacity.</td>
<td>Portland</td>
</tr>
<tr>
<td>Polystyrene plastic foam bans and restrictions</td>
<td>To prevent one-time use of polystyrene plastic foam by restaurants and retail food vendors.</td>
<td>Municipal by-law.</td>
<td>Portland, Berkeley</td>
</tr>
<tr>
<td>Hazardous Waste Reduction Targets</td>
<td>To reduce hazardous waste generation.</td>
<td>City staff provide businesses with technical assistance.</td>
<td>Hayward, Santa Monica, and Berkeley, CA</td>
</tr>
<tr>
<td>Comprehensive Resource Recovery and Utilization</td>
<td>To recover and reprocess everything from glass, metals, paper and waste oil to cotton, animal bones, chemical fibres and human hair.</td>
<td>State complex employing 29,000 full-time and many more part-time employees through a network of purchasing stations, integrated recycling centres, sales departments and retail shops selling reclaimed products.</td>
<td>Shanghai</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Recycling Land Use Controls</td>
<td>To ensure that future owners and tenants will participate in city recycling programs.</td>
<td>Set recycling space standards for all new buildings.</td>
<td>Santa Monica, Davis, CA; Boulder, CO; Orlando, FL; Portland, OR</td>
</tr>
<tr>
<td>Redistributing Recycling Subsidies</td>
<td>To provide an incentive to start recycling.</td>
<td>A surcharge of A$ 1.50 per ton on local governments without recycling programs; subsidy of A$ 17.50 per ton for those with active programs.</td>
<td>New South Wales (Australia)</td>
</tr>
<tr>
<td>Dishmobile</td>
<td>To keep tens of thousands of non-biodegradable food containers from the landfill.</td>
<td>Mobile facility for food service at public festivals, equipped with a commercial-size dishwasher and enough plates and silverware to serve 600 guests.</td>
<td>Boeblingen (Germany)</td>
</tr>
</tbody>
</table>
Chapter 4-F

Reducing Resource Consumption:
Water and Sewage

The quality of water affects the quality of the life it touches. Both groundwater and surface water systems have deteriorated in quality in many urban areas. In cities, the rates of water use and water pollution are a primary concern. Urban water management requires a great deal of space and energy for both supply and wastewater treatment.

Water pollution in combination with a too rapid rate of water extraction can cause serious harm to hydrological systems. In the US, for example, the maintenance of adequate water supplies to urban areas in the western states and some of the major population centres of the northeastern states is emerging as a major issue, with rationing and curtailment of non-essential water use implemented in many of these areas during hot dry summers (OECD 1990).

Lowe (1991) observes that there is an important relationship between water quality and land use. "[C]ar-dominated urban areas contaminate stormwater runoff with salt, oil, and toxic fluids from roads and parking lots. Suburbs allow large amounts of chemical fertilizers and pesticides to run off golf courses and large lawns. Construction sites from which trees and other natural vegetation are stripped add large amounts of eroded soil to runoff. Often, stormwater from cities and suburbs – together with agricultural runoff containing chemicals and animal wastes – constitute a greater hazard to water quality than factories and other specific sources do."

Wastewater treatment is a particular concern in many communities. Many municipal wastewater treatment facilities are designed to provide at least secondary treatment. At the community level, contemporary wastewater treatment technologies are major environmental polluters on at least three fronts:

- They produce an often-toxic by-product called sludge which is difficult to dispose of.
- They use hazardous compounds in the treatment process which end up in the environment.
• Without massive federal subsidies, most communities cannot afford to build and operate advanced wastewater treatment facilities; their huge, expensive infrastructure is also difficult to change or adapt.

Sustainable approaches to water management are urgently needed. Sustainable water management would aim to:

• treat water at its pollution source;
• discharge as high or higher quality water than is received; and
• prevent soil and land degradation (healthy terrestrial ecosystems purify water).

Many of the same land use principles that help urban and suburban areas to save energy – such as clustering development, discouraging automobile-oriented land use, and leaving natural vegetation intact – can help to assure that water resources will survive well into the future (Lowe 1991).

The initiatives in Table 4-F illustrate a range of strategies which address water conservation, source protection, and source-centred treatment.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Offset Requirements</strong></td>
<td>To free up enough water for development.</td>
<td>Developers are required to: replace old toilets in existing buildings with low-flow models; install water-saving devices in toilets; install low-flow bathroom basin faucets, showerheads, and toilets.</td>
<td>Santa Barbara, San Luis Obispo, and Santa Monica (CA); Newmarket (Ontario); Niagara Falls</td>
</tr>
<tr>
<td><strong>Tenant User Fees for Water</strong></td>
<td>To protect water reserves and reduce the use of drinking water.</td>
<td>Retrofit water meters in apartments and bill tenants based upon water use.</td>
<td>Hamburg (Germany)</td>
</tr>
<tr>
<td><strong>Grey Water Recycling</strong></td>
<td>To recycle waste water from residential sources.</td>
<td>Use grey water from sinks, bathtubs and washing machines to irrigate trees and shrubs.</td>
<td>San Luis Obispo, Los Angeles (CA)</td>
</tr>
<tr>
<td><strong>Natural Water Purification</strong></td>
<td>To purify water for swimming without resort to chemical treatment such as chlorination.</td>
<td>A swamp pond system with 125,000 plants turns an artificial lake into an ecological preserve.</td>
<td>Montreal</td>
</tr>
<tr>
<td><strong>Constructed wetlands</strong></td>
<td>Sewage treatment.</td>
<td>Treat sewage effluent through a series of natural marshes and restored wetlands.</td>
<td>Arcata, CA; Denhama Springs, LA</td>
</tr>
<tr>
<td><strong>Water Conservation Programs</strong></td>
<td>To conserve water.</td>
<td>Water conservation devices with free or low-cost installation; financed in part by a conservation incentive fee for non-participants.</td>
<td>Santa Monica, CA; Minneapolis, St. Paul, MN; Southern California</td>
</tr>
<tr>
<td><strong>Solar Aquatics Waste Treatment Facility</strong></td>
<td>Septage treatment.</td>
<td>Greenhouse-scale &quot;marshes&quot; purify wastes.</td>
<td>Providence, RI; Harwich, MA</td>
</tr>
</tbody>
</table>
Improving Community Livability: Greening the City

Greening the city refers to a spectrum of ideas and techniques ranging from edible planting and indigenous landscaping to community organizing to protect urban open space and restore creeks. These activities are motivated by awareness of factors such as the need to reduce our use of pesticides, conserve energy, clean urban air, absorb carbon dioxide from the atmosphere, and reduce the urban heat island effect.

McCulloch (1991) notes that the economic and environmental costs of the urban heat island effect alone (in Los Angeles: increased electricity demand of US $100 million per year, plus a 30% increase in smog days) are enough to prompt city greening initiatives.

Our urban ecosystems also serve as indicators of ecological health. Especially in urban areas, there is a fine line between ecological health and public health. No one wants their children to play in water that kills fish.

Beyond this, if we accept the argument that sustainability requires cities to become more urban, they need to also become more pleasant. Lowe (1991) notes that "[g]iven the failure of many urban areas to offer humane, welcoming spaces, it is no wonder so many people flock to suburban shopping malls." One sure way of enhancing the quality of urban life is through "greening" the city. Greening the city means emphasizing an environmental perspective that begins with the city. It means combining urbanism and nature to create cities that are healthy, civilizing, and enriching places to live (Hough 1990).

Perhaps the most important aspect of greening the city is that cities are where most of us live, and therefore cities are where most of us learn about the interplay between society and nature. It is a truism that many urbanites think food comes from supermarkets, water comes from faucets, and wastes are simply taken "away." In a democratic society, we cannot expect people to support sustainability policies if they have no experience of the ecological basis of life – our urban areas should demonstrate our dependence on ecological health. Nor can we expect people to support more ecologically appropriate urban lifestyles (e.g., more
compact communities, less use of private automobiles) unless our urban areas themselves become healthier.

The initiatives in Table 4-G illustrate a range of strategies which address cultivating a sense of place, involving people in their neighbourhood open space, reducing pesticide use, conserving energy, cleaning urban air, absorbing carbon dioxide from the atmosphere, and reducing the urban heat island effect.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creek Raising</td>
<td>To cultivate a sense of place; build community; and revitalize neighborhoods and commercial areas.</td>
<td>Raise and restore buried streams; new developments must incorporate existing streams into their landscaping.</td>
<td>San Luis Obispo and Berkeley, CA; Burnaby, BC</td>
</tr>
<tr>
<td>Green Guerrillas</td>
<td>To involve people in their own neighbourhood open space.</td>
<td>Neighbourhood groups clean and green vacant lots.</td>
<td>Lower East Side, Manhattan (New York City)</td>
</tr>
<tr>
<td>Tree Replacement Bylaws</td>
<td>To maintain the number of urban trees.</td>
<td>Requires replanting of trees affected by development.</td>
<td>Vancouver</td>
</tr>
<tr>
<td>Natural Planting</td>
<td>To protect a critical aquifer district.</td>
<td>Ordinances require that at least 80 percent of each lot be kept in its natural state, and no more than 15 percent of any lot can be planted in fertilized lawns or plants.</td>
<td>Southampton, NY</td>
</tr>
<tr>
<td>&quot;Green&quot; Roofs</td>
<td>To reduce heating and air conditioning requirements.</td>
<td>Planning permission for structures with flat or gently sloping roofs is granted only if they are designed to be of the &quot;living&quot; variety.</td>
<td>Mannheim and Frankfurt (Germany)</td>
</tr>
<tr>
<td>Integrated Pest Management</td>
<td>To reduce reliance on pesticides.</td>
<td>Many techniques to suppress, but not control, insect populations and keep damage to acceptable levels.</td>
<td>Burnaby, BC</td>
</tr>
</tbody>
</table>
Chapter 4-H

Improving Community Livability:
Economic Development

Conventional approaches to economic development often produce enormous amounts of pollution and consume huge quantities of energy and materials while failing to deliver sufficient jobs. A host of existing government policies that encourage pollution and discourage job creation need to be overhauled. While many of these policies, e.g., taxation, are primarily within the jurisdiction of senior governments, municipal and local governments can begin to point the way toward a sustainable economy.

Renner (1991) notes that "[t]he sooner we embrace the principles of sustainability as an essential goal of public policy, the less traumatic the transition will be. An early decision to alter or abandon environmentally destructive practices is likely to cause fewer economic problems or job losses than a reactive policy."

A sustainable economy will emphasize two factors: sustainable employment, and economic demand management. Sustainable employment includes turning "wastes" into resources (e.g., recycling); improving efficiency with regard to energy and materials; converting to greater reliance on renewable energy sources; increasing community self-reliance (e.g., food and energy production); and sustainable management of natural resources (e.g., community forestry).

Several kinds of community-oriented enterprises have proven valuable in the pursuit of sustainable employment. Community Development Corporations (CDCs), for example, have been active in rehabilitating or constructing affordable housing, creating jobs and businesses in economically disenfranchised areas, engaging in commercial and industrial real estate development to promote economic development in their communities, and providing job training and placement services. Likewise, community finance institutions such as community development credit unions, revolving loan funds, and housing trust funds have helped communities experiencing disinvestment and/or a lack of investment capital create their own financial institutions to retain or gain access to capital.
The other factor to emphasize in a sustainable economy is managing economic demand. In Chapter Two we noted that "development" can no longer simply mean economic "growth," but requires instead that we learn to live on the "interest" generated by remaining stocks of "natural capital." Just as sustainability has prompted a shift in our transportation and energy planning away from the traditional concerns with increasing supply to the new focus on managing demand, we must also shift our economic development emphasis from the traditional concern with increasing growth to reducing social dependence on economic growth, or what we might call Economic Demand Management (EDM). A primary focus of EDM should be reducing the need for paid work (Renner 1991) and considering productivity increases in the form of leisure time rather than increased output (Schor 1991). Local governments can promote EDM by, for example, land-use planning that links trip reduction with affordable housing, and by developing partnerships with institutions such as community land trusts to provide an expanding stock of permanently affordable housing.

The initiatives in Table 4-H illustrate a range of strategies which address sustainable employment and economic demand management.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Employment Plan</td>
<td>To create jobs, spur private spending, conserve energy, and reduce CO₂ emissions.</td>
<td>Public investment in energy conservation education, audits, and initiatives.</td>
<td>San Jose, CA</td>
</tr>
<tr>
<td>Community Land Trusts</td>
<td>To hold land for the benefit of a community and of individuals within the community.</td>
<td>A democratically structured nonprofit corporation, with an open membership and an elected board of trustees.</td>
<td>Philadelphia, PA; Burlington, VT; Atlanta, GA; New York City; Greenfield, MA; Providence, RI; Franklinlin, NH; Norwich, CT</td>
</tr>
<tr>
<td>Linkage Programs</td>
<td>To provide funds for affordable housing, job development, and day-care, etc.</td>
<td>Directing a portion of the value created by investment in areas undergoing substantial development to build affordable housing, provide job training, and fund social services in less fortunate neighbourhoods.</td>
<td>Boston, San Francisco, Vancouver</td>
</tr>
<tr>
<td>New Product Development</td>
<td>To encourage manufacturers to develop environmentally-friendly products.</td>
<td>Municipal government project researches environment-economy integration.</td>
<td>Gothenberg (Sweden)</td>
</tr>
<tr>
<td>Increasing Affordable Housing Supply</td>
<td>To keep housing prices affordable and to encourage access by proximity.</td>
<td>New zoning codes that promote a variety of housing types, including smaller and multi-family homes.</td>
<td>Portland, OR</td>
</tr>
</tbody>
</table>
**Greenmarkets**
To preserve farmland and help farmers, while making fresh fruits and vegetables available in city neighborhoods.

**Local Currencies**
To invest energy grant money for long-term local development; to encourage carpooling.

**Citizens’ organization working out of the mayor’s office operates sites.**

**Residents and businesses who signed up for an energy audit received fifteen “Prairie Bucks,” good for the purchase of a compact fluorescent lamp at local hardware stores; “Rideshare Bucks” are offered according to the number of passengers in the car and the number of gallons required for the commute.**

New York City

Lester Prairie, MN
Improving Community Livability:
Community Development

Although some people confuse development with mere growth, development is actually a much more complex, rich term. This chapter explores sustainable community development both in terms of local community livability and also in terms of responsibility to the global community.

The environmental advantages of urban areas—such as compact development, shorter travel distances, economically viable public transit, and per capita energy conservation—can only be realized if our communities are livable. Perhaps the most important indicator of "livability" is that livable communities are communities people want to live in. Municipal and local governments therefore need to address those issues that cause people to stay in their communities—e.g., employment and educational opportunities, accessible health care services, vibrant arts and culture, and a thriving non-profit sector, as well as those that cause people to leave—e.g., crime, dissatisfaction with existing housing choices, and lack of opportunity to participate in decisions affecting their lives and well-being.

In many cities with good public transit systems, for example, a substantial proportion of the population is afraid to use the system after dark. The obvious consequences are that those who can afford it will drive or take taxis, those who cannot will either travel in fear or lock themselves up at home, and the public transit system will lose revenue. Lowe (1991) notes that "[p]lanners and citizens, particularly in North America, often assume that moderate and high-density land use are synonymous with crime and unhealthy conditions. Yet there is no scientific evidence of a link between these social problems and density per se... where density and crime coincide, other, more powerful forces are at work; there is no inherent relationship between population density and urban social ills."

Calthorpe (1989) observes that "[m]obility and privacy have increasingly displaced the traditional commons, which once provided the connected quality of our towns and cities. Our shared public space has been given over to the car and its accommodation, while our private world has become bloated and isolated... The automobile destroys the urban street, the
shopping center destroys the neighborhood store, and the depersonalization of public space grows with the scale of government. Inversely, private space is taxed by the necessity of providing for many activities that were once shared and is further burdened by the need to create identity in a sea of monotony."

Sustainable community development implies that we address not only the "hard" urban environmental issues such as transportation, land use, air quality, and energy conservation, but also the "soft" issues such as public health and safety, gender equity, environmental education, and global environmental responsibility. Perlman (1990) has observed that "[e]very first-world city has within it a third-world city of malnutrition, infant mortality, homelessness and unemployment. Every third-world city has within it a first-world city of high tech, high fashion, and high finance. Seeing the cities of the world as a global laboratory breaks down the stereotype North/South technology transfer, and opens up the rich possibilities of South/North and South/South exchange, vastly increasing the number of potential solutions."

The initiatives in Table 4-I illustrate a range of strategies which address local community livability and global community responsibility.
Table 4-1. *Improving Community Livability: Community Development Initiatives*

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Worker Safety</strong></td>
<td>To regulate the use of video display terminals (VDTs) in private businesses.</td>
<td>Municipal ordinance.</td>
<td>San Francisco</td>
</tr>
<tr>
<td><strong>Healthy Community Projects</strong></td>
<td>To create healthy public policy at the community level.</td>
<td>Healthy community platforms, offices, and network.</td>
<td>Vancouver, Toronto, Edmonton, Montreal, Québec City; Seattle</td>
</tr>
<tr>
<td><strong>Smoking Disincentives</strong></td>
<td>To ban cigarette vending machines from apartment buildings, gasoline stations, coin-operated laundromats and restaurants where the sale of alcoholic beverages is incidental.</td>
<td>Municipal legislation.</td>
<td>New York City</td>
</tr>
<tr>
<td><strong>“Disassembly” Line</strong></td>
<td>To integrate environmental and social policy.</td>
<td>Apprentice shop for unemployed young people where discarded but serviceable equipment (e.g., refrigerators) is repaired and sold, and polluting substances are removed.</td>
<td>Zutphen (Holland)</td>
</tr>
<tr>
<td><strong>Integrated Environmental and Social Policy</strong></td>
<td>To provide food while training inmates for future employment.</td>
<td>Prison greenhouse pilot program using integrated fish culture and hydroponic vegetable production system.</td>
<td>Bridgewater, MA</td>
</tr>
<tr>
<td><strong>Gender Equity</strong></td>
<td>To respond to the special needs of women crime victims, and to create new career paths for women.</td>
<td>&quot;Delagacias da Mulher,&quot; all-female police stations.</td>
<td>Sao Paulo (Brazil)</td>
</tr>
<tr>
<td><strong>Urban Environment Platforms</strong></td>
<td>To build a united, broad-based political coalition for progress on sustainable community development.</td>
<td>Policy platforms, candidate surveys, policy endorsements.</td>
<td>New York City, Philadelphia, Victoria</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><strong>Global Environmental Responsibility</strong></td>
<td>To save tropical rainforests.</td>
<td>Restrict or ban the use of tropical timber within municipal boundaries.</td>
<td>Many cities in the United Kingdom, West Germany, the Netherlands, and Belgium</td>
</tr>
<tr>
<td><strong>City-to-City Partnerships</strong></td>
<td>To cooperate on municipal environmental assessment; to promote &quot;municipal foreign policy&quot;; to support development education, liberation movements, and renewable energy use in developing countries.</td>
<td>&quot;Twinning&quot; or &quot;linking&quot; with sister cities; a local elected officials project; <em>The Bulletin of Municipal Foreign Policy</em> (now <em>Global Communities</em>); an overall partnership development program.</td>
<td>Federation of Canadian Municipalities; US Local Elected Officials Project; Bremen (Germany)</td>
</tr>
</tbody>
</table>
Chapter 4-J

Administration for Sustainability:

Investment and Purchasing

Government investment and purchasing has a great influence in the local economy. For example, in 1989 total government purchases in the U.S. amounted to approximately $916 billion or about 20% of the gross national product. About 13% of these purchases were made by state and local governments (Local Government Commission 1990). Municipal investment and purchasing is particularly important in terms of setting an example for private purchasers, creating new markets, and stimulating sustainable economic development.

"Public purchasing policy and the promotion and maintenance of standards are central to an effective environmental strategy. They complement the activities of trade and industry and affect the quality of life of all sectors of the community" (ACC 1990).

Municipal purchasing policies are often critical to the success of other sustainable community programs. For example, despite winning a United Nations environmental award in 1989, Ontario's Blue Box recycling system was soon suffering as municipalities realized the program did not pay for itself (Reguly 1992). As many communities have found out the hard way, municipal expenditures on recycling programs are not useful or cost-effective if there is no local demand for businesses which make recycled or reusable products.

The initiatives in Table 4-J illustrate a range of strategies which address influencing the economy through municipal spending, setting an example for private purchasers, creating new markets for environmentally appropriate products, and stimulating sustainable economic development.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valdez Principles</td>
<td>To promote environmental responsibility among businesses and local governments.</td>
<td>Elimination or minimization of pollution, sustainable use of natural resources, reduction and safe disposal of waste, energy conservation, environmental risk reduction, marketing of safe products and services, damage compensation, hazard disclosure, selection of environmental directors and managers, and annual environmental audits.</td>
<td>Ottawa, Vancouver, Los Angeles, New York City, Pasadena, Philadelphia; California, New Jersey, New York, and Minnesota.</td>
</tr>
<tr>
<td>Environmental Charter</td>
<td>To make local governments model environmental citizens.</td>
<td>Pledges to develop programs to provide clean water; improve air quality; expand recycling and minimize waste; foster sound energy policy; plan for environmentally responsible growth; implement environmentally sound procurement policies; enforce laws and improve oversight capacity; encourage environmentally responsible business practices; maximize citizen education and involvement; and implement the goals of this charter.</td>
<td>New York City</td>
</tr>
<tr>
<td>Environmentally Sound Purchasing Policies</td>
<td>To promote the purchase of reusable, recyclable and reclaimable materials.</td>
<td>Review and amend contracts and tender specifications for goods and services.</td>
<td>Toronto</td>
</tr>
</tbody>
</table>
Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER)

To incorporate environmental considerations into purchasing procedures, with the goal of 50 per cent reduction in waste generation by the year 2000.

Intergovernmental committee from waste management and purchasing departments of federal, provincial and municipal levels of government and other concerned organizations.

Ontario
Chapter 4-K

Administration for Sustainability:

Leadership by Example

While progress in environmental management appears to be the order of the day, a look at even recent history gives cause for concern. For example, in 1990 Toronto made headlines around the world by becoming the first city to commit itself to reducing its 1988 level of carbon dioxide emissions 20% by 2005. Included in its "call for action" was a goal of "significantly reducing the number of commuting autos" and a strategy to "promote significant reductions in the energy intensity of transportation in the city" by promoting public transit, bicycling and walking (City of Toronto 1989). Yet ten years earlier Toronto City Council had passed an energy conservation by-law designed, among other things, to encourage development and redevelopment that would contribute to energy-efficient urban form, reduce the need for transportation, discourage automobile use and encourage public transit and bicycle transportation (Lang and Armour 1982). That the same environmental legislation was passed twice in ten years is a strong indicator that the earlier measures were not implemented.

Another example of purported progress is the recent mushrooming of municipal and local government environmental departments, coordinators, task forces, staff committees, and citizen boards. At one level this certainly deserves applause. Yet a major survey of environmental management in nearly 3,000 North American local governments in 1973 found that 20 percent had staff environment committees, 40 percent had designated environmental coordinators, and 24 percent had citizen environmental boards. Inadequate funding, uncertainty and delay in program administration, inadequate communication with senior levels of government, and inadequate technical assistance were all perceived in the mid-1970s as major impediments to adequate local responses to environmental problem solving (Magazine 1977). Nearly 20 years later, this list still sounds familiar.

How can we encourage sustainable policymaking and ensure sustainable implementation? Local government is an influential employer in most communities. The first step toward sustainable administration is leadership by example, particularly "greening" City Hall. We need to put our own house in order, using tools such as environmental audits, staff training, eco-counselling, environmental impact assessment, and state-of-the-environment reporting.
The initiatives in Table 4-K illustrate a range of strategies which address leadership by example.
TABLE 4-K. Administration for Sustainability: Leadership by Example

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Municipal Environmental Offices/Positions</strong></td>
<td>To monitor and coordinate environmental management.</td>
<td>Ecosystem planners, environmental managers and program administrators, energy conservation offices.</td>
<td>Burnaby, Vancouver, Toronto; Portland, OR; Irvine, CA; Calgary; Baltimore; San Francisco, San Jose</td>
</tr>
<tr>
<td><strong>Environment First Policy</strong></td>
<td>To develop a broad-based, systematic approach to environmental enhancement at the local level.</td>
<td>Environmental Think Tank; Environmental Coordinator.</td>
<td>Waterloo</td>
</tr>
<tr>
<td><strong>Assistant Mayor for the Environment</strong></td>
<td>To raise the profile of environmental programs.</td>
<td>Elected &quot;green&quot; assistant mayor chairs a number of public/private committees that promote, monitor and administer environmental initiatives.</td>
<td>Bordeaux (France)</td>
</tr>
<tr>
<td><strong>Green Economic and Social Strategy</strong></td>
<td>To identify and promote emerging new environmental products and services; invest in environmental research and development; and develop an integrated approach to urban policy planning within City Council.</td>
<td>&quot;Green growth network&quot; to develop a city-wide green economic and social strategy.</td>
<td>Sheffield (UK)</td>
</tr>
<tr>
<td><strong>Overcoming NIMBY</strong></td>
<td>To ensure that LULUs (locally unwanted land uses) are distributed equitably among resisting neighbourhoods.</td>
<td>Planning department calculates a ratio comparing each neighbourhood's existing LULUs to the overall population; neighbourhoods will not be expected to carry more than their fair share of facilities.</td>
<td>New York City</td>
</tr>
</tbody>
</table>
Administration for Sustainability:

Environmental Administration

As noted in the previous section, the road to sustainable development is paved with failed efforts to incorporate the environment into everyday municipal decision-making. The first step toward sustainable administration is leadership by example.

Unfortunately, energy-efficient light bulbs and reusable china in the City Hall cafeteria will not in themselves achieve sustainable development or slow global climate change. These kind of well-intentioned initiatives are but small steps toward creating sustainable communities.

The second step toward sustainable administration is conceptual and organizational. One of the greatest obstacles to sustainability is the reductionist administrative mindset that subdivides problems and prevents the left hand of government from understanding what the right hand is doing. For example, despite considerable trumpeting of the Canadian government's "Green Plan," an analysis of the 1991 federal budget and spending estimates concluded that Ottawa spent billions of dollars in 1991 on programs and policies that create pollution and encourage environmental degradation (RFI 1991). Such bureaucratic schizophrenia is perpetrated at all levels of government as well as throughout academia.

Sustainable communities cannot be achieved through the kind of fragmented and bureaucratized administration that characterizes senior government. At the community level the issues of, for example, transportation, land use, economic development, public health, environmental protection, and housing affordability cannot be successfully managed as separate problems by separate agencies using separate strategies.

Conventional wisdom considers the environment as an administrative problem, to be solved by better management – understood as cutting the environment into bite-size pieces. This approach seems increasingly unable to deal effectively, sensitively, and comprehensively with environmental complexities.

Rather than the environment as an administrative problem, it would appear that administration is itself an environmental problem. The alternative to conventional
municipal administration is an emerging form of what has been called "environmental administration." It can be characterized as non-compartmentalized, open, decentralized, anti-technocratic, and flexible (Paehlke and Torgerson 1990). Community "Round Tables" on the environment and the economy may prove to be a good example of environmental administration.

It will take a great effort over a long time to turn the system of local government into a paragon of environmental administration, though try we must. In these transition decades, however, an effective and popular way to implement sustainable community development is urgently required.

The initiatives in Table 4-L illustrate a range of strategies which address environmental administration.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Commitments and Legislation</td>
<td>To, for example, reduce the threat of atmospheric change.</td>
<td>Targets and by-laws to reduce or eliminate emissions of carbon dioxide, CFCs, etc.</td>
<td>Toronto; Irvine, CA; Vancouver</td>
</tr>
<tr>
<td>Community Round Tables on the Environment and the Economy</td>
<td>To bring diverse perspectives together to identify common ground and work collectively toward the goal of sustainable development.</td>
<td>Community &quot;vision statements&quot; or other documents attempt to establish goals, priorities and an action strategy.</td>
<td>Peterborough, Burlington, Kitchener, Guelph, Muskoka, Skeena, and Capital Regional District of Victoria</td>
</tr>
<tr>
<td>Environmental Enforcement</td>
<td>To improve the effectiveness of environmental policies and legislation.</td>
<td>Police department enforces environmental laws; environmental officers and investigation teams.</td>
<td>Weert and Apeldoorn (Holland); Richmond and Los Angeles, CA</td>
</tr>
<tr>
<td>Sustainable City Strategy</td>
<td>To promote a sustainable future by conserving 10% of the projected energy use in all sectors in the year 2000.</td>
<td>Education and persuasion, technical and design assistance, financial incentives, municipal operations, and policy and regulation.</td>
<td>San Jose, CA</td>
</tr>
<tr>
<td>Eco-Counselors</td>
<td>To review the environmental impact of all municipal practices.</td>
<td>Recommend environmentally sound practices to various government departments.</td>
<td>Germany, Sweden, Switzerland, Austria, Italy, Spain, UK, France, Luxembourg, Belgium</td>
</tr>
<tr>
<td>Government-Community Partnerships</td>
<td>To support non-governmental organizations in achieving public interest goals.</td>
<td>Rent-free office space, seconded research and support staff; granting power of eminent domain.</td>
<td>Toronto, Metropolitan Toronto, Boston</td>
</tr>
</tbody>
</table>
Administration for Sustainability:

Beyond Municipal and Local Government

The preceding sections in this chapter identified the first two steps toward sustainable administration. The first is leadership by example. The second is to recognize that conventional municipal administration is itself an environmental problem and that we need a new form of "environmental administration" which is non-compartmentalized, open, decentralized, anti-technocratic, and flexible. For our communities to genuinely become sustainable communities, however, we also need to take a third step.

The third step toward sustainable administration is improving the context for sustainable community planning and governance. This requires looking beyond the local level toward regional, provincial/state, and federal policies and programs. Recent research indicates that successful programs require three elements: 1) communities need some overarching institutional arrangement with the capacity to build consensus toward a comprehensive long-term shared image of the region and where it should be heading; 2) this institutional arrangement should also have appropriate authority, resources, and incentives to help implement regionally approved policies; and 3) there should be some mechanism for metropolitan-wide property tax and general revenue sharing that minimizes inter-jurisdictional competition – to avoid distorting development patterns and undermining regional concerns (Rothblatt 1992). These programs should use means such as sustainability goals and targets, planning grants, technical assistance, and timelines. They should encourage, enable, and empower those communities which have already started to plan local initiatives for a sustainable future, and require the rest to begin.

The initiatives in Table 4-M illustrate a range of strategies for improving the context for sustainable community planning and governance.
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Purpose</th>
<th>Mechanisms</th>
<th>Practiced/Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Programs</td>
<td>To support nationwide programs of municipal plans for the environment; test administrative and organization models.</td>
<td>Multi-year action programs; municipal environmental committees; introduction of municipal EIA.</td>
<td>France, Norway, Finland, Holland</td>
</tr>
<tr>
<td>State Programs</td>
<td>To require all cities and counties in these states to plan their own development according to stipulated goals, such as energy conservation, protection of open space, and provision of affordable housing.</td>
<td>Legislation calls for all state cities and counties to adopt comprehensive plans that meet state standards.</td>
<td>Florida, Georgia, Maine, Massachusetts, New Jersey, Oregon, Rhode Island, and Vermont</td>
</tr>
<tr>
<td>Regional Cooperation</td>
<td>To reduce competition between regional municipalities for commercial and industrial development.</td>
<td>Municipalities are required to pool a portion of their commercial and industrial tax base, which are pooled and then distributed throughout the metropolitan region according to each community's population and overall tax base.</td>
<td>Minneapolis-St. Paul</td>
</tr>
<tr>
<td>Municipal Foreign Policy</td>
<td>To influence national foreign policy.</td>
<td>Offices of International Affairs; sister cities; nuclear-free zones; etc.</td>
<td>Los Angeles, Pittsburgh, Baltimore, New York City, Seattle, Dallas, Vancouver</td>
</tr>
</tbody>
</table>

107
Chapter 5  Conclusions and Discussion

The initiatives cited in Chapter Four clearly demonstrate that many creative, solution-oriented policy ideas for dealing with current and future sustainable development challenges are emanating from the local government level. Using the framework developed in Chapter Three, we can begin to identify broadly applicable strategies for planners and policymakers to hasten the development of sustainable communities.

*Efficient Use of Urban Space*

*Transportation Planning and Traffic Management*

Urban transportation systems should be redesigned to minimize environmental impacts. Goals should include reducing the number of automobile trips; increasing opportunities for non-auto transportation including bicycles, walking, rail, bus, and alternative vehicles; and reducing the use of gasoline and diesel fuel in conventional autos, buses and trucks. Objectives should include measures, for example, to:

- encourage transit over personal automobile use;
- identify means for managing transportation demands, especially of commuters;
- emphasize bicycle and pedestrian networks as valid components of a regional transportation strategy; and
- reduce "automobile dependency" by, for example:
  - restricting new road projects through the city;
  - restricting central city parking levels;
  - slowing traffic speeds;
  - discouraging single occupancy vehicles (SOVs);
  - encouraging high occupancy vehicles (HOVs); and
  - reorienting subsidies from private to public forms of transportation.

The transportation and traffic initiatives show that there are many ways for communities to reduce automobile dependency, manage transportation demand, and encourage public (e.g., bus, rail) and alternative (e.g., bicycles, walking) forms of transit (Table A). Automobile trip-reduction by-laws, road pricing, preferential parking, regional carbon
dioxide taxes, street redesign and traffic calming, and many measures to encourage public transit and bicycle transportation can be actively encouraged. Few communities, however, seem to have grasped the connection between improving non-automobile forms of transit and reducing automobile dependency. For example, despite attempts to improve public and alternative transit, the speed and convenience advantages of the automobile over these other forms are rarely being reduced – except in those cities where the lack of planning initiatives (and the resulting congestion) has inadvertently created this disadvantage. In addition, public and alternative transit is chronically underfunded and is likely to remain so until automobile subsidies (e.g., free parking) are reoriented.

Land Use and Growth Management

Sustainable land uses create travel patterns effectively served by energy-efficient travel modes, such as public transit, bicycling, and walking. Objectives should include measures, for example, to:

- reduce the average length of daily automobile trips where other modes are not feasible;
- reduce physical infrastructure and related costs of sprawl;
- reduce per capita water and energy consumption; and
- encourage reurbanization.

The initiatives on land use and growth management (Table B) indicate that land use planning and controls can be created or strengthened (see e.g., Richardson 1989). Energy-efficient land use policies can be developed to reduce the need for transportation (Federation of Canadian Municipalities 1990). Grants and loans for transportation investments can be tied to compliance with requirements for regional land use planning and growth management. Sprawl can be attacked by setting maximum expansion limits and favouring growth near transit stations. Metropolitan planning can shift from access by transportation to access by proximity (City of Vancouver 1990).

---

1 One exception to this seems to be the traffic calming initiatives undertaken in Holland and Germany since the 1970s. Although there is increasing discussion of traffic calming in North America, most local governments here appear more reluctant to interfere with the public's perceived right to drive anywhere and anytime.

2 One recent study (Newman 1991a) suggests that congestion can actually be creatively exploited to reduce automobile dependency and improve air quality. While congestion reduces vehicle efficiency, it also encourages other modes of transportation and, more importantly, keeps urban areas from sprawling and hence building in even greater travel distances.
The effectiveness of compact urban development can be fully achieved only if governments remove the conflicting incentives posed by other (often national) policies such as artificially low gasoline prices. For example, fuel taxes that more accurately reflect the true environmental and social costs of private vehicle use – from the health costs of air pollution to the military costs of policing the Persian Gulf – would give an enormous boost to more efficient urban land use and raise revenue for investment in a broader range of transport options (Lowe 1992).

Despite the absence of supportive national policy frameworks, municipal and local governments can do a great deal to create more energy-efficient travel patterns by concentrating activities in specific areas and developing a mix of land uses in those areas. Governments, investors, and banks should require analysis of alternative long term least-cost strategies for transportation and land use investments. Long term least-cost strategies would tend to give pedestrians, cyclists, and public transportation priority over the automobile. These strategies would favour the building of surface light rail and bikeway systems connecting higher density pedestrian-friendly city and suburban centers. They would also favour the building of bicycle parking garages, and they would lead to policies that slow down car traffic to improve conditions for pedestrians and cyclists (Replogle 1990).

As recognized by the Canadian Institute of Planners, "If we are to achieve sustainable development, we will have to go beyond the notion that land is a mere commodity" (CIP 1990). The most promising initiatives found in this regard are Halton's land stewardship initiative (Table B) and community land trusts (Table H). Halton's draft Official Plan Review Report recognizes that "the extent to which an individual realizes the economic benefit of a land use change should be balanced by the community's desire in preserving the environment or certain forms in the landscape" (Regional Municipality of Halton 1991). The community land trust model stems from the ancient view of the earth as something naturally given, or God-given, to all people in common – something which, like the air above it, can never be owned in any absolute sense by individuals (ICE 1982).
Reducing Consumption of Energy and Material Resources

Atmospheric Change and Air Quality

Sustainable approaches to air quality should emphasize an integrated strategy for improving local air quality while simultaneously addressing global atmospheric change issues. Objectives should include measures, for example, to:

- eliminate ozone-depleting compounds as soon as possible; and
- reduce emissions of carbon dioxide, methane, and other greenhouse gases.

The initiatives on atmospheric change and air quality indicate that measures to recycle, reduce, and eliminate ozone-depleting compounds and to reduce emissions of carbon dioxide and other greenhouse gases can be undertaken in conjunction with measures to improve local air quality, traffic congestion, and land use efficiency (Table C). These initiatives indicate both the strengths and weaknesses of local government efforts to address global environmental problems such as ozone depletion and greenhouse gas build-up. Initiatives such as Vancouver's *Clouds of Change* program clearly demonstrate the potential of local governments to test and develop policies and programs which can be transferred to other jurisdictions and/or serve as models for provincial or federal initiatives. In parts of Canada, these initiatives have had something of a ripple effect, spurring similar efforts in other communities and at higher levels of government (see, e.g., CRD 1992). However, with the exception of some larger cities, few municipal governments have so far taken it upon themselves to explicitly address global environmental issues. In the US, the far-reaching air quality initiatives of cities such as Los Angeles have almost invariably been in response to non-compliance with Federal air quality standards. With local issues demanding local attention, it appears that few communities focus on seemingly distant global issues unless required to do so by senior government.

Energy Conservation and Efficiency

Sustainable energy policy should emphasize conserving energy, using energy more efficiently, and converting to renewable energy sources. The initiatives on reducing consumption of energy resources (Table D) show that energy efficiency can be increased in all sectors to reach specific targets, e.g., 20% by 2000. Energy conservation retrofit ordinances, renewable energy technologies, and least-cost utility planning can be encouraged and financially supported. It is worth noting, however, that there is relatively little municipal
effort in North America to promote energy substitution (shifting away from dependence on fossil fuels toward renewable energy sources such as direct solar and photovoltaics). Given the considerable interest in this area during the 1970s, one is forced to attribute the current dearth of activity to Canadian and US federal energy policies from the 1980s which continue to encourage dependence on fossil fuels, and to the concomitant lack of senior government support for renewable energy sources.3

Waste Reduction and Recycling

Sustainable approaches to solid and hazardous wastes should emphasize waste reduction far more than recycling. Objectives should include measures, for example, to:

- adopt waste reduction targets combined with measures such as "precycling" campaigns and packaging restrictions;
- divert an increasing proportion of the waste stream from landfills or incinerators to recycling and composting programs;
- research and develop opportunities to convert "wastes" into resources; and
- recycle, reduce, and properly dispose of hazardous and toxic wastes.

The initiatives on waste reduction and recycling indicate that packaging restrictions can be adopted along with ambitious goals to reduce, reuse, reprocess and recycle waste (Table E). In recent years, recycling programs have become perhaps the most visible aspect of sustainable development in North America. However, they have been motivated not by the argument that North Americans must reduce their consumption of material resources, but rather by the simple fact that the majority of North American municipal landfills are quickly reaching capacity. Municipalities have been less ambitious about waste reduction than about recycling. Overt waste reduction initiatives such as "precycling" campaigns and packaging restrictions put municipal governments on the front lines in the battle not only against waste but against overconsumption per se, which can be an uncomfortable position in regard to local businesses who manufacture and/or sell wasteful packaging or items sold with it. The Shanghai example of comprehensive resource recovery and utilization dramatically demonstrates how far we still have to go in North America. For the moment, waste reduction targets seem to hold the most promise.

---

3 For example, of the roughly $50 billion in energy tax credits and research funding granted annually by the US government, $26 billion goes to fossil fuels, $19 billion subsidizes nuclear power, and $5 billion supports renewable energy sources (Hubbard 1991).
Water and Sewage

Sustainable approaches to water and sewage should emphasize water conservation, source protection, and source-centred treatment. Increasing interest in biological alternatives (e.g., wetlands, solar aquatics) to conventional chemical-based sewage treatment systems should be encouraged, along with initiatives to protect water-related carrying capacity vis-a-vis new development. Objectives should include measures, for example, to:

- conserve water through offset requirements or user fees;
- protect water supplies from the effects of industrial activity (e.g., discharges of toxic wastes directly or indirectly into the marine environment); and
- prevent soil and land degradation (healthy terrestrial ecosystems purify water).

The initiatives on water and sewage indicate that water conservation and source-protection programs can be combined with programs to protect water-related carrying capacity, and that biological sewage treatment systems can be a viable alternative to conventional chemical-based systems (Table F). Municipal and local governments have been slow to apply the notion of demand management to water. For example, many North American communities do not even meter water consumption. Growing populations combined with increasing rates of water consumption and concern over possible long-term climatic changes may force a change in attitude toward water resources, as indicated by Hamburg's tenant user fees for drinking water. Experience with water shortages is also encouraging some communities, especially in California, to investigate means of protecting water-related carrying capacity such as offset requirements and grey water recycling.

Municipal wastewater treatment has long been dominated by a chemical engineering bias. Biological alternatives to conventional chemical-based sewage treatment systems will have to overcome considerable resistance from the engineering professions. Perhaps the best hope for protecting water resources in the near future is that urban decision makers will learn more about urban ecology and take measures to use urban space more efficiently, thus reducing waste, runoff, and sludge simultaneously.
Improving Community Livability

Greening the City

Greening the city should emphasize the need to cultivate a sense of place, involve people in their neighbourhood open space, reduce pesticide use, conserve energy, clean urban air, absorb carbon dioxide from the atmosphere, and reduce the urban heat island effect. Objectives should include measures, for example, to:

- protect mature urban trees from development;
- use integrated pest management strategies (instead of relying solely on pesticides);
- restore urban wildlife corridors (e.g., creek raising);
- encourage urban food production (e.g., community gardens);
- encourage natural drainage rather than dependency upon storm sewers; and
- line urban streets with shade trees.

City greening initiatives indicate that involving people in their community and cultivating a sense of place can be readily combined with programs to protect and enhance open space and natural features (Table G). These initiatives appear to be among the easiest measures for which to gain public support. Perhaps more than other kinds of initiatives, many of them originate from community organizations and concerned citizens rather than from municipal officials or processes. However, they often seem to focus on improving a particular neighbourhood place (e.g., a creek) or protecting some special neighbourhood feature (e.g., mature trees) rather than on broader community environmental concerns.

Economic Development

A sustainable community economy should integrate traditional community economic development concerns with newer ideas about sustainability. It should emphasize community self-reliance in combination with sustainable employment and economic demand management strategies. Objectives should include measures, for example, to:

- make the local economy more diverse and self-reliant (e.g., re: food and energy production);
- manage local "natural capital" so that future generations will also be able to benefit from the use of those resources (e.g., community forestry);
• encourage community-oriented enterprises (e.g., community development corporations, revolving loan funds) and locally- and worker-owned businesses; and

• reduce social dependence on economic growth (e.g., by land-use planning that links trip reduction with affordable housing, or by developing partnerships with institutions such as community land trusts to provide an expanding stock of permanently affordable housing).

The economic development initiatives indicate that local governments can exercise significant influence over the local economy (Table H). Some of the initiatives, such as linkage programs, stem from traditional community economic development concerns such as job creation, social justice and community empowerment. Others, such as San Jose's sustainable employment plan, represent the integration of traditional community economic development concerns with newer ideas about sustainability. New York City's Greenmarkets represent an attempt to make the local economy more diverse and self-reliant, rather than specialized and dependent on trade and natural resources. Gothenberg's municipal research and development initiative, St. Paul's home-grown economy project, and Lester Prairie's local currencies each demonstrate pioneering attempts to encourage community-oriented enterprises. Community land trusts hold promise as a way to advance social equity, to manage local "natural capital" so that future generations will be able to benefit from the use of those resources, and to reduce social dependence on economic growth.

Community Development

Sustainable community development should emphasize both local community livability and global community responsibility. Local community livability is enhanced by actions such as improving public health and safety, environmental education, and the quality of public space. Global community responsibility is enhanced by efforts such as twinning programs with sister cities and by municipal foreign policy initiatives. Objectives should include measures, for example, to:

• improve safety for women, seniors, and children;

• direct sufficient growth to older neighbourhoods so that their infrastructure does not deteriorate;

• decrease the rate of lifestyle-related diseases (heart disease, emphysema, etc.);

• discourage importing products or materials from – or exporting wastes to – areas with poor environmental or labour management practices; and

• initiate "sister-city" or "twinning" relationships with communities in developing countries, and attempt to improve poor environmental or labour management practices which may exist in those communities.
Chapter Five: Conclusions and Discussion

Initiatives such as the Bridgewater prison greenhouse aquaculture/hydroponic program, the Zutphen Sloopstraat ("disassembly line") project, and the healthy communities projects in many cities demonstrate ways municipal governments can enhance local community livability (Table I). Global community reponsibility can likewise be enhanced by efforts such as city-to-city "twinning" partnerships, which can range from modest Federation of Canadian Municipalities (FCM) projects to cooperate on municipal environmental assessment to Bremen's innovative "sustainable development" partnerships to suport development education, liberation movements, and renewable energy use in developing countries. However, few of these initiatives are explicitly motivated by an overriding concern for sustainability per se – more traditional humanitarian concerns (e.g., charity, rehabilitation, disaster recovery) generally appear to be sufficient motivators.

Administration for Sustainability

Investment and Purchasing

Sustainable community investment and purchasing should emphasize explicit attempts to use municipal spending to influence the local economy, set an example for private purchasers, create new markets for environmentally appropriate products, and stimulate sustainable economic development. Objectives should include measures, for example, to:

- adopt codes for socially/environmentally responsible investment and purchasing;
- purchase products made from recycled materials or create markets for such materials;
- support locally owned and socially responsible businesses; and
- support businesses with environmentally sound practices.

The initiatives on investment and purchasing indicate that local governments can embrace social and environmental responsibility by adopting charters or codes such as the Valdez Principles (Table I). As with the issue of waste reduction, local officials are likely to be uncomfortable with the idea of adopting an investment and/or purchasing policy which may alienate offending local businesses. Intergovernmental committees such as GIPPER may be necessary to overcome this resistance.

Leadership by Example

Leadership by example is important not only because local government is an influential employer in most communities, but also because municipal initiatives are not likely to be
successful in the community if local government does not practice what it preaches. Objectives should include measures, for example, to:

- address sustainable development concerns on a daily basis (by, e.g., environmental managers, staff sustainable development committees, etc.); and

- use monitoring tools such as environmental audits, environmental impact assessment (EIA), and state of the environment (SOE) reporting (see Appendix 2).

Local governments can improve daily practice through administrative reorganization explicitly designed to enhance sustainability (Table K). Although the proliferation of municipal environmental offices, positions, task forces, etc. is an encouraging development, many of these initiatives are plagued by the same kinds of obstacles identified by similar entities some 20 years ago (Magazine 1977). Waterloo's "Environment First" policy is a good example of government practicing what it preaches. One advantage these kinds of initiatives have over those of the 1970s is the wider availability of new monitoring tools.

Interviews with numerous participants and observers, however, suggest that the key to success for many of these initiatives rests less on technique than on the dedication of the individual staff selected to implement them. Staff with long-standing background and personal interest in environmental matters are far more effective than those staff who are transferred, seconded or promoted from other municipal departments (e.g., engineering, finance, public health, etc.) simply on the basis of factors like seniority. To ensure the success of these initiatives, it is important to create mechanisms for involving concerned citizens and community organizations in their design and implementation. Bordeaux's "green" assistant mayor is an innovative way of accomplishing this, and leads toward the concept of environmental administration.

Environmental Administration

Environmental administration initiatives should emphasize administrative forms that are democratic, participatory, open, decentralized, and flexible. Concern that sustainable development cannot be achieved through traditional fragmented and bureaucratized administration has prompted the development of new administrative forms, such as Round Tables, at local and higher levels of government. Objectives should include measures, for example, to:

- adopt planning commitments and targets;
- assure open and fair processes for citizen involvement in municipal decision-making;
• involve citizens in municipal decision-making (e.g., citizen-staff committees, task forces, etc.);

• allocate resources for improving community sustainability and planning for growth management;

• provide support for environmental non-governmental organizations (ENGOs); and

• support ENGO participation in municipal decision-making.

The environmental administration initiatives indicate that local governments can expand the domain of local government concern by, for example, involving local police departments in enforcement of environmental laws, and by reaching out to the broader community through local round tables, eco-counselors, and partnerships with non-governmental organizations (Table L).

Senior government can play an important role in empowering or constraining local environmental administration initiatives. For example, open and fair processes for citizen involvement in municipal decision-making often exist in response to senior government requirements (e.g., Oregon's land use planning system requires all of its cities and counties to provide for widespread citizen involvement). Likewise, many communities that have allocated resources for improving community sustainability and planning for growth management have been required to do so by senior government. However, in cases where local government commitments and targets substitute for the absence of senior government standards, they are likely to be weakened if weaker senior government standards are introduced (e.g., it will be more difficult for Toronto and Vancouver to achieve their targets to reduce 1988-level CO₂ emissions 20% by 2005 now that the federal government has committed only to freezing 1990 CO₂ levels).

Some local governments appreciate that environmental non-governmental organizations (ENGOs) can be potential allies, and recognize the mutual benefit of government-community partnerships with ENGOs to achieve shared public interest goals. Direct cash grants to ENGOs are an obvious form of support; less obvious forms include subsidized or free office space, seconded research and support staff, granting powers such as eminent domain to a community organization, or using municipal powers (e.g., granting of building permits) to indirectly assist a community organization (e.g., a community land trust).

4 Canada's Community Round Tables hold some promise in regard both to open, fair decision-making processes and to allocating resources for sustainability planning. However, there are still many unanswered questions about the relationship between such "multi-stakeholder" attempts at an advisory "consensus" and genuine public participation in actual decision-making processes.
Chapter Five: Conclusions and Discussion

Beyond Municipal and Local Government

A commitment to sustainable community development should emphasize the importance of regional planning and cooperation (e.g., re: waste management and public transportation), encourage senior government direction and initiative in these areas, and encourage appropriate devolution of authority to local governments for implementing sustainable community development initiatives. Objectives should include measures, for example, to:

• improve the effectiveness of regional planning;
• reorganize regional governance if necessary to accomplish sustainable development goals (e.g., Air Quality Management Districts);
• advocate for (and use) the policy-making authority and financial resources to work toward sustainable community development; and
• advocate that senior governments encourage, enable, and empower those communities which have already started to plan for sustainable development, and require the rest to begin.

Beyond the municipal and local government level, regional planning and appropriate devolution of authority to local governments for implementing sustainable community initiatives can be encouraged (Table M). Issues such as air quality, waste management and public transportation are almost invariably regional in nature and require regional initiatives, planning and governance. Regional planning powers vary widely – in some cases (e.g., tax pooling in Minneapolis-St.Paul) cooperation between regional municipalities can contribute toward sustainability, while in others (e.g., air quality in the Lower Mainland) regional governance may need to be reorganized to accomplish sustainable development goals (see City of Vancouver 1990).

Analysis of regional sustainability issues leads to the conclusion that sustainable development anywhere requires sustainable development everywhere (Rees 1992). Although some regional governments have initiated far-reaching programs to address sustainability issues (e.g., California’s South Coast Air Quality Management District), these have generally been in response to non-compliance with senior government standards. As demonstrated by the programs from Oregon, Norway, etc., sustainable community planning works best in the context of supportive regional, provincial/state, or national frameworks of goal-oriented planning – i.e., frameworks which encourage or require planning for sustainable community development. The more common approach – crisis management – is simply not adequate for achieving sustainable development goals.
Chapter Five: Conclusions and Discussion

General Conclusions

Four general conclusions emerge from analyzing the data. The first is that, as demonstrated by the range of initiatives identified in this study, many local governments are aware of at least some elements of sustainable development and are making a contribution toward achieving it. These initiatives also show that social invention is alive and well; given the challenge – or the opportunity – local governments have developed a wide range of creative, solution-oriented innovations for responding to sustainable development concerns.

The second conclusion is that some initiatives (e.g., blue box recycling programs) are politically easier than others (e.g., trip reduction by-laws) for local governments, and even though they may be more expensive and/or less effective in terms of reducing urban environmental impact, the easier initiatives will be implemented first. Ingredients of political ease include factors such as political will, ease of implementation, level of community awareness (e.g., re: gravity of air quality problems, need to reduce automobile dependency, etc.), program cost, distributive effects, and timing.

A related conclusion is that great intentions do not necessarily equal great actions. For example, although it is too soon to judge the effectiveness of Vancouver's Clouds of Change initiative, nearly two years after Council approved the report's recommendations it is apparent that the City is dragging its feet in terms of their implementation. This underscores the importance of administration for sustainability as a component of the framework developed in this study.

Timing includes elements such as the current and projected state of municipal finances, the amount of public interest consumed by other local issues (e.g., a major development or a political scandal), the date of the next election, and the media attention associated with related local and non-local events. For example, one elected official attributed Council approval of an ambitious series of environmental proposals in large part to her ability to put the package on the Council agenda just prior to Earth Day.

From the perspective developed here, a primary weakness of this Vancouver initiative is that it leaves implementation entirely in the hands of the bureaucracy rather than building in an ongoing citizen participation mechanism to monitor progress. An initiative as ambitious as Clouds of Change (see Annotated Bibliography) also needs a champion in City Hall. When Council approved the recommendations in 1990, participants and observers alike expected the soon-to-be-staffed Special Office for the Environment to be that champion and, among other things, to develop a public involvement mechanism. However, for a variety of reasons (e.g., an inexperienced Environment Manager who only lasted a few months and is unlikely to be replaced), the initiative has been left without an effective champion in the bureaucracy and without a mechanism to involve the public. The Mayor has reportedly suggested that perhaps the Task Force on Atmospheric Change which designed the initiative should be brought together occasionally, but this is a far cry from the kind of regular, ongoing citizen participation illustrated here under environmental administration (Table L). The author served as Research Director for the Task Force.
The final conclusion is that while many individual initiatives are impressive in scope or design, most of them appear to have been adopted piecemeal rather than as part of a broader framework. In other words, the elements for moving toward sustainable communities are being put in place but not, as yet, the necessary synthesis.

There is nothing surprising in this last finding; after all, the very concept of sustainable communities is relatively new and, at least at this time, esoteric. Some might argue that a synthesis is not even necessary. Perhaps incrementalism is all we can hope for — it certainly seems to be producing some impressive results. Yet these successes come in spite of the fact that most community decisions which affect sustainability (e.g., re: land use, transportation and air quality) are made with little or no attention to their synergistic effects, and indeed may even conflict with broader sustainability objectives.

A 1981 study of potential sustainability strategies for the city of Portland, Oregon made some observations which still hold true today:

"A sustainable city thinks of itself whole, moves with change, and plans for permanence. Above all, this implies an acceptance of responsibility and nurturing of solutions at the local level: conserving indigenous resources and managing them for sustained yield; fostering local production to meet more of local needs; designing political systems to support decision-making at the lowest possible level; and, everywhere, encouraging low-cost, community self-help strategies that empower people to help themselves. The vision is still a distant one. It may require nothing less than a reorientation of our values. But doing such things, a city will survive and endure.

Pieces of such a vision have already begun to appear: neighbourhoods that have experimented with integral food, energy and waste systems; cities that have built energy conservation into their street design, zoning and building codes; urban regions that are assessing the levels of growth and development that can be supported by their air- and watersheds; whole states that are being studied to determine their ability to become self-reliant in food production. Make no mistake about it, the transition has begun.

But, as yet, no major community has come forward with a new image of itself that integrates all these ideas and uses that image to build its future" (RAIN 1981).

The present study demonstrates that a vision of sustainable communities is beginning to emerge and that creative, transferable solutions to seemingly intractable sustainable development challenges are being initiated by municipal officials and citizen organizations in communities across North America. Yet, while individual initiatives are undoubtedly innovative, and certain programs far-sighted, overall they present a disjointed and incoherent package.
Although the language of sustainability is just now starting to appear in official documents such as Council Mission Statements (e.g., City of Ottawa 1991), in 1992 it is still true that "no major community has come forward with a new image of itself that integrates all these ideas and uses that image to build its future." It seems plausible, therefore, that the framework developed here, which builds both upon the literature cited and upon the range of initiatives identified in this study, could itself contribute to sustainable community development. Perhaps, as well, it could hasten the day when a major community does step forward to embrace the image of itself as a sustainable community and uses that image to build its future.

The framework developed in this study indicates that characteristics of municipal planning for sustainable development can be illustrated by examining a variety of specific measures based in real practice. While a commitment to sustainable development may not require every particular community to enact the exact measures identified in Chapter Four, it does require simultaneous initiatives in each category of the framework proposed in Chapter Three: efficient use of urban space, reducing resource consumption, improving community livability, and administration for sustainability. These are necessary conditions for sustainable community development.

Whether they are also sufficient conditions for sustainable community development is a more difficult and debatable question; while it would be premature to make this claim at this point, the framework described here – in contrast to the temptation to think that the mere existence of a blue box recycling program makes a community sustainable – is certainly a major step toward determining sufficient conditions for sustainable community development.

**Suggested Areas for Further Research**

This study broadens our understanding of what sustainable development initiatives are possible at the local level. Further research will be required both to monitor the development of new initiatives which expand the current range and also to evaluate the many initiatives now or soon to be underway but which are too new to be evaluated at this time.
As discussed earlier, most of the initiatives identified in this study have only been implemented in the last few years or even months; many are not yet actually in place (e.g., City of Vancouver 1990), and are therefore largely untested. A key area for further research is evaluating these initiatives.

Most individual initiatives can (eventually) be evaluated according to local government data. For example, Irvine, California's 1989 ordinance "Governing the Manufacture, Distribution, Sale and Recycling of Products Which Utilize Ozone Depleting Compounds" is attributed with reducing CFC emissions of large users in Irvine by 46% in 1988-89 (UNEP 1990). Within the first year of Mexico City's 1989 "Hoy No Circula" ("Day Without A Car") program, the city recorded a 23% reduction in air pollutant emissions (UNEP 1990). As a result of bicycle transportation incentives, bicycle commuters now account for more than 40 percent of passenger trips in some Dutch cities. As a result of integrated transportation and land use planning, most people in Curitiba, Brazil prefer mass transit for routine urban travel, despite one of the highest per capita rates of motor vehicle ownership in the country (Bleviss and Walzer 1990). As Maclaren (1992) notes, this kind of information is already becoming increasingly important to municipal and local governments as they respond to public pressure to implement sustainable development initiatives.

Beyond evaluating individual initiatives, another area of future research is evaluating the overall sustainability of a municipality. Some of the administrative and monitoring tools described in Appendix 2 (e.g., environmental audits, environmental impact assessments, state of the environment reporting) can contribute to these evaluations; however, for evaluating the overall sustainability of a municipality they are often too narrow in scope or else oriented to evaluating specific projects rather than entire communities. This study argues that becoming a sustainable community means embracing a new paradigm; consequently, the framework developed and elaborated here may provide a better initial benchmark for evaluating a municipal commitment to sustainable development than more conventional monitoring tools.

The area of community control over the economy, at least within the context of sustainability, has barely been explored. While this study has attempted in part to bridge the gap between traditional community economic development concerns and newer ideas about sustainability, considerable research is required to increase our understanding of issues such as community self-reliance, sustainable employment, and economic demand.
management. Further research should explore the role of community-oriented enterprises (e.g., community development corporations) and locally- and worker-owned businesses in developing a sustainable community economy. It should also examine the role of municipal government in enabling such activity.

Another area deserving considerable attention is government-community partnerships for sustainable community development. Further research should explore mechanisms for multiplying accomplishments within the constraints of limited financial and staff resources, providing municipal support for environmental non-government organizations (ENGOs), and encouraging ENGO participation in municipal decision-making.

The role of regional governments in implementing sustainable development initiatives, particularly in those areas where there are interdependencies between regional and local initiatives (e.g., waste management, transportation planning), is another area of future research briefly addressed in Chapter Four (see Table M). Detailed case studies of a few types of initiatives or a few cities would provide greater understanding of decision-making processes, problems, successes and other issues (Maclaren 1992). These latter studies might also be strengthened by employing more traditional analytical approaches to the study of local government, such as institutional analysis and public choice theory.

A related area of future research, also addressed briefly in Chapter Four, is the role of provincial/state policies and programs in constraining or empowering local governments to undertake and implement sustainable development initiatives. Similar research could be conducted with a focus on national government policies and programs, such as the programs in France, Norway, Finland, and Holland (see Table M and Appendix 1). As well, the issues related to minimum vs. maximum and local vs. senior government sustainable development standards (e.g., re: reduction of greenhouse gases) are worthy of further investigation.

---

7 Two examples of economic demand management worthy of more detailed investigation are Portland's zoning codes (Table H) and Montgomery County's proposals 1) to make housing affordable by land use planning that reduces the need for a second vehicle and 2) to charge separately for parking so as to lower housing costs, car ownership, and trip generation (see Appendix 2).

8 According to Crossley (1989), although they go by various names, there are three main analytical approaches to the study of local government. Mainstream, institutional analysis focuses on questions of public administration and is traditionally concerned with enhancing the capacity of local governments and ensuring more effective coordination of their activities. Critics from the left have tried to show what interests governments serve, "focusing especially on the way that planning and services provided by local governments have benefited property owners," and often leading to arguments to redirect public policy to compensate for past neglect. The third approach, public choice theory, also stresses the link between economic and political concerns, but "adopts a more pluralistic conception of the number of groups which have an influence on government, and draws parallels between people's behaviour in the public and private sectors."
Finally, an area deserving attention is the role of international agencies (e.g., World Bank, IMF) and policies (e.g., GATT, Free Trade Agreements) in relation to local government sustainable development initiatives.

Toward Sustainable Communities

Local governments are coming to recognize their responsibility to develop sustainable communities. The innovations they are testing are providing models for national level policies and programs (UNEP 1990). Indeed, as the Chair of the National Round Table on the Environment and the Economy wrote in a recent letter to the Prime Minister,

"It is becoming apparent that almost every issue of sustainable development which emerges at the local level will be replicated, in one form or another, at the provincial, national and international levels" (Connell 1991).

In the absence of national public policy frameworks explicitly focused on ecological restructuring, or conversion (see Chapter Two), the framework developed in this study and the initiatives identified here begin to delineate fragments of a strategy for encouraging a globally conscious culture of sustainability in our communities. They also suggest some principles for both local and senior government officials to consider in designing effective sustainable community development policies.

These principles, in conjunction with the tools described in Appendix 2, can help local government officials and concerned citizens design initiatives that address local and global problems within a broad understanding of sustainable development. This requires attention not only to substantive strategies (e.g., re: reducing resource consumption) but also to administrative and planning processes that advance social equity, build public support, ensure adequate opportunities for public participation, and help develop consensus for moving toward sustainable communities.

- **Sustainable development requires sustainable communities**: Seemingly mundane local government decisions may have a more profound impact on the future of the global environment than all the handshaking and speechmaking by heads of state at the recent "Earth Summit" (the United Nations Conference on Environment and Development, held in Rio de Janiero, Brazil, in June 1992). Yet while the initiatives cited in this study are encouraging, it appears that most local governments around the world experience external institutional constraints on the development and implementation of local sustainability policies.
Global sustainable development requires local authority and capacity for sustainable urban management and development. Despite the concentration of population in urban areas, most municipal and local governments do not have the regulatory and financial authority required to effectively contribute to sustainable community development. Lowe (1991) observes that experience in the industrial countries has demonstrated that placing the burden for infrastructure, education, and social services on property taxes can lead local governments to act irresponsibly – for example, allowing ecologically destructive development of valuable open space, or excluding low-taxpaying land uses such as affordable housing. Other levels of government must provide resources and support for the financing, management and policy-making authority necessary for local governments to achieve sustainable development in their communities.

This implies a stronger role for municipal and local governments in moving toward sustainable communities. Local governments will need to develop and implement a wide range of initiatives such as those described in Chapter Four. Senior governments will need to ensure that local governments have the authority and capacity for sustainable community development. In the Canadian context this may imply some delegation of powers from Provincial to municipal governments as well as enshrining some municipal government rights within the Constitution (see, e.g., City of Vancouver 1991, M'Gonigle 1991). In both Canada and the US, municipal and local governments will need national funding commensurate with their increased responsibilities for achieving sustainable development.

- **Sustainability can mean "less" as well as "more":** As discussed in Chapter Two, so long as sustainable development is conceived merely as "environmental protection" it will be understood as an "added" cost to be "traded" against. Once sustainable development is conceived as a different kind of development, such trade-offs become less critical: the new focus is instead on finding ways to stop much of what we are already doing and use the resources thus freed for socially and ecologically sustainable activities. Conceptualized in terms of demand management, this principle has long been obvious in the area of energy conservation and efficiency (see Table D). More recently, it has become evident in areas such as transportation planning (see Table A) and water management (see Table F), and is also emerging as a new focus for economic development strategies (see Table H).

- **Social equity is not only desirable but essential:** Inequities undermine sustainable development, making it essential to consider the distributive effects of actions intended to
Chapter Five: Conclusions and Discussion

advance sustainable development. Growth management ordinances in many western U.S. cities, for example, enacted to safeguard the environment and protect the quality of community life, have caused local housing supplies to tighten, driving up prices and causing serious affordability problems for low- and moderate-income households. As these households leap-frog across preserved open space to less expensive communities in the region, additional commuting, traffic congestion, and air pollution threaten the very quality of life at which the control measures were aimed in the first place (van Vliet 1990).

• Sustainable development requires planning: The concept of ecological restructuring, or conversion (as opposed to environmental protection through piecemeal legislation), "invokes notions of planning, of political control of the economy, which have been driven into ideological retreat" (Ryle 1988). For example, many observers consider Portland to be a model North American sustainable city; however, few realize that Portland's considerable accomplishments are due in large measure to the fact that the State of Oregon requires its cities to produce comprehensive plans to achieve the state's land-use planning goals (e.g., conserving energy). Goal-oriented planning is further discussed in Appendix 2.

• Public participation is itself a sustainable development strategy: To a considerable extent, the environmental crisis is a creativity crisis. By soliciting the bare minimum of public "input," rather than actively seeking community participation from agenda-setting through to implementation, local and senior decision-makers have failed to tap the well of human ingenuity. They have failed to recognize that only by encouraging social innovation can the myriad challenges necessary to develop sustainable communities be successfully met. Public participation mechanisms such as community round tables (Table L) and urban

9 An example of how inequities can undermine sustainable development is the case of Regulation XV, the trip reduction bylaw (see Table A) promulgated by California's South Coast Air Quality Management District (SCAQMD), which mandates employers with more than 100 employees to develop plans to increase "average vehicle ridership" and thereby cut down on auto use and the resultant pollution. In 1990 SCAQMD supported a plan of the Los Angeles County Board of Supervisors to comply with that rule by placing a parking tax of $70 to $120 per month on its employees - many of them clerical and secretarial workers making no more than $1500 per month - after free parking had been a negotiated union benefit for more than 10 years. Yet even when presented with evidence by the Service Employees International Union, the Natural Resources Defense Council, and others that the county's plan would, in fact, increase pollution, place undue burden on low-income workers, and violate SCAQMD's own policy of not approving plans "subject to collective bargaining," the SCAQMD staff refused to withdraw support of what critics called "the county's tax-the-workers program." SCAQMD spokespersons explained that while they felt badly that the workers were being punished, their mandate was to reduce average vehicle ridership regardless of questions of social equity. In response, labour and community groups spent months organizing a broad coalition in support of this proposed amendment to the rule: 'Any employer plans to comply with Regulation XV and to increase average vehicle ridership: 1) Cannot interfere with workers' rights to bargain collectively; 2) Cannot impose undue economic hardship on workers; and 3) Cannot have racially or gender-based discriminatory impacts" (Mann 1991).
environment platforms (Table I) are essential for overcoming resistance from entrenched interests (e.g., automobile and oil industry opposition to automobile restrictions) and for broadening the "narrow and ineffectual conception of the domain of local government concern" (UNEP 1990). Effective and acceptable local solutions require local decisions, which in turn require the extensive knowledge and participation of the people most effected by those decisions, in their workplaces and in their communities.

Sustainable development will not come easily – it requires significant change in our structures, attitudes and values. Sustainable development implies constraints on the capacity of individuals, companies and nations to use resources which they have the right to use – and are encouraged to use – under present legal and economic arrangements. Although even the most conventional analyses recognize the need for changing these arrangements, few openly acknowledge that moving toward a sustainable society requires more than minor adjustments to existing practices.

Wachtel (1989) observes that the key to a sustainable future lies not in making us more competitive but rather in making us more perceptive, more able to realize what we have, what we need, and what are the long-term consequences of the short-term choices we are making. Many North Americans intuitively understand that the reason why economic growth no longer brings a sense of greater well-being, why the pleasures our new possessions bring swiftly melt away, is that at the level of affluence of the North American middle class "what really matters is not one's material possessions but one's psychological economy, one's richness of human relations and freedom from the conflicts and constrictions that prevent us from enjoying what we have." Indeed, we have attempted "to use economics to solve what are really psychological problems."

Like others writing in the growing sociological literature on the "communitarian approach" (e.g., Bellah 1991, Lasch 1991), Wachtel argues that our societal focus on productivity and economic efficiency as defining values leads to greater emphasis on competition, the pursuit of self-interest, and the stimulation of demand.

"This in turn means still more decline in the security to be gained via shared ties and a stable, securely rooted place and way of life, still more need to compensate by organizing everything around what enables us to have 'more,' still more decline of traditional sources of security, and so forth. Thus, the more fully we have committed ourselves to increasing material abundance as our ultimate societal value, the more we have undermined older sources of security and made ourselves dependent on material goods for our sense of well-being to an unprecedented degree" (Wachtel 1989).
The challenge ahead is to explore the implications of a sustainable future and to find a new set of guiding images and metaphors suited for it. Sustainable communities are the next steps in suggesting an alternative vision of the future that is not just a bitter necessity (e.g., re: reducing materials and energy consumption) but holds out promise of a genuinely better life. Sustainable communities do not mean settling for less, but rather thinking of new opportunities along a different, and perhaps more satisfying, dimension.

Within this larger context, the initiatives evaluated in this study can be viewed as illustrative of values that are prerequisite for a sustainable society. The initiatives themselves serve not only as points of intervention but also as processes for social learning by which municipal and local governments can effect positive change toward a sustainable society. Developing a sustainable society requires both shifting away from values which encourage unsustainable behaviours and also shifting toward values which promote sustainable practices. It is here, in the realm where knowledge and action are linked, that planning theory may be able to make a significant contribution. As portrayed by these initiatives, active social learning programs – attempts through social experimentation to change social behaviour – can be effective not only in preventing a host of environmental and related social disasters, but also in creating healthy, sustainable communities which will be more pleasant and satisfying for their residents than the communities we live in today.

With their relatively wealthy and well-educated populations, North American communities have a moral obligation to demonstrate leadership (and consequently benefit from) developing the knowledge, technologies, and processes the world requires for sustainability in the coming decades. Planners have a special obligation and ability to frame issues, assume leadership, champion initiatives, and demonstrate sustainable alternatives in their everyday practice. With creative leadership we may yet be able to leave our children a legacy of which we can be proud.

Sustainable communities require unprecedented and simultaneous emphasis on the efficient use of urban space; on reducing consumption of material and energy resources; on improving community livability; and on organizing sustainable administrative and planning processes. This synergistic approach will enable our communities to be cleaner, healthier, and less expensive; to have greater accessibility and cohesion; and to be more self-reliant in energy, food and economic security than they now are. Sustainable communities will not, therefore, merely "sustain" the quality of urban life – they will improve it.
Chapter One

Association of County Councils (ACC), Association of District Councils, and Association of Metropolitan Authorities, Environmental Practice in Local Government (London: Association of District Councils, 1990).


Chapter Two


Daly, H.E. and J.B. Cobb, Jr., *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* (Boston: Beacon Press, 1989).


References


References


Chapter Three


Brugmann, J. and R. Hersh, Cities as Ecosystems: Opportunities for Local Government (Toronto: ICLEI, 1991), draft.


Gilbert, R., "Cities and Global Warming" (Toronto: Canadian Urban Institute, 1991).


Sutherland, S. (Peterborough Mayor), remarks to the Association of Municipal Clerks and Treasurers of Ontario (AMCTO) and Intergovernmental Committee on Urban and Regional Research (ICURR) Management Symposium, "Implementing Sustainable Development in Municipalities," Hockley Valley, Ontario, May 9, 1991.

Toronto Declaration on World Cities and Their Environment (Toronto: World Cities and Their Environment Congress of Municipal Leaders, August 28, 1991).


Chapter Four

Association of County Councils (ACC), Association of District Councils, and Association of Metropolitan Authorities, Environmental Practice in Local Government (London: Association of District Councils, 1990).


Cameron, M., Transportation Efficiency: Tackling Southern California’s Air Pollution and Congestion (Boulder, CO: Environmental Defense Fund and Regional Institute of Southern California, 1991).


References listed here refer only to literature cited in the introductions to the Tables in Chapter Four. References for the initiatives cited in the Tables, which are based on Appendix 1, are listed with the references for Appendices 1 & 2.
References


137


Chapter Five


Canadian Institute of Planners (CIP), "Reflections on Sustainable Planning: The Implications of Sustainable Development for Planning and the Canadian Institute of Planners" (Ottawa: CIP, 1990).


Richardson, N. *Land Use Planning and Sustainable Development in Canada* (Ottawa: Canadian Environmental Advisory Council, Environment Canada, 1989).


Appendices 1 & 2

4-A. Transportation Planning and Traffic Management


---

2 The references for Appendix 1: Initiatives, and Appendix 2: Tools, have been combined according to topic.


Public Innovation Abroad (PIA), various issues.


Ville de Montréal, Montréal: The Sustainable Development Option (Montréal: Ville de Montréal, 1991).

4-B. Land Use and Growth Management


Kingston Planning Report April 15, 1987, Item No. 213, File 60.73.70.


Land Trust Alliance, "Land Trusts" (Washington, DC: Land Trust Alliance, n.d.).


References

Metropolitan Toronto Planning Department, Policy Development Division, "Housing Intensification," Metropolitan Plan Review Report No. 4 (Toronto: Planning Department, 1987).

Ministries of Municipal Affairs and Housing, "Land Use Planning for Housing" (Toronto: Ministry of Government Services, 1989).


Newman, P., "Urban Villages – Concept for the '90s," Presentation to ECODESIGN Conference, RMIT, Melbourne, Australia October 18-20, 1991c.


4-C. Atmospheric Change and Air Quality


South Coast Association of Governments (SCAG) and South Coast Air Quality Management District (SCAQMD), *Air Quality Management Plan: South Coast Air Basin* (Los Angeles: SCAG/SCAQMD, 1989).


4-D. Energy Conservation and Efficiency


Leonhardt, W. (Chairman of the Board of Directors, Stadtwerke Saarbrücken AG, West Germany), "Local Concepts for the Reduction of CO₂," presentation to the World


Millyard, K., "A Preliminary Carbon Dioxide Inventory for the City of Ottawa" (Ottawa: Friends of the Earth, 1992).


Oregon Revised Statutes, Title 20, Chapter 215. ORS @ 215.044 (1989).


Public Innovation Abroad (PIA), various issues

Vermont Statutes Annotated, Title 24, Part 2, Chapter 117, Subchapter 5 @ 4382 (1989).

4-E. Waste Reduction and Recycling


City of Seattle, Resolution 27871 (1988).


International Council for Local Environmental Initiatives (ICLEI), The Urban CO2 Project (Toronto: ICLEI, 1991).


References


*Public Innovation Abroad* (PIA), various issues.


4-F. Water and Sewage


*Public Innovation Abroad* (PIA), various issues


4-G. Greening the City


References


New Hampshire Title III, Chapter 36-A:2, A:4.

*Public Innovation Abroad* (PIA), various issues


4-H. Economic Development


Boston Redevelopment Authority (BRA), "Linkage" (Boston: BRA, Winter, 1988).


Institute for Community Economics, *Community Economics* (No. 18, Summer 1989).


References


4-I. Community Development


Towns and Development, "Getting to Know Towns and Development" (The Hague: Towns and Development: Local Initiatives for Global Development, n.d.).


Victorian Environmental Education Council (VEEC), Educating For Our Environment (Melbourne: VEEC, 1991).

Zweig, R., "Development of an Integrated Aquaculture System at the Southeast Correctional Center in Bridgewater, Massachusetts" (Cambridge, MA: MIT Sea Grant Program, 1990).

4-I. Investment and Purchasing

Association of County Councils (ACC), Association of District Councils, and Association of Metropolitan Authorities, Environmental Practice in Local Government (London: Association of District Councils, 1990).


4-K. Leadership by Example

Association of County Councils (ACC), Association of District Councils, and Association of Metropolitan Authorities, Environmental Practice in Local Government (London: Association of District Councils, 1990).


Eco-Conseil, "Introducing Environmental Counselling for Local Authorities in France: A Successful Experiment" (Strasbourg: Institut Pour Le Conseil En Environment, 1991).


*Public Innovation Abroad (PIA)*, various issues.

Richardson, N., "Regional Overview Paper: Canada" (Toronto: University of Toronto Centre for Urban And Community Studies; draft prepared for the Colloquium on Human Settlements and Sustainable Development, June 21-23, 1990).


4-L. Environmental Administration


British Columbia Round Table on the Environment and the Economy (BCRTEE), *Sustainable Communities: Getting Started* (Victoria: BCRTEE, n.d.).


Daly, H.E. and J.B. Cobb, Jr., *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* (Boston: Beacon Press, 1989).

Eco-Conseil, "Introducing Environmental Counselling for Local Authorities in France: A Successful Experiment" (Strasbourg: Institut Pour Le Conseil En Environment, 1991).


National Round Table on the Environment and the Economy (NRTEE), Sustainable Development and the Municipality (Ottawa: NRTEE, n.d.).


Toronto Declaration on World Cities and Their Environment (Toronto: World Cities and Their Environment Congress of Municipal Leaders, August 28, 1991).


4-M. Beyond Municipal and Local Government


Jalkanen, P. "The Role of Finnish Municipalities on the Way Towards the Sustainable Future" (Helsinki, Finland: Environmental Department, The Finnish Municipal Association, 1990), unpublished paper.


Public Innovation Abroad (PIA), various issues

Rohse, M., Land Use Planning in Oregon (Corvallis, Oregon: Oregon State University, 1987).

Secretary of State, Oregon Blue Book 1989-90 (Salem, Oregon: Secretary of State, 1989).

Toronto Declaration on World Cities and Their Environment (Toronto: World Cities and Their Environment Congress of Municipal Leaders, August 28, 1991).

Annotated Bibliography:

Sustainable Development and Sustainable Communities

**Chapter 2. The Meaning of Sustainable Development**


Herman E. Daly and John B. Cobb, Jr., *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* (Boston: Beacon Press, 1989). Daly, a World Bank economist and Cobb, a theologian, teamed up to critique "mainstream" economic thinking and offer a new paradigm for economics, public policy, and social ethics. Their work is based on a concern with building community, achieving equity and social justice, and maintaining high levels of economic well-being while conserving and enhancing environmental resources.

Daly and Cobb argue that the "welfare approach to social justice" must be replaced by a more comprehensive approach in which municipalities expand their authority and responsibility in order to work with local citizens on projects designed to enhance community capacity environmentally, socially and economically. They believe that the promotion of greater levels of self-reliance within the geographic boundaries of the municipality should provide one basis for this new approach. For example, they suggest that using wastes as raw materials and emphasizing the local production of goods and services for local use, using locally-based resources, is likely to have a far greater positive impact on social welfare than is the further expansion of human services.

Perhaps Daly and Cobb's greatest contribution is their index of sustainable economic welfare (ISEW). As an alternative accounting system to the GNP, the ISEW attempts to factor in the social and environmental costs of growth in measures of:

- income distribution, as a measure of equity;
- net capital growth, in order to assess whether capital formation is proceeding "in step" with population growth, as a measure of the sustainability of current economic activity;
- sources of capital (i.e., internal or external), as a measure of self-reliance;
- natural resource depletion, as a measure of how much future generations will need to be compensated for the loss of services from exhausted nonrenewable resources;
- environmental damage, as a measure of the costs of noise, air and water pollution;
- value of unpaid household labour, in order to ensure that the index does not discriminate against non-waged contributions to general welfare.
Whereas GNP for the US has risen annually for the last few decades, the ISEW shows a similar pattern of improvements in the 1960s, little growth in the 1970s, and decline in the 1980s. The exercise underscores the authors’ argument that growth at the expense of sustainability makes us poorer rather than richer. The important question, they conclude, is whether we continue to focus our efforts on increasing total output or whether we redirect our focus toward sustainability.

Michael Jacobs, *The Green Economy: Environment, Sustainable Development and the Politics of the Future* (London: Pluto Press, 1991). This book is primarily about environmental economic policy in industrialized countries, which Jacobs argues are mainly responsible for the environmental crisis. Jacobs rejects both the traditional Green movement demand of "zero growth" and the new economic orthodoxy which seeks to give the environment a monetary value. He argues that sustainability provides an objective both morally defensible and capable of being translated into policy. He then describes a range of instruments by which economic activity can be constrained within environmental limits, and shows how environmental policies need not hurt the poor. His discussion includes regulation versus financial incentives, the role of government expenditure, and integrating equity with social policy. The last section of the book addresses questions of measurement in the context of environmental decision-making.

Jacobs' final chapter addresses the impact of a Green economy on our lives. Jacobs makes a cogent distinction between "standard of living," as equated simply with disposable income, and "quality of life," the sum of all things which people purchase collectively, whether through public expenditure (e.g., public education) or not purchased at all (e.g., air quality).

Will people be willing to forgo constant expansion of material possessions in favour of a more sustainable lifestyle? The important point, he notes, is not how likely such a change in culture might be - whether or not the change occurs is for us to decide. Cultures and tastes are influenced by a whole range of social and political factors which themselves can be changed and developed by political parties, pressure groups, voluntary organizations, individual behaviour and cultural activity. In this sense achieving a sustainable economy in industrialized societies is not ultimately a question of economics but rather a question of manifesting the desire and will to change.

Linda Starke, *Signs of Hope: Working Towards Our Common Future* (NY: Oxford University Press, 1990). Starke's book records some of the progress made in the first few years after publication of *Our Common Future*, and points to initiatives underway around the world by governments, industry, scientists, non-governmental organizations, the media, and young people. While not intended to be comprehensive, it shows that those working toward a sustainable future no longer toil alone.

World Commission on Environment and Development, *Our Common Future* (New York: Oxford University Press, 1987). This is the report of the Brundtland Commission discussed above. The Commission's main recommendations are to revive economic growth; change the quality of growth; conserve and enhance the resource base; ensure a sustainable level of population; reorient technology and manage risks; integrate environment and economics in decision-making; reform international economic relations; and strengthen international co-operation. The Commission's call for a five- to ten-fold increase in world industrial output, without any analysis to show whether such expansion is ecologically possible, is highly questionable.

Annotated Bibliography

and international agencies contributed to this report, which sets out 132 measures that must be implemented over the next ten to twenty years if the Earth is to remain capable of supporting its population. The report estimates that ensuring the long-term survival of the planet will cost $1,288 billion over the next decade (equal to three times Canada's national debt), much of which could come from reducing military spending, selling "Earthcare Bonds," and other financial mechanisms. Additional recommendations include creating an international body to monitor the environment on a global scale, controlling population growth, minimizing the depletion of non-renewable resources, and sharing resources between rich and poor countries and with future generations.

This report stands out as essential reading for two reasons. It is the first such document to propose a global action plan that will sooner or later, in this format or another — have to be adopted. It is also the first such report to recognize that local governments are key units for environmental care.

Chapter 3. Toward Sustainable Communities

Marcia D. Lowe, *Shaping Cities: The Environmental and Human Dimensions* (Washington, D.C.: Worldwatch Institute, Paper 105, 1991). This paper provides an overview of urban environmental planning issues in cities around the world, with considerable attention to the challenges facing Third World cities. The future growth of cities "can either recognize the limits of the natural environment, or destroy the resources on which current and future societies depend; it can meet people's needs equitably, or enrich some while impoverishing or endangering others." It concludes with a framework for urban land use policy which emphasizes adequate information, regional cooperation, and strong support from national governments.

Organization for Economic Co-operation and Development (OECD), *Environmental Policies for Cities in the 1990s* (Paris, OECD, 1990). This report examines various existing urban environmental improvement policies, proposes ways and means to improve policy coordination with regard to urban environmental impacts, and describes policy instruments available to national, regional and local governments. It also assesses local initiatives in three areas of concern: urban rehabilitation, urban transport and urban energy management, and proposes policy guidelines for improvement in these areas. The report emphasizes the need to develop long-term strategies, adopt cross-sectoral approaches, facilitate cooperation and coordination, enable polluters to absorb environmental and social costs through fiscal and pricing mechanisms, set and enforce minimum environmental standards, increase the use of renewable resources, and encourage and build upon local initiatives. Several descriptions of urban environmental policies and programs in OECD countries are included.

Richard Stren, Rodney White, and Joseph Whitney, editors, *Sustainable Cities: Urbanization and the Environment in International Perspective* (Boulder, CO: Westview Press, 1991). Based on a 1990 colloquium at the University of Toronto, this volume brings together comprehensive studies of the urban experience in the U.S., Canada, Western Europe, Eastern Europe, Japan, Southeast Asia, China and Hong Kong, Africa, and Latin America. The chapters examine the meaning of sustainable development in a specific region, the growth and structure of urban systems, the effects of possible climatic changes on urban areas, and the political environment within which cities operate. Chapters conclude with policy proposals for increasing sustainability.

proposals toward the goal of shaping cities upon ecological principles. Over 80 sessions addressed the broad spectrum of ecocity concerns. The Second International Ecocity Conference was held in Adelaide, South Australia in 1992.

Sim Van der Ryn and Peter Calthorpe, editors, **Sustainable Communities: A New Design Synthesis for Cities, Suburbs and Towns** (San Francisco: Sierra Club, 1986). Architects Sim Van der Ryn and Peter Calthorpe's seminal volume grew out of an intensive week-long workshop with thirty leading innovators in ecology and community design. It includes contributions from biological designer John Todd, economist David Morris, planner Clare Cooper-Marcus, businessman Paul Hawken, bioregionalist Peter Berg and agriculturalists David Katz and Fred Reid.

Hawken postulates that the shift to a post-industrial economy requires a design shift from consumption toward efficiency, i.e., doing more with less. Katz argues that the post-industrial suburb will be more site-specific and rely more on local people and local intelligence rather than standard formulations from afar. Reid argues for diversity in transportation options, noting that lighter, more efficient autos are only an interim step towards diversity in land use planning, with more emphasis on clustering, density, and mixed-uses.

Cooper-Marcus notes our existing land use patterns are built on outdated notions of the nuclear family with one wage earner (as much as on outdated notions of cheap oil, land and water), and that the shift toward a service economy should mean more work opportunities in or close to residential neighbourhoods and greater accessibility to public transport. Morris argues that cities and neighbourhoods will gain greater economic and political independence as local self-reliance provides cheaper and more stable services than can be provided by large centralized industries or government (e.g., utilities). Todd argues that the sustainable settlement can reintegrate today's "producer" and "consumer" roles at home and elsewhere, with the household, through its design, producing some of its own food, energy, and even employment on site, rather than being merely a place of consumption.

Despite a wide range of expertise and opinion, the common perspective of these authors is characterized by an emphasis on energy efficiency, stressing passive solar heating and cooling; encouraging local food production and reliance on local resources; and fostering creation of on-site jobs and neighbourhood stores to revitalize communities and eliminate wasteful commuting. These physical layouts, in turn, encourage social interaction by clustering dwellings and creating common-use areas and shared facilities, while increasing security and stressing appropriate scale.

**Chapter 4-A. Transportation Planning and Traffic Management**

Deborah Gordon, *Steering a New Course: Transportation, Energy, and the Environment* (Cambridge, MA: Union of Concerned Scientists, 1991). Gordon argues that the pollution, congestion, and damage to health caused by our dependence on motor vehicles are the hidden costs of our transportation system. As these costs continue to mount, we will pay them increasingly with our time, health, and welfare. In this report the Union of Concerned Scientists makes bold recommendations for policymakers seeking to ameliorate a host of problems associated with the US transportation sector. Issues addressed include greenhouse gases and other air pollutants, alternative transportation fuels, ultra-fuel-efficient vehicles, innovative transportation strategies, and public-policy options and recommendations. Comprehensive and well referenced, this book is a tremendous resource.

of alternative future growth scenarios were constructed and the results of applying two computerized impact assessment simulation models, TRAVEL and FISCAL, to the alternative growth scenarios.

Peter Newman and Jeffrey Kenworthy, *Cities and Automobile Dependence: An International Sourcebook* (Brookfield, VT: Gower Technical, 1989). Based on extensive research, this landmark study examines urban form, transport and energy use in thirty-two cities in North America, Europe, Asia and Australia. The data cover approximately 100 parameters for 1960, 1970 and 1980 and include parking, car ownership and use, roads, congestion, public transport, modal split and energy consumption; city form is characterized by central, inner and outer area population and employment data. The study confirms that the shorter distances inherent in medium- and high-density urban areas correspond with much more walking and cycling. For example, in the West European cities in the study – with an average of some 85 people and jobs per hectare – more than 21 percent of workers walk or cycle to work. By contrast, in the study's U.S. and Australian cities, with about 20 people and jobs per hectare, only 5 percent of workers walk or cycle to their jobs.

*Transportation: An International Journal Devoted to the Improvement of Transportation, Planning and Practice* devoted a special issue (Volume 17, No. 2, 1990) to Transportation Demand Management (TDM). TDM consists of efforts to induce behavioural changes on the part of travelers in order to maximize efficiency in the use of existing transport systems. Examples of TDM programs include employer subsidies of monthly transit passes in lieu of employer-provided parking facilities, encouragement of carpooling and vanpooling through financial incentives and preferential parking, and encouraging "telecommuting."

Chapter 4-B. Land Use and Growth Management

Michael N. Corbett, *A Better Place to Live: New Designs for Tomorrow's Communities* (Emmaus, PA: Rodale Press, 1981). Village Homes, Michael and Judy Corbett's 70-acre (28 ha), 270-unit solar subdivision in Davis, California is a pioneering example of sustainability by design which has received considerable attention. The development incorporates a wide range of innovative measures in a plan which satisfies three basic conservation objectives: reduction in total energy consumption, efficient use of energy, and conversion to renewable energy resource usage. The five main characteristics exhibited by this subdivision and neighbourhood design are: intensive land use, prominent use of solar energy, functional landscaping (e.g., trees were selected for maximum summer and minimum winter shading), energy-efficient transportation (all roads end in cul-de-sacs, making it faster to walk than drive from one area to another; a comprehensive greenbelt pathway is tied into the City bikeway network), and involvement of residents. The Corbetts attempted to facilitate "sense of community" through physical design, by establishing a homeowners association to participate in development and management decisions, and by becoming Village residents themselves. Michael Corbett later became mayor of Davis.

Doug Kelbaugh, ed., *The Pedestrian Pocket Book: A New Suburban Design Strategy* (New York: Princeton Architectural Press, 1989). This little book documents a design charrette with architect Peter Calthorpe at the University of Washington in 1988, testing Calthorpe's "Pedestrian Pocket" concept on a site next to a proposed rapid transit line. It shows that strategic interventions could affect the structure, legibility, and sense of place in suburbia. It contends that finite centers of community are achievable, and that affordability, traffic decongestion, open space, mixed population, and mixed use are all mutually compatible.

"neotraditional" town planning, Duany and Plater-Zyberk advocate designing suburban subdivisions in the manner of towns. They also challenge zoning conventions and write design codes that favour traditional patterns of placemaking. Duany and Plater-Zyberk are widely known for their design of the resort community of Seaside, on the Florida panhandle. This volume appears to be the first book-length treatment of their ideas.


Michael A. Mantell, Stephen F. Harper, and Luther Propst, Creating Successful Communities (Washington, DC: Island Press, 1990). Volume I is subtitled A Guidebook to Growth Management Strategies; Volume II is a Resource Guide. These books are particularly useful in regard to agricultural land, wetlands, historic and cultural resources, and open space. They also include useful information on easements and conservation restrictions, and on growth management tools and techniques.


The Real Estate Research Corporation's (1974) massive study for the US Government on The Costs of Sprawl still stands as a classic. Three community types were analyzed: the "low density sprawl" community (entirely single-family homes, 75 percent in traditional grid pattern typical of suburban development); the "combination mix" community (20 percent of each of five types of dwellings, half in planned unit developments, half in traditional subdivisions); and the "high density planned" community (40 percent highrises, 30 percent walkups, 20 percent townhouses, and 10 percent clustered single family homes, all clustered together into contiguous neighbourhoods). A major conclusion of the study was that sprawl is "the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption, and many types of personal costs... This cost difference is particularly significant for that proportion of total costs which is likely to be borne by local governments."

Samuel N. Stokes, et al, Saving America's Countryside: A Guide to Rural Conservation (Baltimore: John Hopkins University Press, 1989). This book was written for the U.S. National Trust for Historic Preservation. It focuses on protecting the entire spectrum of a rural community's resources - natural, historic, scenic, and agricultural. Twenty-eight recent case studies are documented. The chapter on land protection techniques that local governments can use is particularly valuable.

Sim Van der Ryn and Peter Calthorpe, editors, Sustainable Communities: A New Design Synthesis for Cities, Suburbs and Towns (San Francisco: Sierra Club Books, 1986). Recently re-released in paperback, this is a stimulating collection edited by two forward-looking architects. See annotation under Chapter 3 in this bibliography.

Robert D. Yaro, et al, Dealing With Change in the Connecticut River Valley: A Design Manual for Conservation and Development (Amherst, MA: Center for Rural Massachusetts at Amherst, 1988). This volume attempts to develop practical planning standards which rural New England towns can adopt to protect their distinctive character, while at the same time accommodating economic growth.
Chapter 4-C. Atmospheric Change and Air Quality

Kai Millyard, *A Preliminary Carbon Dioxide Inventory for the City of Ottawa* (Ottawa: FOE, 1992). This report attempts to inventory carbon dioxide emissions not only from city operations but from the entire municipality. Although the focus is on Ottawa, appendices describing the methods used to ascertain these figures may be useful in estimating carbon dioxide emissions in other jurisdictions.

City of Toronto, *The Changing Atmosphere: Strategies for Reducing CO2 Emissions, Volume One: Policy Overview, Volume Two: Technical Volume* (Toronto: City of Toronto, Special Advisory Committee on the Environment, Report Number Two, March 1991). In 1990, Toronto made a commitment to reduce the city's net CO2 emissions by 20 percent, relative to the 1988 level, by the year 2005. By "net" emission reduction, the city's Special Committee meant some combination of direct emissions reductions and creation of an offsetting "carbon sink" (e.g., financing reforestation in Southern Ontario or Central America). In 1991 the Toronto Special Committee revised its position, arguing that the city can reduce its gross carbon dioxide emissions by a full 20% without the need for an offsetting carbon sink. They outlined a set of strategies to achieve this target while still accommodating up to 20 percent growth in the number of people living and working in the city. The report includes strategies for measuring and allocating CO2 emissions reductions, electricity use, natural gas use, district heating and cooling, building, transportation, urban forestry, energy efficiency, education and advocacy.

City of Vancouver, *Clouds of Change: Final Report of the City of Vancouver Task Force on Atmospheric Change* (Vancouver: City of Vancouver, 1990, 2 Volumes). After public consultations based upon its research, Vancouver's Task Force on Atmospheric Change published its two-volume *Clouds of Change* report in June 1990. Volume One explains the causes of global and local atmospheric change, the known and probable effects of atmospheric change, and the role of the City in acting to protect public health by reducing the hazards posed by atmospheric change. The report sets forth a framework for action based on targets to eliminate or reduce emissions of ozone-depleting chemicals, carbon dioxide and related pollutants. Thirty-five major recommendations are presented regarding administrative organization, transportation planning and traffic management, land use planning, energy efficiency, public health, a regional carbon dioxide tax, urban reforestation, waste reduction and recycling, leadership by example (e.g., procurement policies), and public involvement and education. Volume Two is a set of model and example by-laws from other jurisdictions which are referenced in the report. Vancouver City Council approved the report's recommendations in October 1990.

Chapter 4-D. Energy Conservation and Efficiency

Center for Renewable Resources, *Renewable Energy in Cities* (NY: Van Nostrand Reinhold, 1984). This book supplies some of the information needed to develop local energy plans and policies based on the use of energy conservation and renewable energy technologies. It provides technical information to help city energy officials discriminate between appropriate and inappropriate technologies and options; explains constraints and opportunities with respect to land use patterns, building stocks, energy supply and distribution networks, and social and economic conditions; and examines the links between energy and housing, employment, and economic development.

Reg Lang and Audrey Armour, *Planning Land to Conserve Energy: 40 Case Studies From Canada and the United States* (Ottawa: Lands Directorate, Environment Canada, 1982). Although the case studies are dated, this volume contains a wealth of useful information. The case studies are in five categories: community energy profiles, municipal plans and
policies, new communities and residential development, non-residential land use, and land use and development controls.

Chapter 4-E. Waste Reduction and Recycling

Institute for Local Self-Reliance, *Beyond 40 Percent: Record-Setting Recycling and Composting Programs* (Washington, D.C. & Covelo, CA: Island Press, 1991). This book offers ample proof that community recycling and composting operations can be our primary solid-waste management strategies. Case studies document the operating experiences of seventeen US communities – urban, suburban, and rural – all with materials recovery levels of over 30 percent. Fourteen have total, residential, or commercial materials recovery rates at or above 40 percent. The book discusses the advantages of mandatory recycling, its economic incentives, the collection of source-separated yard wastes for composting programs, and the benefits of extending programs beyond the residential sector to the commercial sector. It also provides specific examples of how your community can plan and implement recycling and composting programs that will work. The Institute for Local Self-Reliance is a non-profit organization promoting self-reliance for cities. Since 1974 ILSR has been providing research and technical assistance to citizens, local governments, and small businesses on waste utilization, closed-loop manufacturing, and materials policy. *Beyond 40 Percent* is part of an ongoing series of technical reports prepared by ILSR staff.

Chapter 4-F. Water and Sewage

John M. Teal and Susan B. Peterson, "The Next Generation of Septage Treatment," *Research Journal Water Pollution Control Federation* (WPCF) 63(1): 84-89, January/February 1991. This paper describes the preliminary results of a pilot experiment run by Ocean Arks International in the town of Harwich, Massachusetts, in the summer of 1988 at the town landfill. The landfill held the lagoons, inlined pits in the sand, into which septage was pumped for disposal. Liquids seeped through the bottom of the lagoon or evaporated and the remaining solids were eventually placed in the landfill. During the experiment, septage was pumped from the active lagoon into the treatment system and the effluent was returned to the lagoon. Metals were sequestered in the system and all but lead met drinking water standards in the effluent. Metals in fish living in the last tanks met food standards except for antimony, cadmium, and lead. Methylene chloride, trichloroethene, and toluene were high in the influent but met drinking water standards in the effluent.

Nancy Jack Todd and John Todd, *Bioshelters, Ocean Arks, City Farming: Ecology as the Basis of Design* (San Francisco: Sierra Club Books, 1984). This book extends the work of design pioneers such as R. Buckminster Fuller and Gregory Bateson in developing renewable energy and systems based on natural cycles in agriculture, aquaculture, fuel resources, and general design. It describes a spectrum of innovative experiments integrating small, self-adapting systems with 21st-century biotechnologies. Includes sketches of a neighbourhood sewage treatment facility, a solar sewage wall, rooftop farming, sidewalk gardening, warehouse farming, and bus stop and sidewalk aquaculture.

Chapter 4-G. Greening the City

Annotated Bibliography

Peter Berg, Beryl Magilavy and Seth Zuckerman, *A Green City Program for San Francisco Bay Area Cities and Towns* (San Francisco: Planet Drum Books, 1989). This intriguing book arose from a set of symposia on urban sustainability in the San Francisco Bay Area in 1986. The premise of the participants was that cities must be transformed into places that are life-enhancing and regenerative, and that enormous changes in a society can come from a handful of citizen planners who restructure how they live and actively influence others. Topics include urban planting, transportation, planning, energy, neighbourhood character and empowerment, recycling and reuse, celebrating life-place vitality, urban wild habitat, and socially responsible small businesses and cooperatives. Each chapter includes a section on "What can cities do to promote ...?" long-term visions for municipal action, a "fable" to illustrate the way beneficial changes could occur, and a section on "... in Green City: what's possible?"

Gerald F.M. Dawe, editor, *The Urban Environment: A Sourcebook for the 1990s* (Birmingham, UK: Centre for Urban Ecology, Nature Conservancy Council, and World Wide Fund for Nature, 1990). This 636 page book contains 1,768 abstracts of articles, papers, reports and books on various aspects of urban ecology. Each abstract is classified by means of key words which tie into the main indexes (plant and animal, town and city and subject indexes), as well as with graphic symbols designed to give a first-glance impression of the emphasis of each abstract. The book is a useful guide to work carried out in the 1980s on urban landscape, wildlife, climate, pollution, and ecosystems.

David Gordon, ed., *Green Cities: Ecologically Sound Approaches to Urban Space* (Montreal: Black Rose Books, 1990). What is the Green City? This anthology begins with a series of attempts to articulate ideas on culture, globalism, international economics, and local initiative. The bulk of the book is devoted to strategies and techniques for "naturalizing" and "greening" urban areas. The final section describes how some local organizations have overcome institutional and social barriers in their attempts to realize visions of the green city. Appendices include a list of horticultural services and suppliers; a bibliography on urban wilderness and ecological landscaping, edible landscaping, groundcovers and herbs, and urban agriculture and gardening; and a listing of selected organizations and demonstration projects.

International Society of Arboriculture, *Municipal Tree Manual* (Urbana, Ill: International Society of Arboriculture, 1990). A municipal ordinance to control the planting and care of trees is a critical tool for improving the health of a city landscape. This report is a comprehensive guide to drafting or revising such an ordinance. It includes three sample ordinances as well as additional ordinance sections and commentary. Also included is a useful and well-illustrated section on management standards and specifications that can be developed as an appendix to a tree ordinance or as a separate management document. Contains examples from the field and useful advice on contract specifications and standards.

Gary Moll and Sara Ebenreck, editors, *Shading Our Cities: A Resource Guide for Urban and Community Forests* (Washington, D.C.: Island Press, 1989). This valuable reference, published under the auspices of the American Forestry Association, explains how to preserve and extend urban forests. The authors argue that beyond the aesthetic benefits of parks and tree-lined streets, trees can also reduce energy demand (by providing cooling shade), improve air quality, protect water supplies, and signal community stability. The book includes practical measures to save existing trees, information on how to start an urban forestry program, and profiles of successful projects in Los Angeles, Philadelphia, New York, Atlanta, and other cities.

US Environmental Protection Agency (EPA), *Cooling Our Communities: A Guidebook on Tree Planting and Light-Colored Surfacing* (Washington, D.C.: US EPA, 1992, S/N 055-000-00371-8). This guidebook was developed specifically for reducing summer heat in cities. It discusses ways of reducing the effects of urban "heat islands," and the likely environmental
and economic benefits of taking appropriate measures. Includes resources, references, sources of support, descriptions of mitigation efforts already underway, and technical appendices.

*The Urban Ecologist* is the newsletter of *Urban Ecology*, a California non-profit organization founded by *Ecocity Berkeley* author Richard Register. Although primarily focused on the San Francisco Bay Area, this group organized the First International Ecocity Conference in 1990. The conference emphasized the need to rebuild our cities in harmony with nature, and the newsletter includes vignettes of ecological rebuilding around the world.

**Chapter 4-H. Economic Development**

**Sustainable Employment**

Frank T. Adams and Gary B. Hanson, *Putting Democracy to Work: A Practical Guide for Starting Worker-owned Businesses* (Eugene, OR: Hulogos'i Communications, 1987). This is a comprehensive "how-to" guide for setting up a worker-owned organization. As a changing economy forces many businesses to the brink, more workers are considering buying them. This book tells how to do it and how the worker-owner edge can make a difference. Topics include organizing, managing, participating, assessing, technical assistance, capital, taxes, law and the business plan, with examples from the U.S. and Europe. Also includes examples and models on the decision-making process, by-laws, board and officer roles, legal structure, membership, meeting process and voting.


Keith M. Cossey, *Co-operative Strategies for Sustainable Communities: Community-Based Development Organizations* (Sackville, N.B.: Mount Allison University, 1990). This paper focuses on the role of community development corporations as a vehicle for sustainable community development.

Floyd W. Dykeman, ed., *Entrepreneurial and Sustainable Rural Communities* (Sackville, N.B.: Mount Allison University, 1990). This collection links theory and action by focusing on rural community adaptation/innovation and support systems for rural community development. Dykeman's introductory essay discusses a range of alternative organizational structures for community development, from development corporations to local government committees.

David Morris, *An Environmental Policy for the 1990s: Fashioning the Molecular Basis for a Green Economy* (Washington, DC: Institute for Local Self-Reliance, 1990). Morris is well known for his work around the concept of local self-reliance. The Institute for Local Self-Reliance's *Carbohydrate Economy Project* is researching the feasibility of moving toward a plant matter based economy, with the objective of substituting plant matter for a third of our current consumption of fossil fuels. In this essay Morris argues that all environmental and economic development policies should be guided by a molecular accounting system, with the goal of extracting the maximum amount of useful work on a sustained basis from every molecule. A fascinating, forward-thinking piece on creating a new economy that integrates concerns about democracy, equity, economic development, and the environment, with attention to the role of local as well as senior government.

*Sustainable Development: A Policy Paper by The Canadian Manufacturers' Association* suggests that embracing the concept of sustainable development offers "our best opportunity
to work in a spirit of cooperation with governments and members of the public to achieve practical and cost-effective solutions to our environmental problems.

_Economic Demand Management_

Severyn T. Bruyn and James Meehan, eds., _Beyond the Market and the State: New Directions in Community Development_ (Philadelphia: Temple University Press, 1987). Part One of this fascinating and informative collection of essays explores new community-oriented enterprises such as CLTs, CDCs, worker and consumer coops, and community financial institutions. Part Two examines local, regional and national strategies to enhance local self-reliance, including education and legislation. Of particular note is Karl Seidman’s essay, "A New Role for Government: Supporting a Democratic Economy."

_The Institute for Community Economics_ is a non-profit corporation providing technical and financial assistance to community land trusts, limited-equity housing coops, community loan funds, and other grassroots organizations, as well as providing information and educational material to the general public. The Institute authored _The Community Land Trust Handbook_ (Emmaus, PA: Rodale Press, 1982), and also publishes a quarterly journal, _Community Economics_.

Ward Morehouse, ed., _Building Sustainable Communities: Tools and Concepts for Self-Reliant Economic Change_ (NY: Bootstrap Press, 1989). The three major sections of this book deal with community land trusts and other forms of community ownership of natural resources; worker-managed enterprises and other techniques of community self-management; and community currency and banking. Also included are a lexicon of social capitalism and a bibliography of key works on self-reliant economic change.

_Community Forestry_

The British Columbia Village of Hazleton’s 1991 _Framework for Watershed Stewardship_ is a key document for forest communities struggling to gain some measure of control over the local forest base. The Framework is based upon Hazleton’s 1990 "Forest Industry Charter of Rights," which was adopted wholly or in principle by at least eleven municipalities and regional districts in British Columbia. The original Charter was revised to reflect growing understanding of the principles of "new forestry" at the Community Options Forestry Conference at the University of Victoria, February 15-17, 1991. Although the Framework is focused on British Columbia, it could serve as a model for communities in other jurisdictions where forest resources are primarily controlled by senior government agencies.

The Framework argues that forests are unique resources which should be stewarded to maintain ecological diversity and integrity; guarantee biologically sustainable levels of resource harvest and extraction; require maximum value-added manufacturing of all resources; provide stable, fairly paid, and challenging employment; support a fair return on natural resource industry investments; and allow stable growth of regions whose communities control management of their local watersheds.

Orville Camp, _The Forest Farmer’s Handbook: A Guide to Natural Selection Forest Management_ (Ashland, OR: Sky River Press, 1984). This book describes a sustainable all-age, all-species forest management system that does not involve clearcuts, burning, or herbicides. It also includes an appendix on designing appropriate access roads for a kinder, gentler forestry.

_Forest Planning Canada_ is a bi-monthly which rightly describes itself as "Canada’s community forestry forum."

Ruth Loomis, _Wildwood: A Forest for the Future_ (Gabriola, B.C.: Reflections, 1990). Describes the sustainable forest management practices of Vancouver Islander Merv Wilkinson.
Chris Maser, *The Redesigned Forest* (San Pedro, CA: R. and E. Miles, 1989). Maser is a consultant on sustainable forestry and was formerly a researcher for the US Bureau of Land Management. This book has won unqualified praise for its clarity and relevance to current issues in forestry.

*The Trumpeter: Journal of Ecosophy* is a quarterly which addresses serious discussions of ecosophy, but also includes good coverage of books and developments in community forestry.

*Chapter 4-I. Community Development*

Medea Benjamin and Andrea Freedman, *Bridging the Global Gap: A Handbook to Linking Citizens of the First and Third World* (Cabin John, MD: Seven Locks Press, 1989). This book launched Global Exchange, a non-profit research, education and action centre focusing on US-Third World internationalism. Global Exchange's version of internationalism recognizes that the interests of the Third World coincide with the interests of the majority of North Americans. For example, less poverty abroad would mean fewer companies abandoning the US and Canada in search of cheaper labour; higher standards of living in Third World countries would mean more markets for our goods; greater democracy overseas would mean less US tax dollars wasted on military aid to repressive regimes. Includes information on municipal foreign policy and an extensive Resource Guide.

Dorit Fromm, *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing with Shared Facilities* (NY: Van Nostrand Reinhold, 1991). This volume focuses on housing forms characterized by residents taking the initiative to plan and manage their neighbourhoods. It includes case studies of Dutch, Danish, Swedish, and U.S. prototypes, and offers guidelines on transplanting European models to North America. Issues and obstacles are addressed, and a variety of tenure and management styles are discussed. The book features models for urban, suburban and rural environments. The appendices include community diagrams, comparisons of ownership types, sample design programs and bylaws, and definitions of housing terms.

Kathryn McCamant and Charles Durrett, *Cohousing: A Contemporary Approach to Housing Ourselves* (Berkeley: Habitat Press, 1988). McCamant and Durrett are an American husband-wife design team, and leading experts on cohousing. After an extensive study of cohousing in Denmark, where they lived in or visited 60 communities, they introduced cohousing to North America through this book. *Cohousing* is written in three sections. The first introduces cohousing and explains how it works. The second is an inside look at eight cohousing communities. The third, "Creating Cohousing," considers the evolution of cohousing, the development process, design considerations, and translating cohousing to North America.

*Healthy Communities*

Peter Boothroyd and Margaret Eberle, *Healthy Communities: What They Are, How They're Made* (Vancouver: UBC Centre for Human Settlements Research Bulletin, 1990) explores the meaning of healthy communities and how they can be created. The authors define a healthy community as "a community in which all organizations from informal groups to governments are working effectively together to improve the quality of all people's lives."

Brijesh Mathur, editor, *Perspectives on Urban Health* (Winnipeg: University of Winnipeg, Institute of Urban Studies, 1991) is a collection of essays on urban health and wellness and the implications of healthy cities for urban planning.
Chapter 4-I. Investment and Purchasing


Chapter 4-K. Leadership by Example

Association of County Councils, Association of District Councils, and Association of Metropolitan Authorities, *Environmental Practice in Local Government* (London: Association of District Councils, 1990). The three U.K. national local authority Associations teamed up to produce this impressive notebook-style publication in an attempt to raise environmental awareness throughout local government. The first edition concentrates on examples of best available practice within U.K. local authorities; while few of these are in themselves relevant to North American municipal and local governments, this book would be a good model for a similar effort on this continent.

Chapter 4-L. Environmental Administration

Friends of the Earth (U.K.), *The Environmental Charter for Local Government* (London: FOE, 1989). This package includes the 15-point Charter (reprinted in Appendix 2), a guide to local government in the U.K. (including a glossary of council jargon), and a book of 193 practical recommendations. In addition to many of the topics covered in the present volume, the Charter recommendations cover everything from employment policies (drop any requirement for transport planners to be Members of the Institute of Civil Engineers) to travel allowances (which should not discriminate against the non-car user).


Chapter 4-M. Beyond Municipal and Local Government

*Global Communities*, a newsletter of the Institute for Policy Studies, reports on issues such as economic conversion, nuclear free zones, municipal environmental initiatives, and municipal foreign policy.

The National Growth Management Leadership Project (NGMLP) is a coalition of state and regional conservation and planning organizations in 18 states. Founded in 1988, the NGMLP advocates regional and statewide land use planning as a policy tool to address land conservation, housing, transportation and other key growth management concerns. In 1992, the NGMLP opened an Office of Federal Policy in Washington, D.C. to monitor opportunities for strengthening federal programs and policies related to growth management efforts at the state and regional level. NGMLP's study on "Managing Growth to Promote Affordable Housing" found that modest increases in housing densities and a wider range of housing types can positively influence the affordability of housing on a regional basis. LUTRAQ, a national research project on the land use, transportation, air quality connection, is expected to produce valuable new computer models of transit-oriented (vs. auto-dependent sprawl) land use development patterns when it is completed in 1992. The NGMLP also publishes a newsletter, *Developments*. 
4-A. Transportation Planning and Traffic Management

**Trip Reduction Bylaws**

Montgomery County, a suburb of Washington, D.C., has instituted both developer requirements and a Ride Share Ordinance. Developers must prepare a ten year trip reduction plan that includes elements such as personalized ridesharing assistance, shuttle van services, transit pass subsidies and other measures. The Ride Share Ordinance requires new employers to achieve a specified increase in transit use by their employees; penalties are exacted if goals are not met. This ordinance has achieved a 31.7% increase in the number of carpools and a 59.6% increase in transit commuters within just one year. Other communities that have adopted similar ordinances include Bellevue, Washington, and at least 37 cities and counties in California (Local Government Commission 1990; Cal DOT 1990).

Regulation XV of the South Coast Air Quality Management District in Southern California requires all work sites with 100 or more employees to implement a ridesharing program and to increase the organization's "average vehicle ridership" to a specified target. After more than a year of experience, the first evaluation of the program's results show that there has been a small but significant increase in average vehicle ridership, and a corresponding decrease in commuting by single-occupant vehicle. Most of the initial change appears to be from increased carpooling, while the use of compressed work hours and walking and bicycling also increased (Giuliano et al 1991).

**Automobile Restrictions**

Budapest bans motor traffic from all but two streets in the downtown area during particularly polluted spells. In Mexico City and Santiago, one-fifth of all vehicles are kept off the streets each weekday based on their license-plate numbers. Florence has turned its downtown into a pedestrian mall during daylight hours (French 1990).

At least 11 Italian cities, including Rome, Milan, Naples and Turin, have imposed alternate-day driving rules on high-pollution days. Fines range from approximately $50 Cdn for driving with the wrong plate to $1000 for altering plates. On a single day in December 1991, police in Rome issued a record 12,983 such citations. In January 1992 the Italian Government abolished all the bans, saying cities did not have the power to impose them, and leaving it to regional governments – the Italian version of Canadian provinces – to act (Associated Press 1991; Montalbano 1992).

**Road Pricing**

In February 1990 Oslo, Norway implemented a toll system. Oslo motorists are charged Nkr 10 (US $1.50) to pass through one of the 18 gantries set up around the central business district. Prepayment coupons costing Nkr 180 (US $27) for 20 trips or Nkr 2,200 ($330) for an annual pass are also available. Coupons need to be displayed in the windshield. Prepayment lanes are enforced by a numberplate video surveillance and a 1:20 spot check to deter "sneak drivers." There were reportedly some 100,000 subscribers to the prepayment system in the first few months (PIA 14(6), June 1990).

**Parking Measures**

**Parking Offsets**

Several cities have found that parking programs pay. Sacramento, California grants developers a five percent reduction in required parking for providing bicycle facilities, 15
percent for providing marked car/van-pool spaces, and 60 percent for purchasing transit passes for tenants of new offices.

**Preferential Parking**

Portland, Oregon and Seattle, Washington lead in on-street preferential parking programs for car-pools. Among the incentives: poolers are allowed to park downtown all day at specific metered locations, are exempted from hourly parking limits and meter fees, and enjoy spaces closest to building entrances.

**Parking Pricing**

The Federal Government increased its parking rates for federal employees in Ottawa, resulting in a 23 percent reduction in employees driving to work, a 16 percent increase in transit ridership among federal employees, and an increase in average vehicle occupancy from 1.33 to 1.41 passengers.

Preferential high-occupancy vehicle pricing strategies are also highly effective. Differential parking rates paid by the employer are applied, with two-person car-pools getting a 50 percent reduction, three-person car-pools 75 percent, and van-pools 100 percent. Montgomery County, Maryland has achieved over 75 percent use of high-occupancy vehicle spaces. Seattle has achieved 95 percent high-occupancy vehicle use in public spaces and 35 percent in private spaces (Totten 1989).

**Free or Inexpensive Transit**

Experiments with eliminating systemwide fares in Trenton, New Jersey and Denver, Colorado in the late-1970s found that the costs of doing so were high relative to benefits. Based on experiments in Seattle, Portland (Oregon), Syracuse, and Salt Lake City, free fare programs limited to the downtown core have generally had better results. Seattle has had the most success (Cervero 1990).

**Public Transport Innovation**

The Brazilian city of Curitiba has recently gained an almost legendary reputation as an "ecological city," and was chosen by the United Nations to host the "World Urban Forum" in conjunction with the 1992 UNCED. Curitiba is noted for several environmental management programs, but has attracted particular attention from so-called developed countries for the way it has developed its public transportation system over the last 20 years. Rather than invest in an expensive new metro or light rail system, Curitiba decided to improve upon its bus system in conjunction with supportive land use planning (Keeler-Hemphill 1992).

"Buses are colour coded: the express buses are red, inter-district buses are green and the conventional (feeder) buses are yellow. There is full integration between [them]. There are large bus terminals at the end of each of the five express busways. Along each express route, smaller stations are situated every 400 metres and are equipped with newspaper stands, public telephones, and post office facilities. Here passengers arrive on feeder buses and transfer to the express buses. The latest innovation is the introduction of the 'direct' express bus system, where there are fewer stops and where passengers pay before boarding the buses in special raised tubular stations. These new stations (with platforms at the same height as bus floors) cut boarding and deboarding times; a rapid bus system with 'boarding tubes' can take twice as many passengers per hour. They also take three times as many passengers per hour when compared to a conventional bus operating in a normal street. The boarding tubes also eliminate the need for a crew on the bus to collect fares, which frees up space for more passengers."
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

"Curitiba’s public transportation system is used by more than 1.3 million passengers each day, and attracts nearly two-thirds of the population. Twenty-eight percent of express bus users previously travelled in their cars. This has meant savings of up to 25 per cent of fuel consumption city-wide. Curitiba’s public transportation system is a major reason for the city having one of the lowest levels of ambient air pollution in Brazil. Two further effects of Curitiba’s transport policy are also worth noting: one of the lowest accident rates per vehicle in the country; and the savings for inhabitants in expenditure on transport (on average, residents spend only about 10 per cent of their income on transport which is relatively low for Brazil)" (Rabinovitch 1992).

Bicycle Transportation

Under a program called Bycyklen (City-Bike), Copenhagen plans to re-establish itself as a bicyclist’s city by allowing residents and visitors to borrow bikes free of charge. Riders may borrow a City-Bike by inserting a 20-krone coin (about Cdn $3.20) in one of hundreds of special bike racks to be installed all over the city but concentrated in the downtown area. The bike can be returned to any rack and the coin will be refunded. Plans call to have 3,000 bikes available when the program is in full operation in spring of 1992 (Vancouver Sun 1991).

Measures to make bicycling a better transportation alternative are currently under consideration in several North American cities. Palo Alto and Davis, California; and Bordeaux, France are "bikeable" cities where services and safety for bicycles are provided on a level comparable to that for automobiles. Montréal has built a 130-kilometre network of bicycle paths covering the whole city (Ville de Montréal 1991).

Traffic Calming

For more than two decades Dutch cities like Delft, Groningen, and Maastricht have calmed traffic by changing the layout of the residential street, transforming it into a woonerf, or "living yard." In the woonerf, cars are forced to navigate slowly around carefully placed trees and other landscaping. Since motor traffic cannot monopolize the entire breadth of the street, much of the space becomes more open to walking, cycling, and children's play. Automobiles are free to enter the woonerf, but only as "guests," while non-motorized traffic has priority. Experience with traffic calming has shown that it is most effective if widely implemented, so that motor traffic problems are not simply diverted to nearby streets. Traffic has been calmed on over 30% of residential roads in Maastricht.

West Germany's similar Verkehrsberuhigung ("traffic calming") schemes multiplied into the thousands since they were started in the seventies. Originally intended for residential areas, the technique is now spreading over whole cities. Traffic calming greatly improves the quality of life in neighborhoods where it is implemented, and so is gathering popularity in many countries, including Italy, Japan, Australia, Sweden, and Switzerland. Such restraints are so well-received in Denmark that local residents themselves are often willing to pay for the measure. In the US, Berkeley is experimenting with a "slow streets" system.

Traffic calming is not just a set of engineering techniques – it is also a community process, a way to reclaim streets into more attractive public spaces. Wherever traffic calming has been conducted on a large scale the urban area has found, contrary to many economists' predictions, that the local economy has improved. This appears to be because people like to come to attractive, green cities; businesses like to locate in cities with a high-quality urban environment; car access is not banned but it is not facilitated; and other modes are generally facilitated (Lowe 1991a; FOE/UK n.d.; Newman 1991).
Traffic Cells

Saarbrücken, the capital of West Germany's Saarland, along the French border, has a population of about 200,000. Saarbrücken now has plans which call for the entire municipal area to be a 30 km-per-hour zone, although a speed limit of 50 km/h will still apply on certain "priority roads" chosen according to their importance for traffic. The aim of this effort is to achieve the greatest possible restraint of traffic and to reduce accident figures, especially in residential areas, and mainly to reduce the number of accidents involving children, old people and bicyclists. It is anticipated that the 30 KPH speed limit will also stabilize traffic flow and thus result in a significant reduction of noise and exhausts in the residential areas. According to calculations performed by the Municipal Office of the Environment, the emissions released by car traffic alone now amount to between 50,000 and 60,000 tons of carbon dioxide (Leonhardt 1990).

Telecommunications

Portland's seven neighborhood offices, several City bureaus and the Center for Urban Studies at Portland State University (PSU) are talking to each other via computers. The system enables the Office of Neighborhood Associations, neighborhood offices, the Bureau of Community Development, the Planning Bureau, and PSU's Center for Urban Studies to exchange information about neighborhood issues, meetings, mailing lists, resources, and statistics (City of Portland OMA 1990).

Transit Marketing

In Frankfurt, Germany transit operators have signed contracts with municipal administrators and private firms to allow their respective commuters free access to public transportation. The city and the employers consider the subsidized tab as a job benefit. The city led the way by signing an agreement to reimburse the regional transit authority for the issue of "job ticket" flash passes to all 26,000 municipal employees. The contract has been in force since May 1991 and is costing the city approximately US $8 million per year. The public employees union opted to drop its demand for an increase in a supplemental allowance to enable the city to fund the initiative out of current revenues.

The Phoenix, Arizona bus system has introduced a "transit credit card" which allows passengers' employers to be billed monthly for actual transit usage. The magnetic stripe Bus Card Plus is issued to employees of participating employers who fall under a county-imposed mandate to reduce by at least 5% commuter trips of single occupant vehicles. The order, imposed for air quality reasons, affects all companies with more than a hundred employees at a single work site. Employer contributions and employee payroll deductions defray the monthly cost of the system at specific firms. Employees are generally charged a fixed monthly fee through payroll deductions and the employer subsidizes the rest. Before the new system was installed, companies (or employees) paid $27 for a monthly pass, regardless of the number of trips taken. With Bus Card Plus, the company is only charged for trips actually taken up to the cost of the monthly pass (PIA 15 (9), September 1991).

Freiburg, Germany (pop. 172,000) introduced a public transit "environment pass" in 1985 which has since been adopted by more than 30 German communities. Freiburg's city council authorized the transit authority to lower season pass fares from the equivalent of US $34 to $22 a month to give people an incentive to switch from their cars to public transit in order to protect the environment. During the first year, ridership increased by as much as 23%; between 3,000 and 4,000 car owners switched permanently to the Freiburg streetcar system, and ticket revenues increased while expenditures remained constant. Revenues and ridership continued to increase in succeeding years, with more than 350,000 passes sold in 1988, about 100,000 more than in the first year. The upward trend continues. An agreement with the transit authority of neighbouring Basel (Switzerland) allows mutual acceptance of their respective environment passes (PIA 14 (6), June 1990).
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

The Swiss ski resort community of Zermatt has added two solar buses to its municipal fleet of battery-operated electric buses. Private vehicles are banned in the mountain resort. The solar buses get about half of their battery-stored energy from roof-mounted solar collectors. Their cost, about US $285,000, was shared equally between the local administration and the rail line which brings tourists to the mountain community (PIA 14 (9), September 1990).

German transit authorities in Hamburg and Frankfurt have negotiated flash transit passes for hotel guests. Guests of one chain are offered an unlimited two-day transit pass good for all public transit in the city when they check in. The subsidized arrangement, negotiated between the hotel chain and the local transit authority, aims to make it easy for out-of-town hotel guests to use the city's transit system and leave their cars in the hotel garage or at home (PIA 14 (3), March 1990).

In the Philadelphia area, the Delaware Valley Regional Planning Commission's commuter benefit program enables employers to distribute tax-free transit vouchers, worth $15 a month, which employees can use to buy tickets, tokens, or passes on all public transit systems in the area, including Amtrak (Epstein and Driscoll 1991).
4-B. Land Use and Growth Management

Proximity Planning

*Vancouver's* *Clouds of Change* report makes "access by proximity rather than access by transportation" a central focus of city planning.

The City and County of Denver, Colorado are investigating the possibility of offering new employees a financial incentive, in the form of a higher starting salary, to live close to their workplace. The amount of the adjustment would reflect the distance to be travelled and the relative costs of housing in the city as opposed to the more distant suburbs (City of Vancouver 1990; McCulloch 1991).

Energy-Efficient Land Use Planning

*Portland*, Oregon provides an example of a larger city-region experimenting with land use policies to control energy demand - in this case within the framework of a mandatory State planning goal which requires that land use should be managed in order to conserve energy. One of the main objectives of the Portland Energy Conservation Demonstration Project, completed in 1977, was to examine the links between energy saving and urban form. An energy zone map, dividing the city into five zones based on relative energy efficiency, was produced in order to guide new development to energy efficient locations, and an energy conservation policy was adopted by the city council after extensive public consultation in 1979. It included commitments to develop land use policies using density and location to reduce the need to travel, and to improve the efficiency of the transport system and reduce its consumption of non-renewable fuels. More specific objectives related to the location of new developments and encouragement of energy efficient transport modes. These strategies were then incorporated into the city's draft comprehensive plan.

One of the central features of the plan was a "centers and corridors" concept, which would involve guiding new development into centers of existing commercial activity and along major streets (corridors). Emphasis was on energy conservation through compact high density development, using an urban pattern which combines nucleated centers with high linear densities. In theory, less travel would be required, essential travel would be carried out by energy-efficient modes and higher density development would permit more efficient use of fuel for space heating. During the public consultation phase, the energy related features of the plan were among the most controversial, winning strongest support from environmentalists, newspapers and heads of local government agencies, and opposition mainly from developers, industrial and union leaders and the Chamber of Commerce. Zoning was unpopular with development interests and landowners, while the emphasis on high-density corridors was opposed by neighborhood groups. Revisions were made to break up several corridors into "development nodes" – clusters of commercial activity, surrounded by high-density housing. Any plan which tries to take energy considerations into account at this scale is likely to face intensive lobbying by interest groups, the power of which must be recognized as a constraint on "pure" energy-related objectives.

Since the early 1970s, the volume of cars entering the downtown has remained the same, even though the number of jobs has increased by 50 percent. New development in Portland has been contained inside a regional "urban growth boundary" (UGB) surrounding the metropolitan area. Residential development, in particular, has been mandated at a high enough density to help support a nationally acclaimed public transit system that received top honours from the American Public Transit Association in 1989-90.

Today 43 percent of all Portland's commuters to downtown ride buses and a light rail system. This transit ridership rate is higher than most other U.S. cities its size. For example, Seattle has a rate of 38 percent, Denver 29 percent, and Buffalo 25 percent.
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

The Portland experience demonstrates that it is possible to plan for greater energy efficiency in large, established urban centers, though it is difficult to establish how effective the policies will be in the longer term in modifying the spatial structure and in reducing energy requirements.

Unfortunately, Portland still has traffic woes. Local officials worry that already congested roads on the west side of town cannot accommodate expected growth in car traffic. The answer, according to state and regional transportation officials, is building a circumferential bypass road (Owens 1990; Kasowski 1991; and Lowe 1991a).

Compact Community Policies

In Peterborough, Ontario the Sustainable Development Task Force argues that Compact Community planning cannot happen without concerted effort by local governments, supported by the public at large. Specifically, Official Plans, Zoning By-Laws and local building or development by-laws should be amended to facilitate intensification.

- Intensification should be made a core basis of housing policy in the Official Plan rather than a marginal component of traditional patterns of housing policy.
- Zoning By-Law matters relating to residential density, clustering, lot size, setbacks, basement apartments, etc., should also be amended to facilitate intensification.
- Design guidelines or standards (fitting into neighbourhood character, etc.) should also be established.

These policies should be developed with input from a broad range of stakeholders – from developers to affordable housing planners to environmental and community activists (Peterborough Task Force on Sustainable Development 1991).

Urban Villages

Urban villages provide a lifestyle with minimal car dependence and the kind of densities which make rail highly viable. The evidence would suggest that those cities which have tried to build urban villages have found them to be an extremely attractive lifestyle option. Recent examples appear to be succeeding and urban villages are now appearing such as Arabella Park, Zamilla Park and Germering in Munich, Der Seepark in Freiburg and Kista in Stockholm. These are nearly all private developments with very high popularity. Examples of urban village style developments in North America include False Creek in Vancouver, River Place in Portland, Oregon, and Mission Bay in San Francisco. The characteristics of these urban villages are:

- mixed land use, with commercial offices and shops on main spines, surrounded by residential;
- high density so that everything within the "village" is within walking and cycling distance;
- considerable landscaping including gardens on top of buildings and on balconies;
- a mixture of public and private housing with an emphasis on families and hence quite large internal home spaces;
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

- extensive provision for children in good view of dwellings;
- community facilities such as libraries, child care, aged centres and in a few cases small urban farms;
- pedestrian links with car parks placed underground and traffic calming on any peripheral roads;
- public spaces with strong design features (water, street furniture, playgrounds, etc.);
- a large degree of self-sufficiency for the community but with good rail links to the rest of the city (Newman 1991; 1991c).

Sustainable Urban Megaproject Planning

A 1990 sustainable development plan for Toronto's Waterfront Railway Lands (not adopted by the City) included several interesting recommendations in regard to urban megaproject planning:

- That the City Council endorse the principles of:
  a) minimizing fossil fuel consumption
  b) producing no peak drain on Ontario Hydro power from the railway lands development.
- That urban design principles maximizing solar access for heat and light be developed and included in a modified railway lands plan.
- That the Commissioner of Planning and Development in conjunction with the Commissioner of Parks and Recreation report on strategies to maximize shading within the railway lands including rooftop gardens. Such a strategy to be prepared in conjunction with strategies to maximize solar energy utilization.
- That landscape designs be developed to maximize the natural filtering of storm water.
- That strategies to use "waste heat" be developed including the heating of greenhouses on rooftops or on atriums for food production, air filtration and humidity control.
- That a thorough study of "solar aquatics" be undertaken in order to develop its eventual application within railway lands' development to achieve minimum or zero discharge and plant (including food) production.
- That proximity planning policies including appropriate ratios of residential to office space be established for the railway lands in order to minimize transportation per capita and greenhouse gases.
- That parking standards be set at an extremely low level for all development and at zero for many buildings.
- That a complete package of pro-cycling policies be adopted in the new plans.
• That composting factory space be provided in basements of some buildings, adequate to process all compostable waste generated within the lands. Methane by-products to be used locally for energy requirements.

• That an implementation strategy for the Greenplan be developed, to include a team to be composed of developers' representatives; building industry representatives; environmental, alternative technology, and academic specialists; and civic staff including representation from the new Energy Efficiency Office (Allen et al 1990).

Land Stewardship

The Regional Municipality of Halton, Ontario has advanced land stewardship as the first guiding principle for land use planning in Halton. "In this regard, we submit that the ownership rights of land are not absolute and the best and highest use of land is not an unfailing principle as there are other balancing factors to be considered. This is not meant as a denial of property rights, but an affirmation of a social responsibility.

"The duration over which a particular individual has titles to a piece of real property is but a fleeting moment in the history of the land. Individual property owners shall be encouraged to consider themselves as stewards of the land and give proper regard to the long term environmental interests in proposing any change to their land. To be stewards, we have to develop a renewed respect for the land, knowing that the quality of our natural environment is as much a part of our quality of life as our jobs, wealth and health. The extent to which an individual realizes the economic benefit of a land use change should be balanced by the community's desire in preserving the environment or certain land forms in the landscape. As we said, we intend this to be a social responsibility and not a challenge to property rights...

"Not only does the suburban form of development, with its attendant auto-dependency, consume land and energy, it also degrades the environment, segregates socio-economic classes, and reduces our opportunity of being more involved locally...

"We should create a more integrated live-work environment through more compact and people-oriented urban development design... We should promote public transit, develop land uses that will support transit, create compatible jobs and housing, encourage mixed land uses, selectively increase urban densities, and make our daily activity functional without the absolute necessity of the private car" (Regional Municipality of Halton 1991).

Residential Intensification

Kingston, Ontario created a low-interest loan program in 1981 to encourage the conversion of vacant, obsolete second and third storey commercial space in the downtown area into residential units. The program, which provides financial assistance to property owners within the CBD, was funded by an initial allocation of $250,000 from Council to serve as a revolving fund for future loans. The program's advantages include business benefits to downtown merchants, cost-effectiveness, increased assessments; downtown revitalization; and easing a tight rental apartment situation (Kingston Planning Report 1987).

St. Catherines, Ontario instituted a similar program in 1987, creating a $300,000 revolving fund to provide 8% conversion loans of up to $20,000 per dwelling unit (St. Catherines Planning Report 1987).
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

The Metropolitan Toronto Planning Department has estimated that the conversion aspect alone of a residential intensification program could produce 39,000 new housing units, the equivalent of 11 years of rental housing production (both private and social units) (Ministries of Municipal Affairs and Housing 1989; Metropolitan Toronto Planning Department 1987).

"Commute-sheds" for Jobs-Housing Balance

Southern California has seized on the concept of balancing jobs and housing as a means of reducing traffic congestion and automobile emissions. In 1989, the South Coast Air Quality Management District, together with the Southern California Association of Governments, unveiled a plan that combines traditional approaches to air pollution abatement with strategies to reduce emissions by redirecting residential and commercial development. The plan establishes subregional "commute-sheds" that are designated as either job-rich or job-poor. Planners estimate that by redirecting nine percent of the new jobs from job-rich to job-poor area and five percent of the new housing in the other direction, the number of vehicle-miles traveled per day could be cut by 33.4 million, or nine percent (APA 1991a).

Building Permit Allocation

In Florida, Key West's 1986 growth management ordinance establishes the number of dwelling units that still can be constructed before the island is completely built out. Before the enactment of the ordinance, the city approved an average of 400 to 500 dwelling units annually. Under the ordinance, the city can allow either seven percent of the total units permitted or 300 units per year. Housing permits are allocated on a merit system that awards points for recreational amenities, landscaping and open space, design quality, impact on the local infrastructure, and energy efficiency.

The ordinance also requires that at least 40 percent of all residential housing units must be constructed as affordable housing. Affordable apartments have annual rental rates less than 30 percent of the median household income in the city, while affordable sale units have a sale price that is less than three times the city's median household income.

Developers must enter into a development agreement with the city. Deed restrictions guarantee that the unit will remain affordable for a period of five to 20 years, depending on the project. In addition, the ordinance contains provisions for the waiver of impact fees on affordable units. Developers can obtain waiver credits by offering the units at prices below those established by the affordability threshold and by ensuring that the project will remain affordable for at least five years. Usually, at least half of the impact fee is waived for affordable units (APA 1991b).
4-C. Atmospheric Change and Air Quality

Bans on Ozone-Depleting Compounds

Newark, New Jersey and Irvine, California have passed comprehensive bans on the use, sale and manufacture of ozone-depleting compounds within their jurisdictions. Their by-laws:

- prohibit the use, sale, and manufacture of nearly all ozone-depleting compounds, except in the manufacture of drugs and medical devices and when military specifications call for them; and

- require all service stations and repair shops to capture and recycle CFCs.

Irvine's 1989 ordinance "Governing the Manufacture, Distribution, Sale and Recycling of Products Which Utilize Ozone Depleting Compounds" went into effect July 1, 1990. Irvine is a major center of aerospace, computer, and hi-tech manufacturing, and the ordinance was estimated to affect between 400 and 500 businesses in the community. Knowing the ordinance was coming, Irvine's businesses began reducing their emissions even before the measure took effect. During 1988 and 1989, the large users of CFCs in Irvine reduced their emissions by approximately 46%, and city officials expected further reductions in 1990 (UNEP 1990).

CFC Recycling

Montréal collects CFCs found in discarded refrigerators and air conditioners. Municipal employees pick up the appliances and send them to a company that stores the CFCs in sealed tanks. The recycled CFCs are used in repairing old appliances that still use the product (Ville de Montréal 1991).

Stratospheric Protection Accord

Twenty-four North American municipalities – including Los Angeles and Toronto – joined together in a Stratospheric Protection Accord. They have agreed to ban the local use of ozone-depleting substances by early 1992 unless no technically feasible alternatives exist by then, and to require the recovery and recycling of CFCs from products such as refrigerator-coolant units (Starke 1990).

Carbon Reduction Targets

In 1990, Toronto made a commitment to reduce the city's net CO2 emissions by 20 percent, relative to the 1988 level, by the year 2005. By "net" emission reduction, the city's Special Committee meant some combination of direct emissions reductions and creation of an offsetting "carbon sink" (e.g., financing reforestation in Southern Ontario or Central America). In 1991 the Toronto Special Committee revised its position, arguing that the city can reduce its gross carbon dioxide emissions by a full 20% without the need for an offsetting carbon sink. They outlined a set of strategies to achieve this target while still accommodating up to 20 percent growth in the number of people living and working in the city. The report includes strategies for measuring and allocating CO2 emissions reductions, electricity use, natural gas use, district heating and cooling, building, transportation, urban forestry, energy efficiency, education and advocacy (City of Toronto 1991).

Vancouver's Task Force on Atmospheric Change recommended in June 1990 that Vancouver commit itself to achieving the following three targets:

1) A complete phase out of all uses of products containing ozone-depleting chemicals within the City by the year 1995;
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

2) Immediately reducing emissions levels of sulphur dioxide and methane; and

3) A 20% reduction in 1988 level carbon dioxide emissions by the year 2005; and bringing all related atmospheric pollutants within federally determined acceptable levels.

To achieve these targets, the Vancouver Task Force proposed a set of 35 far-reaching recommendations in the areas of transportation, land use, energy conservation and efficiency, and administrative organization (City of Vancouver 1990). Vancouver City Council approved the report's recommendations in October 1990.

Ottawa, Ontario's Official Plan includes City Council's stated objective to reduce carbon dioxide emissions 50% by the year 2005 by increasing non-auto transportation, regulating polluting development, improving energy efficiency, planning land uses to reduce distances and vehicle trips, and improving the urban forest (City of Ottawa 1991). While the Ottawa Plan is admirable in many respects, the goal of reducing carbon dioxide emissions 50% by 2005 may be overly ambitious.

Airshed Quality Management

In early 1989, an extensive three stage programme to substantially improve air quality was adopted for the metropolitan area of Los Angeles, California. The programme's first stage (1989-93) includes tightening restrictions (at a cost of $2.8 billion per year) on the use of private automobiles and on pollution-causing industrial and household activities. During its second stage (1993-98), all diesel buses, 70 per cent of freight vehicles, and 40 per cent of private automobiles will be required to convert to cleaner fuels, with an additional 50 per cent reduction of industrial and consumer-related emissions. The final stage of the programme anticipates the total prohibition of gasoline fuels in automobiles by the year 2007 – a prohibition that assumes the availability of new, perhaps unknown, technologies emerging as viable commercial alternatives to gasoline fueled vehicles. A key to the success of the plan is a "redirection" of development patterns, employment and housing locations, and a substantial reduction in travel from homes to employment centres. This "redirection" must be led co-operatively by communities within the Los Angeles metropolitan area.

For especially significant environmental problems, local governments have the ability and the will to take equally significant corrective actions. While a major incentive for local action may be provided through national standards, the actions themselves cannot be taken by the national government alone. The Los Angeles (South Coast Air Quality District) plan is the most drastic, comprehensive and expensive effort to improve air quality ever drawn up locally in the United States. While specific actions proposed were not mandated by the Federal government, court decisions in response to the region's non-compliance with Federal air quality standards were a major factor in the development of the local plan. Implementation of the plan will be a local responsibility (SCAG 1989; SCAQMD 1989; OECD 1990).
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

4-D. Energy Conservation and Efficiency

Least-Cost Utility Planning

Uncertainty about the future cost of regional hydro power electricity, concern over the environmental impacts of building large scale hydroelectric power dams, the 1973 OPEC crisis, and citizen opposition to nuclear power prompted the City of Seattle, Washington to conduct a major study to define its energy alternatives. "Energy 1990" included sophisticated load forecasts based on economic models and defining a menu of (non-generating) alternatives to serve future load growth. Results from this first "least-cost" planning study in the region recommended a strong emphasis on conservation and indicated that future loads could be met without participation and substantial investment in the development of two new nuclear generating plants. Seattle has established by City Council Resolution the goal of reducing the need to expand or develop new generating facilities through conservation. With leadership from Seattle's Mayor, Council and citizen committees, the city and its municipally-owned utility now produce a biennial Strategic Corporate Plan to guide cost-effective and environmentally-sensitive electric power provision (OECD 1990).

Energy Efficiency Targets

In April 1990, the City of Portland, Oregon adopted an energy policy with the goal of "increasing energy efficiency in all sectors of the City by 10 percent by the year 2000 so as to enhance the livability, economic strength and well-being of the City's residents and businesses and reduce environmental problems, such as air pollution and emissions that contribute to global warming." The policy specifies that the City will advocate energy efficiency, promote energy efficiency in city-owned buildings and in residential buildings, promote energy efficiency through land use regulations, encourage energy efficiency in commercial and industrial facilities, provide energy efficient transportation, research and support telecommunications as an energy efficiency strategy, promote conservation as the energy resource of first choice, and promote waste reduction and recycling (City of Portland 1990). The city's Energy Office has already helped to weatherize more than 5,500 apartment units, and plans to complete 2,500 more by the end of 1992. It has also assisted over 1,300 of the city's poorest families to weatherize single family homes (ICLEI 1991).

District Heating and Cogeneration

Helsinki, Finland's district heating program has used cogeneration to reduce Helsinki energy demand to 30% of early 1970s levels (Helsinki Energy Board 1989).

Municipal Energy Conservation Campaigns

The municipal utility in Osage, Iowa conducted a successful energy conservation campaign which included sending infrared photos of energy leakage to each home in the town. The utility's efforts have saved the citizens of Osage $1.2 million annually.

Research and pilot programs in Seattle are under way in conjunction with small private industrial plants to build energy conservation into their manufacturing equipment and processes. Several industrial firms have participated in pilot projects to retrofit for energy efficiencies, and then monitor such equipment as motor drives, heating and cooling systems and lighting (OECD 1990).

Energy Conservation Retrofit Ordinances

San Francisco, California enacted a comprehensive residential energy conservation retrofit ordinance in 1982, which has already resulted in the retrofitting of over 25,000 residential units. The San Francisco ordinance requires all existing residential buildings, including
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

apartment buildings, to be brought up to an energy conservation standard at the time of sale. The cost of the conservation measures can be included in the financing of the residential unit. Cost-effective conservation measures required by the ordinance include ceiling insulation, weather-stripping, a water heater insulation blanket, low-flow showerheads, caulking and sealing of major cracks and joints, and insulation of heating and cooling ducts. Additional measures are required of multi-family units. San Francisco also has a commercial energy conservation retrofit ordinance, which is estimated to save San Francisco businesses over $50 million in energy costs after the first five years (Local Government Commission 1990).

Weatherization

Seattle provides free home weatherization inspections and advice, plus low-interest loans for weatherization. The city has also developed a list of qualified weatherization contractors who are authorized to do the work and to be paid from low-interest loans. Encouragement to participate in cost-effective conservation efforts is also provided to self-motivated customers through city-sponsored educational and pilot programs (OECD 1990).

Energy Audits and Loans

Public utilities in the German state of Schleswig Holstein are providing households with free energy audits and low interest loans for the purchase of energy-saving domestic appliances. Households that can demonstrate lower energy consumption with their 1991 bills over their 1990 bills will get an "environment bonus" of DM 50 (US $35) (PIA 15(5), May 1991).

Sacramento, California's Municipal Utility District promotes audits and arranges complete residential efficiency upgrades for their customers. Utility staff target the program to neighborhoods through personal contact in church group meetings, ratepayer groups, and other avenues. Interested homeowners sign up on the spot for an energy audit. The utility arranges the audit, and the inspector recommends an appropriate package of measures to improve efficiency. This typically includes improved insulation, weatherstripping, insulating the hot water tank, installing compact fluorescent fixtures and replacement of electric resistance heating with a heat pump. For simply agreeing to the audit, the utility provides the homeowner free of charge with compact fluorescent light bulbs, a high performance showerhead, and 2 trees which, when planted, will reduce air conditioning energy requirements. If the customer decides to proceed with the full package, the utility arranges for one of the various qualified private contractors to come in and do the work. Part of the cost is an outright grant (about $800) from the utility, and the rest of the cost (typically $3400) is put on the customer's hydro bill, amortized over 15 years. This extra charge on the power bill is less than the immediate reduction in energy costs, so the customer comes out ahead with lower power bills (Millyard 1992).

Solar Oven Cookbook

The municipal utility in Sacramento, California published a solar oven cookbook to promote solar cooking and thereby reduce air conditioning in overheated kitchens.

Local Energy Supply Concept

In reaction to the oil price shock of the 1970s, the Saarbrücken public utility company, Stadtwerke Saarbrücken, initiated a Local Energy Supply Concept in 1980. The program is based on a few simple premises: reduce energy consumption, exploit energy better through district heating and through innovative technologies, and focus on renewable energy sources. Some 40,000 homes are now supplied with district heating rather than individual heating, "at almost no cost to the environment." Stadtwerke Saarbrücken also set up the largest privately used photovoltaic system in Europe, as part of their campaign to develop "solar power from the roofs of Saarbrücken."
Saarbrücken (pop. 128,000) enables citizens to sell back to its municipal utility excess power generated by solar rooftop installations. The city has offered to “buy back” solar power from individual suppliers at about 15 US cents per kilowatt hour. The local public utility will reward homes that install rooftop solar collectors by “sharing” its monopoly on power production. The subsidy scheme in effect underwrites part of the cost of household solar conversion. Loans are also provided, through a local partner savings bank, for any household improvements related to energy efficiency, energy conservation, or water conservation.

Since 1980 Saarbrücken has achieved substantial emissions reductions with respect to NOx (34%), SO2 (76%), and CO2 (15%). With continued effort to develop photovoltaics and further expansion of the district heating network, Saarbrücken expects to reach the target called for by the Toronto Conference on the Changing Atmosphere, namely a 20% reduction in CO2 emissions by 2005, 10 years earlier. Perhaps more significant is that this goal will be attained without nuclear energy (Leonhardt 1990; PIA 14(4), April 1990; ICLEI 1992).

Energy-Efficient Neighbourhoods

A variety of "urban villages" (e.g., False Creek in Vancouver), "neotraditional towns" (e.g., Seaside, Florida), and "energy-efficient neighbourhoods (e.g., in Davis, California, and Eugene, Oregon) have been developed to conserve energy through urban design, site-planning, development controls, and energy-efficient land use planning. Techniques have traditionally included solar orientation of streets, cluster development, neighbourhood-level services and facilities, increased densities, natural drainage, narrow roads, and energy conservation programs. The recent contributions of "neotraditionists" such as Andres Duany and Peter Calthorpe rely on techniques such as "traditional neighbourhood development ordinances" and "transit-oriented development" design guidelines (see, e.g., Corbett 1981; Duany and Plater-Zyberk 1992; Kelbaugh 1989; Lang and Armour 1982; and Okamoto 1991).
4-E. Waste Reduction and Recycling

Waste Reduction Targets

In 1988 Seattle adopted a resolution establishing a goal of reducing solid waste in the City by 60% by 1998 with intermediate goals of 40% by 1991 and 50% by 1993 (City of Seattle 1988). Recycling, composting, and avoiding waste production are noted as the primary waste management strategies. The resolution outlines specific programs and a time line for implementation. Seattle also operates a municipal compost operation and provides bins and training to homeowners for backyard composting.

Packaging Restrictions

In 1989 Minneapolis placed severe restrictions on food and beverage packaging – including national brands – originating at retail food establishments. "The Council therefore finds that the minimization of nondegradable, nonreturnable and nonrecyclable food and beverage packaging ... is necessary and desirable in order to reduce the City's waste stream, so as to reduce the volume of landfilled waste, to minimize toxic by-products of incineration, and to make our City and neighboring communities more environmentally sound places to live." Although the ordinance was initially opposed by the Minnesota Grocers Association and the Council for Solid Waste Solutions (a plastics industry group), it was passed unanimously by city policymakers. Rather than battle the ordinance, the plastics industry chose to work with local officials. The Council for Solid Waste Solutions offered to sponsor a six-month pilot recycling program to prove that plastics recycling was possible. The program impressed city environmental leaders, who now believe that recycling is a realistic option for certain products. As a result, the ban will not be as sweeping as originally proposed. However, to meet the new law's guidelines, an actual recycling system must be operating. McDonald's clamshell containers, for instance, have always been technically recyclable, but no one was actually doing it in Minneapolis prior to the new law (Minneapolis Code of Ordinances 1989; Bulletin of Municipal Foreign Policy 1991).

"Precycling" Campaigns

The city of Berkeley, California realized that its recycling program would be much more effective if it were complemented by a program educating consumers to consider waste before they make purchases. The campaign includes media advertising and promotion and public events.

Municipal Composting

The city of San Jose, California is experimenting with a municipal composting program to reduce yard wastes. The city is selling the dry sewage sludge as a soil amendment. The centralized composting program can handle 60,000 tons of yard waste annually.

Municipal Garbage Composting

As part of its waste reduction strategy, in 1991 Portland opened the first municipal garbage composting facility in the U.S. The facility is capable of handling 185,000 tons of garbage a year (ICLEI 1991).

Polystyrene Plastic Foam Bans and Restrictions

Portland and Berkeley were among the first local governments to attempt to prevent the one-time use of polystyrene plastic foam by restaurants and retail food vendors. The Portland
initiative was greeted by legal challenges from industry which, as of this writing, have not been resolved.

**Hazardous Waste Reduction**

The California cities of *Hayward, Santa Monica* and *Berkeley* have staff who provide businesses with technical assistance to reduce their generation of hazardous waste (Skinner 1990).

*Santa Monica* distributes brochures to targeted small businesses which outline specific waste reduction measures. These include information for vehicle and equipment repair shops, machine toolers, the printed circuit board industry, metal finishing industry, general commercial printers, commercial dry cleaners, paint formulating industry, photographic processors, and automotive painting businesses.

Seven of North Carolina's POTWs (Publicly Owned Treatment Works) help industries reduce their regulated wastes by providing in-depth technical assistance to local companies through on-site waste reduction consultations as a routine part of compliance inspections (Local Government Commission 1990).

**Comprehensive Resource Recovery and Utilization**

For a humbling perspective on even the most ambitious North American recycling programs, consider this Chinese example from Shanghai. The Shanghai Municipal Environmental Administration serves a 150 square-kilometre city (Shanghai) and 6035 square kilometres of suburbs and rural areas around the city core with a total population of some 12 million. Since 1957, it has developed a State complex retrieving materials and marketing the reclaimed products and now has some 29,000 full-time and many more part-time employees.

A network of 502 purchasing stations and 1500 purchasing agents in rural areas acquire material for reclamation or recycling and are paid on commission. Twenty-six integrated recycling centres reclaim or recycle material from industrial and consumer wastes and a network of sales departments and retail shops sell reclaimed products.

Among the materials recovered from wastes are ferrous and non-ferrous metals, rubber, plastics, paper, rags, cotton, chemical fibres, animal bones, human hair, broken glass, glass bottles, old machine parts, chemical residues and waste oil. The company has subsidiaries for copper refining, precious metal recovery and refining, iron and steel scrap recycling, plastics production, ferrous metal production and oil wastes recycling. In addition, there are over 3600 people employed to work with factories – for instance advising them on setting up containers for wastes and establishing systems by which the company can collect them (Gunnerson 1989).

**Recycling Land Use Controls**

Several communities now set recycling space standards for all new buildings (Canli and Gordon 1991). In *Santa Monica*, California, residential buildings with 10 or more units are required to provide 100 square feet for recycling facilities for the first 10 units and five square feet for each additional unit. Commercial buildings over 10,000 square feet must set aside 1,000 square feet for recycling for the first 10,000 square feet, then five square feet for each additional 1,000 square feet. The city is allowing its recycling program to mature before it specifies the types of bins required.

*Davis*, California requires the provision of at least three recycling carts for each trash enclosure in dwellings with 10 or more units. Building owners must submit collection plans for recyclable materials and provide occupants with information on the building's plan and the city's recycling program.
Developers in Boulder, Colorado seeking residential building permits must score at least 20 points among several categories of conservation measures. Providing a recycling facility and retrofitting for recycling each earn two points.

Orlando, Florida requires developers of large projects to agree to ensure that the development's tenants and future owners will participate in the city's recycling program.

Portland, Oregon requires new developments of three or more units to have recycling collection areas of at least 100 cubic feet for every 10 units, with specific requirements.

**Apartment Recycling**

The City of North Vancouver, British Columbia is providing curbside recycling to all apartments, townhouses and condominiums in North and West Vancouver. The city delivers big bins to apartment buildings and a local recycling firm collects the material weekly. The city has passed a bylaw requiring new buildings to provide space for the bins (Gram 1990).

**Redistributing Recycling Subsidies**

An extra surcharge of A$ 1.50 per ton is being levied on Australian local governments in New South Wales which do not have recycling programs. Local governments with active recycling programs are expected to receive an average of A$ 17.50 per ton of reclaimed materials from the extra landfill charges, a subsidy of tens of thousands of dollars. The redistribution should provide a substantial incentive to start recycling, and officials hope it will double the estimated 100,000 tons currently recycled in the state (PIA 15(4), April 1991).

**Dishmobile**

The German town of Boeblingen (pop. 42,000) has acquired a new "dishmobile" for food service at public festivals. Equipped with a commercial-size dishwasher and enough plates and silverware to serve 600 guests, the mobile facility is also available for a modest user charge to serve clubs and voluntary groups for their own festivities. Tens of thousands of non-biodegradable food containers will avoid the landfill as a result of the facility. The dishwasher on wheels, with its associated plates and equipment, cost approximately US $15,000 (PIA 14(5), May 1990).
4-F. Water and Sewage

Water Offset Requirements

In the California cities of Santa Barbara, San Luis Obispo, and Santa Monica, water offset requirements on new projects require developers to replace old toilets in existing buildings with low-flow models in order to free up enough water to build (Fulton 1991).

In Ontario, the Town of Newmarket requires water-saving devices in toilets as a condition of subdivision agreement, while the City of Niagara Falls requires low-flow bathroom basin faucets, showerheads, and toilets for any development subject to site plan control and for new plans for subdivision.

Tenant User Fees for Water

To protect water reserves and reduce the use of drinking water in the metropolitan area, the city government of Hamburg, Germany (pop. 1.8 million) has made tenants rather than property owners responsible for the water use fee. The ruling will lead to the retrofitting of water meters in apartments and end automatic billing of owners for water use based only on the size of their property and the number of occupants (PIA 14(1), January 1990).

Grey Water Recycling

The Los Angeles county board of supervisors voted for a study on the safe use of "grey water" – recycled waste water from residential sources. Without objection, the board ordered the departments of health services and public works to issue recommendations within 60 days on how residents might use grey water from sinks, bathtubs and washing machines to irrigate trees and shrubs (LADN 1991). San Luis Obispo, California allows the use of grey water (Skinner 1990).

Natural Water Purification

A swamp pond system that purifies water by running it through some 125,000 plants of 11 species has turned an artificial lake on Montreal's Expo 67 site into an ecological preserve. The lake balances nature, recreation and public use. The three pond purification system on the Ile Notre Dame recreational lake has resulted in a wetlands preserve that has helped to make the lake safe for swimming without resort to chemical treatment such as chlorination (PIA 15(2), February 1991).

Constructed Wetlands

Arcata, California (pop. 15,000) completed one of the first marsh-ecology sewage treatment systems in 1987. When Arcatans flush, gravity takes their wastewater to a conventional treatment plant on the edge of the bay, where it is screened and solids settle out. The effluent is piped to 50 acres of oxidation ponds, where algae work on the wastes and more solids are removed. The wastewatuer then flows into two 2-1/2 acre man-made marshes planted with bulrush and cattail, where the sewage effluent is "polished" (given advanced wastewater treatment). Next it flows into 45 acres of marshes constructed by the city and the California Coastal Conservancy to help restore fish, shellfish, waterfowl and other wildlife to the area. By the time it flows into Humboldt Bay, the effluent is cleaner than the water it meets there. Total cost of the system, including planning and environmental studies and acquisition of some land: $514,600 (Marinelli 1990).

Denham Springs, Louisiana (pop. 20,000) runs its processed sewage through two shallow 40-acre ponds that have been lined, carpeted with stones, filled with water, and planted with lilies and other plants. Although it looks like a flower farm in summer, the facility
can treat 3 million gallons of sewage per day. Compared with conventional treatment, the city saved $1 million in initial construction costs and will save $60,000 per year on operation and maintenance. Maintenance consists mostly of removing the dead plant tops in spring before new shoots start poking up (MacLeish 1990; Marinelli 1990).

### Water Conservation Programs

**Santa Monica, California and Minneapolis and St. Paul, Minnesota** provide residents water conservation devices with free or low-cost installation (Skinner 1990). Santa Monica has installed low-flow toilets in one-quarter of the city’s homes, saving almost a million gallons of water every day. The $2.8 million program, which offered free installation or rebates to cover installation costs of the low-flow toilets and shower heads, was financed by a conservation incentive fee (participants were exempt from this surcharge on their water bill), general water revenues, and money from the water wholesaler. The program has reduced per capita consumption for indoor use from 80 gallons to 50 gallons per day. It also eases demand on the municipal wastewater treatment system (MacLeish 1990). Santa Monica has also installed treatment systems at drainage points for the city’s storm drain system (Skinner 1990).

The Metropolitan Water District of **Southern California** is promoting 16 "best management practices" for water conservation, including: installing low-flush toilets and other water-conserving fixtures; checking distribution systems for leaks and repairing them; installing meters with all new water hook-ups and billing by volume of water use; enacting water-efficient landscaping ordinances; providing incentives for reducing peak demand; and designating a water conservation coordinator to prepare and implement a conservation plan (Schilling 1992).

### Solar Aquatic Waste Treatment Facilities

Designed by Dr. John Todd of Ocean Arks International, the first solar aquatic waste treatment facilities opened in Providence, Rhode Island in July 1989 and Harwich, Massachusetts in May, 1990. The Solar Aquatic System™ or SAS, duplicates, under controlled conditions, the natural water purification processes of freshwater wetlands. Wastewater is circulated inside a greenhouse through a series of clear tanks, each with its own aquatic ecosystem, and marshes. In this treatment process, sunlight, oxygen, bacteria, algae, plants, snails and fish work together to purify the water. SAS uses aeration and mixing in the tanks to prevent sludge from settling. This enhances degradation of solids and results in fewer solids than conventional wastewater systems (EEA n.d.).

The experimental Providence facility is an 11 by 40 metre (30 by 120 feet) greenhouse which treats up to 20,000 gallons of sewage per day, or about the amount from 150 households. To treat the whole city’s wastes would require about 120 acres, comparable to the acreage now used to treat its wastes to secondary standards. Since the SAS waste doesn’t stink, it can be disaggregated: each neighborhood or community could have its own facility and use its own by-products, tree saplings, flowers, etc., to enhance the environment and urban landscaping, and as a source of income. The facilities are modestly more cost-effective than ordinary secondary treatment plants; for dealing with very concentrated wastes, like septage, which is 30-100 times more concentrated than sewage and hard to treat conventionally, the plants are far more cost effective than any other technology. They also create substantially less sludge than conventional treatment (CBC 1990; Marinelli 1990).
4-G. Greening the City

Creek Raising

In our cities, we have tended to bury or modify streams beyond all recognition, in the process neglecting the power of these waters to renew the human spirit, just as they renew the life of the land. Stream corridors ... represent one of the most varied ecosystems. This richness can enable us to re-create our relationships to creeks. The restoration of urban streams thus takes on an ecology of meanings: they are a vehicle which permits us to "re-inhabit" where we live and to cultivate a sense of place; provide an organizing principle for community building and a means to revitalize neighborhoods and commercial areas; give us a way of finding the child again (who loved to play by them); and offer a forum for environmental art, dance, and poetry. Conceiving creek work in this way can serve to infuse community activism with a creative and inspirational dimension that has profound implications for grassroots efforts to revitalize our cities. Communities that have raised and restored their creeks include San Luis Obispo and Berkeley, California (Steere 1990). Burnaby, British Columbia passed a resolution in 1972 that its streams must be "preserved and conserved." Housing developments must incorporate existing streams into their landscaping, and individual homeowners are not allowed to build right down to the bank (Sarti 1992).

Green Guerrillas

People's needs and involvement in their own neighbourhood open space is what the Green Guerrillas is all about. Our organization began in 1973 with a group of neighbours on the lower east side of Manhattan. They had decided that they were tired of the disinterest in and destruction of their community. They cleaned and greened a vacant lot on the corner of Bowery and Houston streets, an area some of us know as Bum's Row. Today that lot is lush with plants during the growing season, and the small Metasequoia tree they planted there is now forty feet tall. The garden has meandering paths, a grape arbour, a pond, and all kinds of flowers, fruits, and vegetables. Anything that will grow in an urban environment is there. It even has a bee hive. That the garden is in an area known for its urban blight holds important significance (Keller 1990).

Tree Replacement Bylaws

Vancouver’s 1991 tree-replacement bylaw requires the replanting of trees affected by development. It requires builders to file site plans showing existing trees with trunks over 20 centimetres (eight inches) in diameter measured 90 centimetres (three feet) above the ground. A tree that is removed must be replaced somewhere on the property by a tree of a type and size approved by the city. Vancouver had originally asked the provincial government to amend the city charter to give it the authority to fine people who destroy trees, but that was not granted. The penalty for those who break the new bylaw is that their occupancy permit will be withheld (Fayerman 1990, 1991).

Natural Planting

In a critical aquifer district in the town of Southampton on Long Island, ordinances require that at least 80 percent of each lot be kept in its natural state, and no more than 15 percent of any lot (and in no case more than 1,900 square meters) can be planted in fertilized lawns or plants. These restrictions still leave landowners with ample landscaping choices; sites that are not left in woodland vegetation can be planted in meadow grasses, perennial wildflowers, ivy, or other dense plantings that need little or no fertilizing (Lowe 1991).
"Green" Roofs

The German cities of Mannheim and Frankfurt are now granting planning permission for structures with flat or gently sloping roofs only if they are designed to be of the "living" variety. The German League of Cities has noted that flat "green" roofs save energy and increase residents' comfort by limiting the temperature spread, thus reducing heating and air conditioning requirements. Current technology allows flat roofs to be retrofitted for vegetation economically without any danger that plant roots will perforate roof surfaces. "Green" roofs have 60% less runoff than gravel or asphalt tiles, reducing the costs of drainage systems and, in sufficient numbers, improving the urban micro-climate (PIA 14(5), May 1990).

Integrated Pest Management

Burnaby, British Columbia uses integrated pest management (IPM) wherever possible to maintain its green areas.
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

4-H. Economic Development

Sustainable Employment Plan

A city plan drawn up by San Jose, California would create 170 jobs over 10 years with an initial investment of just over $645,000. The program includes educational campaigns to show consumers how to save energy, and technical assistance, such as energy audits and the development of a home energy rating system. Prominent in the San Jose plan are initiatives to reduce energy use in government buildings and transportation, in effect providing an example for the community. The city investment, which would spur nearly $20 million in private spending, is expected to pay for itself in two-and-a-half years, and result in reduced carbon dioxide emissions (Flavin and Lenssen 1991).

Community Land Trusts

There are now more than 125 community land trusts (CLTs) in operation or development throughout the U.S. Although most are quite young, these CLTs have acquired or developed several thousand units of permanently affordable housing and provided land for family farms, shelters and health centers.

The United Nations International Year of Shelter for the Homeless (1987) cited three CLTs in the U.S. for its Special Merit Award. For one of these, in Burlington, Vermont, the city provided an initial seed grant for a CLT, and staff people in the city's Community and Economic Development Office took the lead in encouraging local residents to establish the Burlington Community Land Trust (an independent nonprofit corporation) in 1984. Other US cities with CLTs include Philadelphia, Atlanta, and Providence.

Linkage Programs

For community land trusts and related institutions to have a truly appreciable effect on sustainable development, public powers and public funds will be required for their expansion. At the local government level, a good model would be the "linkage" programs which have been used in several cities to provide funds for affordable housing, job development, and day-care. Linkage works by taking a portion of the value created by investment in areas undergoing substantial development, and directing that value to build affordable housing, provide job training, and fund social services in less fortunate neighborhoods. Linkage policies represent "a new social contract to build lasting bridges of economic opportunity between areas of the city experiencing rapid growth, and the people... who, historically, have not shared in the benefits of that growth" (BRA 1988). Linkage programs for sustainable community development, modeled after these existing programs, could provide a means for the environmental costs of conventional development to be balanced by conservation and ecologically appropriate development. While linkage programs have operated for several years in US cities such as Boston and San Francisco, they are also becoming more common in Canada. In December 1990 Vancouver approved its first agreement with a commercial developer in which the capital costs of a day-care centre are financed as a condition of rezoning.

New Product Development

In Gothenberg, Sweden's most industrialized city, the municipal government established the Gothenberg Environment Project (GEP) to demonstrate a more contemporary and effective approach to environment-economy integration. GEP researched the toxic chemicals in Gothenberg's harbor and discovered most of them originated from ordinary household detergents. Rather than the conventional attempt to regulate emissions, the GEP instead
challenged the soap manufacturers to change the product. A truly environment-friendly
detergent is being developed. The city also recognized that environmental responsibility is
global as well as local. Powerpipe AB wanted to set up a factory in Gothenberg to
manufacture pipes. These pipes are normally insulated with a CFC-based foam (CFCs are
chemicals which destroy the ozone layer). The city allowed the company to operate only on
the condition that they not use CFCs. Reluctant at first, the company discovered it was able
to obtain government funds to develop a foam made without CFCs. The new pipes cost about
10% more, but are the world's first CFC-free pipes. The company will benefit as the
chemicals are phased out world-wide. Powerpipe AB's President, Rune Engvall, agrees that
"we have a promising market." And senior government officials are learning from the GEP
that unless government sets rules, these kinds of technical developments will not come about
(Public Broadcasting System 1990).

Increasing Affordable Housing Supply

The Portland metropolitan region has enhanced the supply of affordable housing by
replacing zoning codes that require each house to occupy its own spacious lot with controls
that promote a variety of housing types, including smaller and multi-family homes. Because
of changes in local zoning plans, 54 percent of all recent residential development in the
region consists of apartments, duplexes, and other affordable housing types, compared with
the 30 percent maximum allowed by previous zoning. This policy has been a leading factor
in keeping the city's housing prices affordable. In relation to household income, housing in
Portland is two to three times as affordable as in Seattle, San Jose, San Francisco, and other
West Coast cities (Lowe 1992).

Local Self-Reliance

St. Paul, Minnesota's "Home-Grown Economy" project experimented with a number of
tries to establish closed-loop, self-sustaining economic networks. Rubber tires, for
example, are ordinarily a disposal nuisance. St. Paul learned that tires can be recycled by
freezing them in liquid nitrogen, pulverizing them, and using them as a filler for repairing
potholes, another nuisance for which the city is responsible. The recycling costs were $1 per
tire; the disposal costs were $3.25 per tire (Meehan 1987).

Greenmarkets

New York City's Council on the Environment - a citizens' organization that works out of the
mayor's office - initiated a system of "Greenmarkets" in 1976. Currently operating at 10
sites year-round and 20 in summertime, the Greenmarkets aim to preserve farmland and help
struggling upstate farmers, while making fresh fruits and vegetables available in city
neighborhoods. The markets offer many New Yorkers their only chance to get local produce
without journeying to the suburbs (Lowe 1991).

Local Currencies

In 1988 the local Energy Commission in Lester Prairie, Minnesota (pop. 1,229), developed an
innovative way to invest state energy grant money for long-term local development: a
"Prairie Buck." Residents and businesses who signed up for an energy audit received fifteen
"Prairie Bucks," good for the purchase of a compact fluorescent lamp at local hardware
stores. Instead of flowing out to distant energy suppliers, local dollars stay in town and
bolster the local economy. To encourage carpooling to Hutchinson (15 miles) or the Twin
Cities (45 miles), the town began offering "Rideshare Bucks" according to the number of
passengers in the car and the number of gallons required for their commute. During the first
eight months of the program, 75 participants earned a total of $1,239. After two years, the
citizens of Lester Prairie saved an estimated 600,000 miles of travel and prevented 200,000
pounds of carbon dioxide from polluting the atmosphere (RMI 1991).
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

4-I. Community Development

Worker Safety

San Francisco passed the first US municipal ordinance to regulate the use of video display terminals (VDTs) in private businesses. The ordinance is intended to reduce the risk of ailments caused by prolonged use of a computer terminal, including eye strain, muscle fatigue and carpal tunnel syndrome, an injury that can incapacitate the hand and that often requires surgery. The law requires that workers be provided with adjustable chairs and adequate lighting and that computer terminals be equipped with detachable keyboards and adjustable screens. Employees without regularly scheduled rest breaks are to be given 15 minutes of alternative work after every two hours at a terminal if such work is available. The law also requires employers to provide training on safe use of VDTs and recommends that pregnant VDT users be shifted to other work if they request it (New York Times 1990; Associated Press 1990).

Healthy Community Projects

In Europe the World Health Organization has directed the successful creation of a 30-city network known as the Healthy Cities Project. In Canada, there have been approximately 100 active healthy community projects, and interest has been growing in Seattle and other US cities. Several Canadian cities, including Vancouver, Toronto, Edmonton, Montreal, and Québec City, have adopted healthy community platforms. Toronto City Council has established a Healthy City Office.

Smoking Disincentives

New York City Council's health committee unanimously passed a bill that would ban cigarette vending machines from apartment buildings, gasoline stations, coin-operated laundromats and restaurants where the sale of alcoholic beverages is incidental. Taverns and many bars would be exempted. As many as 75 percent of the city's estimated 36,000 cigarette machines would be affected (LADN 1990).

"Disassembly" Line

The Dutch municipality of Zutphen (pop. 31,000) has integrated environmental aspects into its social policies through its "disassembly line" (Sloopstraat) project, an apprentice shop for young people. In the "disassembly line" discarded but still serviceable equipment is repaired and sold, usable parts are taken out of equipment and sold, and polluting substances are removed. Mostly washing machines and refrigerators are handled. The work is done by long-term unemployed people who have fallen into arrears socially and economically (Association of Netherlands Municipalities 1990).

Integrated Environmental and Social Policy

At the Southeast Regional Correctional Center in Bridgewater, Massachusetts, an innovative pilot program provides food for the prison and the community while training inmates for future employment. Situated in a prison greenhouse, the program uses an integrated fish culture and hydroponic vegetable production system. Within each 5-by-5 foot 675-gallon fiberglass tank fish swim in the lower portion and lettuce or other plants grow on top. The Bridgewater program, sponsored by the MIT Sea Grant College Program, began in 1987. By 1990 the inmates were managing some 20 tanks and growing a weekly crop per tank of about 100 heads of lettuce, plus a seasonal crop of up to 100 pounds of fish. They were also experimenting with watercress, basil, and flowers. The produce and fish were sold to the...
culinary arts program at the prison, to prison staff, to a regional high school, and to a local health-food store. The inmates are learning valuable skills which they may be able to transfer to careers such as horticulture and aquarium management after release. In 1990 the Massachusetts Horticultural Society presented the program with a gold medal for the best use of horticulture in therapy and a silver medal for best example of education (Zweig 1990; Levi 1991).

Gender Equity Initiatives

"Delagacias da Mulher" in Sao Paulo, Brazil are all-female police stations responsive to the special needs of women victims, while creating new career paths for women at every level (Perlman 1990).

Urban Environment Platforms

In May 1989 over two hundred New York City organizations – from local chapters of prominent national groups to the smallest block associations – agreed upon "Environment '90: A Platform for the Future of New York City." With its 49 recommendations, the Platform addresses parks, gardens and open spaces; air quality; water quality; energy conservation; garbage, sewage and toxic wastes; environmentally sound development; and environmental education for all age levels. Political candidates were asked to state their positions on the recommendations.

Green City Philadelphia, a coalition of more than 60 businesses, government agencies, academic institutions, and community organizations, issued an "Urban Environment Platform" in 1990 which sets out detailed lists of "green" political principles in 13 issue areas, including parks, open space, housing, water, energy, air quality, transportation, environmental health, historic preservation, solid waste, and recycling. The program includes specific consideration of the social environment, and in 1991 received additional support from 70 community organizations, including many in minority neighbourhoods. The coalition secured endorsements from both major party mayoral candidates for the 1991 elections, and organizers developed a short list of 10 cost-effective "green" steps the new mayor can take within 100 days of taking office (Urban Ecologist 1991).

In Victoria in 1990, Voters for a Responsible Community, a non-partisan group, formed to raise voter awareness on a wide range of social, economic and environmental issues. With the support of more than 30 community and environmental organizations, the group distributed a pre-election questionnaire of some 100 questions to candidates throughout the Capital Regional District. Topics ranged from waste management and transportation to public involvement, affordable housing, and global responsibility. In Victoria, 70 percent of the candidates responded, including seven of the nine who were elected to office. At least five – a majority vote on council – indicated they would support a broad range of sustainable community initiatives (Dauncey 1990).

Global Environmental Responsibility

In an effort to save tropical rainforests, local community groups associated with Friends of the Earth have convinced hundreds of city councils in the United Kingdom, West Germany, the Netherlands, and Belgium either to restrict or to ban altogether the use of tropical timber within municipal boundaries (Towns and Development, n.d.).

City-to-City Sustainable Development Partnerships (Twinning)

The city-state of Bremen, Germany has established innovative "sustainable development" partnerships with villages and communities in India and Africa, providing safe water and appropriate energy sources. Bremen has an overall program covering development education, support for liberation movements and the development of alternative energy sources. Within this program Bremen works with NGOs to support the installation of bio-gas plants in India,
Mali and Rwanda. In this way Bremen helps to alleviate the firewood crisis and to restore ecological balance in these countries (SODC 1990).

The Austrian town of Leibnitz has an official link with Pedra Badejo, a little village on a barren island of Cape Verde. Within the city link a dozen projects have been set up, in fields such as carpentry, fishing, sewing, city-planning and restoration. Craftsmen and women from Leibnitz worked side by side with the local population to improve life in Pedra Badejo (Towns and Development, n.d.).

The municipality of Amsterdam detached two civil servants to help and train colleagues in the Dutch capital's sister city of Managua, Nicaragua for two years (Towns and Development, n.d.).

The link between the municipality of Campbell River, British Columbia and the Kenyan village of Kivi (pop. 3,500) was first forged by World Vision Canada, an international relief agency, as a pilot project for young people. Kivi has no electricity or running water. With support from the municipal council, schools, local offices of government agencies, and various community organizations, Campbell River is now sending cows, bicycles, and clothing to Kivi. With help from the Rotary Club of Campbell River and the Federation of Canadian Municipalities "Africa 2000" program, an earthfill dam was completed in July 1991, providing drinking water and irrigation. A photocopier for the regional government and wheelbarrows are next on the list. "Some people ask, 'What's in it for you?' But I think we learn a lot from sharing and our children learn there are many people in the world who need help," said Mayor Mary Ashley (Farrow 1991).
4-J. Investment and Purchasing

The Valdez Principles

The Coalition for Environmentally Responsible Economies (CERES) is a broad coalition of environmental organizations and socially responsible investment groups formed to promote environmental responsibility among businesses and local governments. In September 1989 CERES set forth the Valdez Principles as broad standards for evaluating corporate activities that directly or indirectly affect the biosphere. The Principles were adopted to help investors make informed decisions and in the hope of working with companies to create a voluntary mechanism of self-governance. The Valdez Principles call for elimination or minimization of pollution, sustainable use of natural resources, reduction and safe disposal of waste, energy conservation, environmental risk reduction, marketing of safe products and services, damage compensation, hazard disclosure, selection of environmental directors and managers, and annual environmental audits.

Canadian corporate signatories include McDonald's Restaurants of Canada, Delta Hotels, Air Canada, VanCity Savings, and B.C. Tel. At least 40 local governments are considering environmental investment guidelines based on the Valdez Principles; at least five jurisdictions have already adopted guidelines.

The Environmental Charter for New York City

Introduced by New York City Comptroller Elizabeth Holtzman in conjunction with Earth Day 1990, this is a generic document that can be adapted by other North American local governments (City of New York 1990). The Environmental Charter pledges local governments to develop programs to provide clean water (assure water quality, conserve water, and improve sewage systems); improve air quality (reduce vehicle pollution, incineration, and other emissions); expand recycling and minimize waste; foster sound energy policy; plan for environmentally responsible growth; implement environmentally sound procurement policies; enforce laws and improve oversight capacity; encourage environmentally responsible business practices; maximize citizen education and involvement; and implement the goals of this charter (develop timetables, annual audits, periodic reevaluation, environmental subcabinet of key government agencies, collaboration with colleges and universities, and public involvement in monitoring implementation and compliance).

Statement of Principle on Environmentally Sound Purchasing

In June 1989, the City of Toronto and Metropolitan Toronto Department of Purchasing and Supply hosted a symposium of Canadian purchasing officials on the purchase of reusable and recyclable and reclaimable materials. Toronto City Council's version of the symposium's statement of principles reads (City of Toronto 1989):

That in order to increase the development and awareness of Environmentally Sound Products, all departments, in conjunction with Purchasing and Supply staff, review their contracts and tender specifications for goods and services, to ensure that wherever possible and economical, specifications are amended to provide for expanded use of products and services that contain the maximum level of post-consumer reusable or recyclable waste and/or recyclable content, without significantly affecting the intended use of the product or service, and that it is recognized that cost analysis is required in order to ensure that the products are made available at competitive prices.
Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER)

An Ontario intergovernmental committee called Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER) has been established to address procurement's contribution to solving the waste crisis problem. GIPPER is comprised of representatives from both waste management and purchasing departments of federal, provincial and municipal levels of government and other concerned organizations. GIPPER intends to incorporate environmental considerations into purchasing procedures, with the goal of an overall, national, 50 per cent reduction in waste generation by the year 2000. The focus of the procurement policies will be to:

a) Reduce the quantity of waste produced by government bodies and associated agencies, boards, commissions and affiliated contractors.

b) Provide markets necessary to promote and sustain waste reduction, reuse, recycling and recovery of materials initiatives.

c) Develop a process to facilitate co-operative or joint purchasing among the different levels of government so as to substantially influence and enhance item b) above.

Writing Environmental Practice Into Tender Documents

The West Sussex (U.K.) County Council's documents supplied to contractors invited to tender for the buildings cleaning contract includes these requirements in respect to equipment and materials (ACC 1990):

The contractor shall prepare, mix and use all cleaning materials and use all equipment in a safe manner and to the satisfaction of the authorised office, and shall keep the same when on the council's premises under proper control and safe keeping, and shall ensure that all cleaning materials are properly, accurately and clearly labelled on their containers. The contractor shall use his best endeavours to provide, for the purposes of this contract, materials whose manufacture, use and disposal have the least practicable harmful impact on the environment.
APPENDIX 1: Detailed Descriptions of Sustainable Community Initiatives

4-K. Leadership By Example

Municipal Environmental Offices/Positions

Municipal environmental offices/positions have been created in many jurisdictions. Some Canadian examples: Vancouver has created a Special Office for the Environment. Burnaby, B.C. has an "ecosystem" planner. Calgary has an environmental coordinator. Toronto has created an energy efficiency office. Some US examples: Irvine, California has hired an environmental program administrator. Baltimore's Regional Council of Governments has a director of environmental programs. Portland has an Energy Office, San Francisco has a Bureau of Energy Conservation, and San Jose has an Office of Environmental Management.

Environment First Policy

The City of Waterloo's "Environment First Policy" evolved out of an Environmental Think Tank initiated by the Mayor with the full support of his Council and senior staff. It focuses on creeks and stormwater management, flood plain management, environmentally important areas, urban vegetation, and parks and open space development. In addition to individual strategies, the policy is intended to develop a broad-based, systematic approach to environmental enhancement at the local level. A position of Environmental Coordinator for the city was created as part of the policy (City of Waterloo 1991).

Environmental Protection Office

The City of Toronto has an Environmental Protection Office which provides research and policy development services to City Council, other municipal departments, and external groups and agencies. The office has a professional staff of ten, ranging from information officers to researchers to an industrial hygienist (Davies 1991).

Développement Viable

In Montreal, studies commissioned by the city have recommended the adoption of an approach directed to développement viable, based on the concept of the city as an "eco-socio-system." The city will attempt to incorporate sustainability dimensions into its development plan and implement a comprehensive framework for the evaluation of development and transportation plans against sustainability criteria (Richardson 1990).

Assistant Mayor for the Environment

Bordeaux, France's environmental programs are run by the elected "green" assistant mayor for the environment. The assistant mayor chairs a number of public/private committees that promote, monitor and administer environmental initiatives (PIA 14(11) November 1990).

Green Economic and Social Strategy

Sheffield, U.K.'s Sheffield 2000 Development Strategy includes a "green growth network." Its activities include developing a dialogue between environmentalists and industry within the City and the region to promote joint working and to achieve agreed objectives; identifying and promoting emerging new environmental products and services; investing in environmental research and development; developing an integrated approach to urban policy planning within the City Council; implementing green strategies and promoting best practice within institutions, and developing a city-wide green economic and social strategy (Sheffield City Council n.d.).

195
Overcoming NIMBY

New York City is pioneering a way of overcoming the NIMBY (Not In My Back Yard) syndrome by ensuring that LULUs (locally unwanted land uses) are distributed equitably among resisting neighbourhoods. The planning department will calculate a ratio, comparing each neighbourhood's jail beds, halfway houses, group home rooms, and other existing LULUs to the overall population. Neighbourhoods will not be expected to carry more than their fair share of facilities and affluent neighbourhoods that have previously lobbied successfully in the NIMBY mode will no longer be able to turn away every unwanted facility (PIA 15(1) January 1991).
4-L. Environmental Administration

Environmental Commitments and Legislation

As described in previous sections, several cities have made commitments to reach environmental targets, such as a 10% increase in energy efficiency by 2000 (Portland, OR and San Jose, CA), reducing waste 50% between 1988 and 1998 (Seattle), and reducing emissions of carbon dioxide 20% by 2005 (Toronto and Vancouver).

Community Round Tables on the Environment and the Economy

Round Tables on the Environment and the Economy have been established in several Canadian communities to bring diverse perspectives together to identify common ground and work collectively toward the goal of sustainable development. Local sustainable development Round Tables have been set up in Peterborough, Burlington, Kitchener, Guelph, Muskoka, Skeena, and the Capital Regional District of Victoria, to name just a few. In the Province of Manitoba, the Department of Rural Development offers consulting and financial assistance to Community Round Tables. Each one prepares a "Community Vision Statement," which is "a social, economic and environmental game plan" for community development, using citizen input. The document establishes goals, priorities and an action strategy. Special effort is made to coordinate the Community Vision Statement with other local programs such as capital works, land use plans, business strategies, environmental protection, and Healthy Communities (Foulds 1990; NRTEE n.d.; BCRTEE n.d.).

Environmental Enforcement

The Dutch municipality of Weert (pop. 40,000) has an intensive system of environmental enforcement based on an active licensing policy. The police department is authorized to enforce environmental laws, and the Weert police have taken the initiative to organize a course on environmental affairs.

Another Dutch municipality, Apeldoorn (pop.147,000), has an environmental investigation team to monitor source separation. If the team comes across an offence, their first action is to provide information and try to persuade people. Only later do they use their authority to fine offenders (ANM 1990).

Richmond, California has an environmental police officer. The Los Angeles police department has a hazardous waste squad (PBS 1990).

Council Mission Statement on Sustainable Urban Development

"City Council accepts that change is an on-going phenomenon in cities which must be managed within the parameters imposed by the overriding aim of preserving a lasting habitat for humanity and wildlife. It also recognizes that economic prosperity can provide us with the capability to support wise resource management, to meet social needs and to improve environmental quality. Therefore, City Council supports an approach to managing urban development which balances the right of the individual and the needs of society with the need to conserve our natural resource base and enhance the natural environment, thereby promoting the health of Ottawa's inhabitants and communities" (City of Ottawa 1991).

Sustainable City Strategy

San Jose, California's City Council adopted its Sustainable City Strategy in September 1989. This policy aims to "promote a sustainable future by conserving 10% of the projected energy use in all sectors in the year 2000 so as to enhance the liveability, economic strength and
well-being of the City's residents and businesses and reduce environmental problems, particularly emissions that contribute to global warming."

The Sustainable City Strategy is designed to effect change through education and persuasion, technical and design assistance, financial incentives, municipal operations, and policy and regulation. During Year One (1990-91) essential programs included residential information and education, public school education, and lighting and appliance point of sale programs; technical assistance, solar access, and the city's Innovative Design & Energy Analysis Service (IDEAS); municipal facilities energy management, street maintenance and surface improvements, and traffic signal management programs; housing energy efficiency rehabilitation, urban forestry, transportation demand management, growth management and land-use planning programs (City of San Jose 1991).

Eco-Counselors

More than 500 eco-counsellors are at work throughout Europe (Germany, Switzerland, Austria, Italy, Spain, the UK, France, Luxembourg, and Belgium). The concept of environmental counselling was originally developed in Germany (in 1985) as a means of providing detailed, impartial and practical environmental advice to individuals on an individual or small-group basis (e.g., schools, women's groups, businessmen, householders) on matters ranging from energy conservation to water pollution. The central idea is that the environmental adviser, largely by virtue of his or her personal contact with members of the community in which he or she works, can achieve small-scale but long-term behavioural change which in turn can lead to a large-scale improvement in the environment.

Eco-counsellor training programs and even masters degree programs in environmental counselling are now being offered in Europe. While courses on law and economy, etc. are offered, the central foci are environment and communications. Trainees gain expertise in technical, legal, administrative and economic fields, but most important is their experience in animating discussions, presenting issues clearly and simply, diplomacy, team-work and cooperation with different partners.

While financing is necessary to cover training, salaries and materials, local authorities are increasingly accepting that these costs are low compared with a) the potential job-creation possibilities and improved market standing for those involved in the clean technology and environmentally oriented sectors, and b) the avoided economic and social costs of environmental damage. Estimates from Austria indicate that local eco-counsellors typically produce savings double to their costs through identification of waste reduction measures. Often local authorities are able to co-finance schemes with the assistance of government aid, local businesses or sponsorship (Eco-Conseil 1991; World Congress of Local Governments for a Sustainable Future 1990).

Government-Community Partnerships

The Municipality of Metropolitan Toronto and the City of Toronto are the host community for the International Council for Local Environmental Initiatives (ICLEI). For the first three years, the local governments are providing ICLEI with rent-free office space, seconded research and support staff, and approximately $500,000 in financial support (Municipality of Metropolitan Toronto 1990).

Boston has granted the power of eminent domain to a community group in Roxbury. The Dudley Street Neighborhood Initiative, an advocacy and planning association of residents, social service agencies, businesses, and churches, plans to buy 200 properties and build 500 units of mixed-income housing. The city has committed $1.5 million in low-interest loans to help finance the purchases (Peirce and Steinbach 1990).
4-M. Beyond Municipal and Local Government

National Programs

In France, the Environment Ministry is supporting a nationwide program of municipal plans for the environment. The program engages city administrations in a multi-year action program to improve the urban environment. Specifics include air, water and noise pollution control, waste reduction and recycling, urban green space, civic art and architecture and related measures to better the quality of urban life (PIA 15(4), April 1991).

In Norway, the MIK Program is a direct application of the imperative in the Brundtland Commission report to "think globally - act locally." MIK stands for "Miljovern i Kommuner," equivalent to "environmental work in municipalities." It was initiated during 1988 in 90 of Norway's 443 municipalities and is probably the largest local environmental program ever undertaken in one country. Interest in the programme has been overwhelming.

The objective of this program is to test administrative and organization models which can lead to a strengthening of the environmental efforts in the municipalities. Each Norwegian municipality requests participation in the program. The local public then chooses an environmental consultant who fosters interdepartmental collaboration. To increase public participation, the consultant must also promote the building of community social networks. The end result is to be the production of a communal "environmental and natural resource" program for each municipality. The work is thus designed to invite input from the community and create learning networks with other communities.

The Ministry of Environment has recommended that the municipalities establish an independent environmental committee. This model enables the municipal authorities to create a political body which can concentrate on environmental issues, will have the necessary legal measures and authority and, at the same time, can have an overall view of environmental projects in the municipality.

The experiment involves political as well as administrative reorganization. The delegation of authority to the trial municipalities is an important element in the MIK program. They will get increasing formal authority to take care of local environmental tasks and their own priorities will be central. Later this will be extended to all municipalities in the country. This approach to implement environmental policy at the local level also reflects Norway's national strategy for development towards a sustainable future (Bjork and McLaren 1990; OECD 1990).

In Finland, municipalities have statutory tasks in the field of environmental protection. In each municipality there is a statutory Board of Environmental Protection in charge of the general administration and planning as well as of permit and supervision issues in this sector. Officials with responsibility for environmental protection have been engaged by municipalities during the last ten years and presently there are at least one specialist, often biologist, geologist or geographer, in environmental protection in about 300 of Finland's 461 municipalities.

The Association of Finnish Cities, the Finnish Municipal Association, the Ministry of Environment and a selection of municipalities have launched two projects on municipal contributions to a sustainable future. The project on the consideration of sustainability in
municipal activities has so far determined three major capabilities of a municipality to work for a sustainable society (Jalkanen 1990):

- A municipality should be an arena for politicians and especially for citizens to have open discussion about and to make democratic decisions on the long term objectives for the sustainable future. These objectives must guide all municipal activities and direct the private sector as well.

- A concept of sustainability should be one of the major aspects along with economical and operational ones in the strategic planning and implementation of municipal activities.

- A municipality should introduce the environmental impact assessment (EIA) as an essential part of its activities.

A second project, running from 1989 through 1991, focuses on introducing the EIA into the routine activities of Finnish municipalities to:

- systematically ensure that the essential information of environmental impacts of municipal activities is available for the political decision makers;

- detect the cumulative impacts of various activities taking place within municipal boundaries; and

- provide specialists involved in permit and supervision issues with appropriate environmental information at early stages of decisionmaking.

In 1989 the Netherlands Government presented the National Environmental Policy Plan (NMP), a major step towards an integrated environmental policy. NMP+ in 1990 was a further reaching version. The plan is based on the principle of sustainable development, as defined by WCED. Major elements in this approach are: closing substance cycles from raw material to waste as much as possible; reducing the use of fossil fuels combined with an increased use of renewable energy; and promoting product and production process quality. Typical of this policy is the tendency to take measures at the source, while removing the causes of pollution. The municipal environmental tasks consist partly of implementing national and provincial policy aims, but there is also room for municipalities to develop their own local policy (ANM 1990).

State Programs

Provincial or state legislation can require each town's land use to be compatible with specified regional interests, but leave the actual planning process up to the local community. In the US, such legislation has given new force to urban planning in eight states: Florida, Georgia, Maine, Massachusetts, New Jersey, Oregon, Rhode Island, and Vermont. All cities and counties in these states are required to plan their own development according to stipulated goals, such as energy conservation, protection of open space, and provision of affordable housing. These statewide planning requirements not only enhance regional cooperation, but they also give cities the backing they need to apply a comprehensive, long-term vision to their land use planning (Lowe 1992).

Oregon's statewide planning program was launched with the enactment of legislation in 1973 which calls for all of Oregon's cities and counties to adopt comprehensive plans that meet state standards known as the Statewide Planning Goals. These goals (e.g., to provide
for widespread citizen involvement; to preserve and maintain agricultural lands; to conserve energy) are general standards for land use planning. Planning remains the responsibility of city and county governments, but it must be done in accordance with these statewide standards (Rohse 1987). Oregon's program, which is directed by the Land Conservation and Development Commission (LCDC) and administered by the Department of Land Conservation and Development (DLCD), was named the "Outstanding Land Use Program in the Nation" in 1982 by the American Planning Association. The national Fund for Renewable Energy and the Environment also rated Oregon's planning program as the best in the country in 1988 (Secretary of State 1989).

In conjunction with Goal 12 (Transportation) of the state land use planning program, in 1991 LCDC and DLCD issued the Oregon Transportation Planning Rule to address urban sprawl, traffic congestion, and air pollution through an integrated approach to land-use and transportation planning. The rule requires several innovative policies, including:

- Every city and county must plan for increased use of alternative transportation modes. Land-use plans and local ordinances must make specific provisions for transit and for bicycle and foot travel.

- The state's four largest urban areas must plan to reduce per capita vehicle miles traveled (VMT) by 10 percent over the next 20 years and by 30 percent over 30 years.

- The Portland metropolitan region must reconsider land-use designations, densities, and design standards (i.e., more compact development) as a means of reducing travel demand and meeting transportation needs.

The new rules will be phased in over a five year period (APA 1992; NGMLP 1991).

Regional Cooperation

Legislation has successfully foiled fiscal zoning in the state of Minnesota since 1971. All of the municipalities in the Minneapolis-St. Paul region are required to pool a portion of their commercial and industrial tax base – thus reducing the competition between them for commercial and industrial development. Forty percent of the increases in business tax proceeds are pooled and then distributed throughout the metropolitan region according to each community’s population and overall tax base. This tax-base sharing system has not only reduced the usual incentives to court the most lucrative land uses throughout the region, but has also narrowed the gap between the per-capita tax-base of the richest and poorest communities from a ratio of roughly 13:1 to a more equitable 4:1 (Lowe 1991).

Municipal Foreign Policy

Many Canadian and US municipalities have taken municipal foreign policy initiatives such as establishing sister-city programs. Los Angeles, Pittsburgh and Baltimore each passed "Jobs with Peace" ordinances requiring their staffs to prepare and publish annual reports on the local economic impacts of military spending. New York City has lobbyists in Washington, D.C. and at the United Nations. Seattle and Dallas have funded Offices of International Affairs to oversee trade, sister cities, and tourism. Over the last decade more than 100 cities have refused to invest or enter contracts with firms doing business in South Africa (Global Communities 1992).
4-A. Transportation Planning and Traffic Management

Environmental Impacts of Transportation

The environmental impact of transport can be separated into four main components (ACC 1990):

- Vehicle manufacture: Impact on the environment of resource extraction, and the pollutants generated both at time of manufacture and disposal.
- Infrastructure effects: Congestion, visual intrusion, severance and consumption of resources, particularly land.
- Vehicular effects: The contributions of different types of vehicles to air, water, noise or visual pollution; their contribution to global warming; general health risks; safety to the user and non-user; the efficiency with which they use resources.
- Traffic volume effects: Congestion may not only increase vehicular effects proportionately, but also increase the effects further as vehicle efficiency diminishes. Providing new infrastructure to accommodate increased traffic is likely to generate further infrastructure effects. Sometimes the best solution may lie elsewhere.

Transport Infrastructure Policies

A study of 32 major world cities, funded by the Australian Government, shows that there are very clear relationships between transport and urban form. Economic factors such as income and gasoline prices are less important than the direct policy instruments of transportation planners and urban planners, such as the relative provision of infrastructure for automobiles and rapid transit, or the density of population and jobs. The data suggest that city transport patterns would become more sustainable if the set of policies excerpted below were adopted (Newman and Kenworthy 1991):

- A policy to restrict the amount of road supply within a city to something around 2 m to 3 m per capita. This would essentially mean curtailing new road projects that pass through the city. It would also depend on urban form policies (see Land Use section). In particular, since roughly three quarters of city road mileage is comprised of minor and local
streets, this would imply a move away from the single family house with a typical wide street frontage in favour of innovative family housing which shares road access more intensively and needs less roads because of its public transport, walking, and bicycling orientation.

- A policy to restrict central city parking to a level around 200 spaces or less per 1000 CBD workers. This would require a concurrent policy that provides good public transport access and a series of central city policies on housing, cultural attractions, urban design, pedestrianization and commercial activity that allows a central city to compete strongly with suburban centres where easy parking is available.

- A policy accepting that average speeds in a city of around 30 km/h are adequate. This means rejecting the notion that fuel is saved by increasing average speeds.

- A policy that provides a rapid transit option (most likely to be rail) which is substantially faster than the average traffic speed in the city and together with other improvements slowly builds up public transport in stages so that it provides something more like 20 to 30% of total passenger km. This would be a considerable change for many cities where the present situation has public transport at less than 10% and in some cities less than 1%.

- A policy that encourages pedestrianization, traffic-calming treatment of streets and bicycle facilities so that the proportion of work journeys by bicycling and walking rises to something more like 20% rather than its present 5%. Like the others, this policy is not really contentious, but is unlikely to be successful unless wedded to appropriate urban form policies (see Land Use section).

Road Pricing Strategies

There is growing interest in road pricing strategies to check the trend in increased automobile use and its adverse environmental effects, especially in inner city areas. The Singapore "Area Licensing Scheme," a form of road pricing instituted in 1975, demonstrated that such schemes can be used successfully for reducing peak hour traffic volumes, reducing single-occupant vehicle traffic, and encouraging buses and car pools.

More recently, several politically feasible policy measures were analyzed for Stockholm. Of considerable interest was an Area Licensing Scheme combined with different public transport subsidy levels. Four different policies were evaluated in this context:

1. A decrease in the public transport fare by 50 per cent;
2. An area licensing scheme around the inner city of Stockholm;
3. An area licensing scheme combined with a public transport fare reduction of 50 per cent;
4. An area licensing scheme combined with a public transport fare increase of 50 per cent.

The area licensing scheme would totally surround the inner city of Stockholm, with approximately 30 checkpoints on the cordon line. Because of the geographical location of Stockholm County, the inner city and the road transport network, through traffic would be exempt from toll payment on certain routes. A toll fee of 25 SK (app. Canadian $4.65) per passenger car per round trip was adopted for analysis, the fee level being based on the achievement of environmental goals.
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

Each of the transport policy measures was evaluated according to the following criteria:

1. The achievement of the national environmental goal of reduction of NOx emissions by 30 per cent by 1995;

2. Forecasts of NOx and CO emissions from car traffic in Stockholm County and the inner city area and a partial estimate of the environmental costs of car emission based on NOx and CO emission;

3. Changes in the travel pattern by car and public transport in Stockholm County and the inner city;

4. Changes in the amount of vehicle kilometres travelled in Stockholm County and in the inner city;

5. Changes in the estimates of travel time by car and public transport and the average speed on the road network;

6. Estimation of public transport revenue and toll revenue.

The analysis of the policy options against the above criteria concluded that two policy measures satisfy the achievement of the national environmental goal. First, an area licensing scheme combined with a public transport fare reduction of 50 per cent adequately achieves the 30 per cent reduction; and second, an area licensing scheme with no change in the public transport fare almost meets this goal. An area licensing scheme combined with a public transport fare reduction of 50 per cent ranked highest in all the other criteria except for that of combined revenues generated from public transport and tolls but it generates enough revenue to finance the public transport network. An area licensing scheme with no change in the public transport fare produces substantially more revenue and if these revenues were allocated to finance the public transport network (as well as the road network), public transport ridership would further increase as the result of the increase in the level of service of public transport (OECD 1990; Pendakur 1986).

New Approaches to Transportation Analysis

Inefficient transportation and land use patterns brought about by excessive hidden subsidies and the failure of market price signals inevitably translate into reduced economic competitiveness. Governments at every level are in fiscal crisis and mostly unable to adequately maintain and expand transportation infrastructure to keep pace with traffic growth...

Conventional transportation analysis often disregards the potent effects of urban design changes on transportation demand and the impact of transportation investments and policy on land use patterns... Estimates of trip generation, distribution, and choice are often based on look-up engineering formulas that have been determined from the existing automobile-dependent environment...

Recent advances in geographic information systems (GIS) make possible new approaches to deal with small scale pattern and urban design factors that influence travel behavior, such as the quality of the pedestrian and cycling environment, the accessibility of jobs and housing to transit stops, TDM incentives, parking supply and cost, and the micro-scale pattern and mix of land uses (Replogle 1991).
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

Trip Reduction Bylaws

Trip reduction bylaws (TRBs) are designed to reduce single-occupant vehicle trips. This is a summary of a model TRB being developed in Vancouver, B.C.

Applicable To: All employers of 25 or more employees, all employers in non-exempt designated commercial districts, commercial buildings of 25,000 gross square feet or more, and any multi-tenant building or group of buildings on one site with 100 or more employees.

Objectives: To reduce peak hour trips and increase the number of people to vehicles from 1.3 to 1.75.

Requirements: Employers and contractors are required to implement a trip reduction program, including appointment of a transportation coordinator and any reasonable combination of commute alternative programs designed to achieve the required target.

The City is required to monitor and report annually on the success of the trip reduction programs, by administration and analysis of employee surveys. The City is also required to support trip reduction activities by gathering and disseminating material and providing car pool and van pool matching services.

Enforcement: Failure to comply would enable the City to impose an effective trip reduction program or fine. Fines are to be kept in a Trip Reduction Fund for improvement of public transit and for education programs on commute alternatives (City of Vancouver 1990).
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

4-B. Land Use and Growth Management

Comparing Three Urban Structure Concepts

A 1990 study of urban structure concepts for the Greater Toronto Area (GTA) detailed three different ways to manage population growth over the next 30 years. The urbanized area of the GTA totalled 1,500 square kilometres (590 square miles) in 1986. Based on the three urban structures, that area could grow to between 1,890 square kilometres (730 square miles) and 2,400 square kilometres (940 square miles) in the next 30 years.

The study estimates that the cost of this growth would be approximately the same for each of the three concepts, about $79 billion, or approximately $23 billion more than would be spent on urban services in that period if there were no population growth. The three urban concepts were called Spread, Central and Nodal.

The Spread model assumes that existing trends would continue and growth would occur largely in the suburban regions, resulting in an urbanized area of some 2,400 square kilometres (940 square miles) by 2021. This concept would be characterized by the lowest cost of acquiring parks and open spaces; ready availability of serviced land, with lower risks of sudden price increases; a more extensive road system, but increased traffic; and greater duplication of social services and facilities.

The Central concept would concentrate a great deal of growth in the central, built-up areas. It would result in an area of 1,890 square kilometres (730 square miles) and the least encroachment on greenlands; a more efficient and effective transit system; the lowest levels of air pollution and energy consumption from vehicle use; the greatest opportunity to reduce pollution of rivers and lakes through upgrading of existing storm sewers; and better use of existing health and education facilities.

The Nodal concept would have approximately the same number of residents living outside Metropolitan Toronto in the suburban regions as in the Spread concept, but they would be grouped in compact communities, or nodes. This would result in an area of approximately 2,124 square kilometres (820 square miles) in size. This concept would lead to greater preservation of green space than the Spread concept but less than the Central concept; a wider range of community sizes, housing types, densities, and population/employment patterns; expanded crosstown rapid transit; and potential integrating of social services on a community basis.

The study found that the Spread concept is the least compatible with sustainable development in that it would consume the greatest amount of rural land and related agricultural productivity and natural resources, would use the most energy and produce the most air pollution because of its higher travel effort and greater reliance on automobiles, and would provide less opportunity to enhance storm-water quality and dispose of toxic soils in central, built-up areas than would be the case for the other concepts. While the Spread concept is the least risky in terms of change from the status quo, it carries the highest long-term risk since it would place greater negative pressures on the environment and on natural resources including energy sources and agricultural land.

The Central concept would provide the greatest likelihood of achieving sustainable development by making the most efficient use of resources (e.g., land, energy) and placing the least negative load on the environment. However, it would require the greatest change form the status quo in terms of population densities and housing types, automotive travel and transit, and growth management policies/programs, and would require the greatest amount of government regulation in order to divert population growth from suburban areas to central, built-up areas.
The *Nodal* concept would be between the other two concepts in terms of its compatibility with sustainable development and the required level of government regulation. It would appear to provide the greatest range of choice in terms of population densities and housing types, community size and character, suburban and downtown living styles, available range of transportation modes, and integrated delivery of human services, while reducing per capita resource requirements and pollution levels relative to the *Spread* concept.

Because the study found that capital costs for the three concepts would be roughly the same, the authors concluded that the choices facing people and governments depend not so much on cost as on other factors such as environmental and economic considerations, lifestyle preferences, and the quality of community and individual life (IBI Group 1990; RCFTW 1990).

**Urban Form Policies**

As described in the Transportation section, an Australian study of 32 major world cities shows that there are very clear relationships between transport and urban form. The data suggest that the primary urban form policy theme for sustainability should be *reurbanization* – increasing the intensity of activity within present urban boundaries and "hardening" the urban fringe – emphasized mainly in Europe but with even greater application to North American and Australian cities, as detailed in the following set of policies (Newman and Kenworthy 1991):

- **A policy to increase by stages the intensity of urban activity overall so that population densities of around 30 per ha to 40 per ha and job densities of around 20 per ha are obtained.** This will mean an immediate policy of restricting or at least slowing urban development at the urban fringe and concentrating on redevelopment; this consolidation generally has the added benefit of considerable capital savings due to better use of present urban infrastructure rather than requiring new infrastructure at the fringes.

- **A policy to build up the central city activity intensity so that job densities are maintained at more than 300 per ha and population densities are built up to over 50 to 60 per ha.** The provision of housing in central city areas seems to be harder than providing for jobs, though some outstanding successes have been achieved in recent years in Boston, Toronto, and San Francisco.

- **A policy to build up or maintain the inner area at population densities of 40 to 50 per ha and job densities of similar levels.** Most older cities have inner cities with these densities, although in many cases, particularly in the US, these have been declining in recent decades. Policies to contain inner city decline appear to have been relatively successful in Sydney, Melbourne and Toronto. In newer automobile-dependent cities like Houston, Denver, Brisbane, Adelaide and Perth there is enormous development potential in their inner areas.

- **A policy to build up outer area urban activity to population densities of around 20 to 30 per ha and job densities of around 15 per ha.** The way that this is most likely to be effective in transport and land use terms is (a) to slowly expand the present inner area type of development (i.e., mixed and more intensive) into the outer area, and (b) build up densities around rapid transit routes. For low density cities like Brisbane and Adelaide with present rail systems, and in cities like Los Angeles and Perth which are building new
lines, this policy would appear to be of primary importance. Washington and Toronto are good examples where this policy has made major changes in transport and urban form in less than a decade.

The time scale for such changes could possibly be gauged from cities like Detroit and Los Angeles which over a 30 to 40 year period were transformed from being compact rail-oriented cities to dispersed automobile-oriented cities.

**Jobs/Housing Balance**

The job/housing (J/H) balance is a useful developer's tool, although no rule of thumb or actual values are available. Basically, when jobs and housing are not in balance, transportation problems are the likely result. Land-use planners can look at the range of incomes and housing costs to determine how far people have to move away from their jobs to find housing they can afford. The farther they must move, the more congestion, energy use, and air-quality problems an area will have (Gordon 1991).

**Growth Management**

Growth management simply means *planning for the future*. Fundamentally, all growth management systems involve the control of one or more of the familiar components of land use planning: the rate, location, type, density, amount and quality of development. Unlike traditional subdivision and zoning, which are two-dimensional (controlling the use of land and the density of permissible development), growth management adds and emphasizes a third dimension – timing. Managing growth does not mean stopping change or closing the doors to new residents. Properly designed and implemented, a comprehensive growth management system provides a framework that enables local governments to balance and accommodate diverse and competing interests while ensuring the quality of life expected by their citizens (Stone and Freilich 1991).

**Zoning Tools**

Zoning can encourage development that supports alternative transportation. A few of the many zoning tools available to land-use and transportation planners include:

- planned unit development – gives developers incentives to meet pre-determined land-use goals
- floating zoning – permits special uses within a jurisdiction in accordance with development criteria
- bonus or incentive zoning – provides developers with bonuses and incentives to achieve increased development density
- mixed-use zoning – requires a wide array of types of development aimed at reducing distances between houses and jobs
- land banking – outright purchase of land by the public sector well in advance of any development to ensure appropriate land use
- transit zoning districts – targeted development in areas with transit systems already in place (Gordon 1991).
The Pedestrian Pocket

The Pedestrian Pocket is defined as a balanced, mixed-use area within a quarter-mile or a five-minute walking radius of a transit station. The functions within this 50 to 100-acre zone include housing, offices, retail, day care, recreation, and parks. Up to two thousand units of housing and one million square feet of office space can be located within three blocks of the transit station using typical residential densities and four-storey office configurations (Calthorpe 1989).

Transit-Oriented Developments

Transit-Oriented Developments (TODs) are mixed-use neighborhoods, between 20 and 160 acres in size, which are developed around a transit stop and core commercial area. The entire TOD site must be within an average one-fourth mile walking distance of a transit stop.

TODs offer different types of growth for different conditions. "Urban TODs" are located at light rail stops or bus transfer stations with an orientation to commercial and job development. "Neighborhood TODs" are located on feeder bus lines within 10 minutes travel time from light rail stops or bus transfer stations with an orientation to housing, retail and services. "Secondary Areas" of lower density housing, schools, community parks, and commercial and employment uses surround TODs within biking distance (one mile) of the transit stop.

The TOD concept may be applied in four types of settings: Infill Areas on vacant parcels surrounded by urban development; Revitalization Areas in urbanized areas where the quality of development is significantly deterioriated or the land is underutilized; Reuse Areas for underutilized retail, office or industrial sites; and Urban Growth Areas in essentially undeveloped areas on the periphery of the developed portions of the county (Calthorpe Associates 1990).

Traditional Neighborhood Development Ordinance

General dissatisfaction with existing urban patterns motivated a group of architects and developers to draw on the lessons of the resort community of Seaside, Florida - designed by "neotraditional town planning" proponents Andres Duany and Elizabeth Plater-Zyberk - to devise a general system that could be applied to other towns and developments.

An illustrated chart called Traditional Neighborhood Development Ordinance (TND) lays out very simple guidelines for site and building design. These include the close proximity of houses and work places, well-defined public spaces, a variety of streets, and strategically placed civic buildings. The ordinance categorizes these features on a chart according to the needs of different types of buildings – for example, what percentage of public land shall be used for governmental versus retail or general use, how streets are to be arranged in residential areas, and so on.

The aim of the TND is to foster independence from cars by keeping the neighborhood's needs within walking distance. Moreover, by organizing neighborhoods in ways proven to be effective in older North American towns, desirable social objectives automatically fall into place. As the ordinance states, "By walking instead of driving, citizens come to know each other and the bonds of an authentic community are established" (Taylor 1990).

With increasing attention and publicity, the "neotraditionalists" have also earned their share of criticism. For example, Seaside does not employ ecological design techniques (e.g., passive solar) and infrastructure (e.g., provisions for reducing water consumption, such as recycling grey water systems or open rainwater drainage swales) (Okamoto 1991). Seaside's
design may reduce traffic congestion but does not reduce automobile dependence; the TND does not in itself create proximity or even balance between jobs and housing (MacBurnie 1991). The TND is more suitable for a project under single ownership than for a typical community trying to work with several developers (Knack 1991). And although TNDs may be "designed" to encourage a mix of housing types and a diversity of income levels, they offer no mechanism to ensure any stock—never mind an adequate, permanent stock—of affordable housing. Even Duany admits that Seaside has in practice become a "resort community" for the wealthy (Duany 1991).

Transfer of Development Rights (TDR)

The right to develop a piece of land as allowed by zoning and land use controls is one of the rights that comes with property ownership under the "bundle of rights" theory. The ability to sever this right from one piece of property and transfer it to another piece of land is the central element in a transfer of development rights (TDR) program. This approach allows landowners to get development value from their land even if they chose not to develop it. All TDR programs include a sending zone, from which development rights can be severed, and a receiving zone, which can accept development rights and therefore can be developed more densely. TDR programs preserve or protect something in the sending zone, such as farmland, forest land, environmentally sensitive areas, open space, historic buildings, or landmarks; they can also steer development to areas best able to handle it.

At least fifty TDR programs have been established in the U.S. County programs include Montgomery County, Maryland; Collier County, Florida; and San Bernardino County, California. Municipal programs include New York City; Seattle; San Francisco; and Groton, Massachusetts (Heyerdahl 1991).

Conservation Land Trusts

Land trusts are local, regional, or statewide organizations directly involved in protecting important land resources for the public benefit. Land trusts are not "trusts" in the legal sense, but rather private, non-profit, tax-exempt organizations, funded largely through membership dues and donations from individuals, businesses, and foundations. Many refer to themselves as conservancies, foundations, or associations. Some are small and are run solely by volunteers, while others manage thousands of acres and have large, professional staffs.

Land trusts protect land permanently and directly. They accept donations of properties, buy land, or help landowners establish legal restrictions that limit harmful use and development. They protect land that has natural, recreational, scenic, historic, or productive value, depending on the needs of the community or region. Some preserve many different types of land, while others focus on a particular area or resource.

Land trusts are usually not adversarial, but work cooperatively with landowners and government agencies. Some own and manage nature preserves, recreation areas, or historic sites. Others monitor the development restrictions they have helped establish, but own no land at all. Some work in partnership with government conservation agencies, acquiring critical land that they later convey to the agencies.

As private organizations, land trusts offer quick response, flexibility, and confidentiality. They may be effective where government action falls short. Land trusts also provide a cost-effective approach to conservation. They often protect land at a cost far below its market value.

Nearly 900 land trusts in the US have protected over 2 million acres of farms, wetlands, wildlife habitat, urban gardens and parks, forests, ranches, watersheds, coastlines, river corridors, and trails. New land trusts are forming at the rate of one per week. About half are operated exclusively by volunteers with operating budgets of less than $10,000 (Land Trust Alliance, n.d.; Abberger 1991).
4-C. Atmospheric Change and Air Quality

Total Emissions Model for Integrated Systems (TEMIS)

The Total Emissions Model for Integrated Systems (TEMIS Model) is a tool for assessing local CO₂ sources and likely impacts of CO₂ reduction options. The TEMIS model estimates emissions of relevant gases based upon energy use. It is an "integrated systems" model in that total energy impacts of an action are assessed. For example, in considering the energy impact of recycling aluminum versus reusing glass bottles, the TEMIS model would estimate energy use – and resultant emissions – from extraction of raw materials to transporting cans or bottles to smelters or processing plants for recycling. The TEMIS Model is presently being further developed by the U.S. Department of Energy for use in national energy policy development in the United States. The Öko-Institut in Darmstadt, Germany – author of the model – has agreed to provide access to the model for simulations of proposed CO₂ reduction strategies throughout Phase I of the International Council for Local Environmental Initiatives (ICLEI) Urban CO₂ Project (ICLEI 1990).
4-D. Energy Conservation and Efficiency

Least Cost Utility Planning

Least Cost Utility Planning (LCUP) has been implemented in a number of cities in the US. LCUP for electricity supplies is a concept that allows the consideration of investments for energy conservation and demand management on an equal footing with investments for new generating capacity. It formally treats energy conservation as an alternative energy source (what Amory Lovins calls "negawatts" rather than "megawatts"), and will support assessments of non-conventional decentralized smaller generators to substitute for large central generating plants. Applications of this concept require close co-ordination among utility regulators, individual utilities and local governments. To ensure effectiveness, LCUP programs commonly combine technical support and financial incentives for energy efficiency improvements that are targeted to residential, commercial and industrial consumers.

Movements to implement principles of least cost planning are in process in the majority of US state utility regulatory commissions. Although there is wide recognition of the potential benefits of LCUP, for the vast majority of US electric utilities, conservation is not a "profit making" endeavour. Major efforts to define utility incentives for LCUP and to address questions of stability, reliability and equity are currently in progress (OECD 1990).

District Heating and Cogeneration

District heating pipes hot water or steam generated at a central facility to each building in a neighborhood or community. The source is often a business (e.g., hospital, university, hotel, or factory) that has its own cogenerating system. Cogeneration systems make electricity and steam together with one-third less fuel than is needed to produce each on its own; they are also well-suited to sophisticated pollution control equipment. District heating requires a certain level of density to be effective. For example, in the UK, 44 dwellings per hectare is considered the minimum density for economical operation (Lowe 1991).

Solar Access Ordinances

Many local governments have adopted and implemented solar access ordinances. The ordinances provide and protect solar access to the south face of buildings during solar heating hours, taking into account latitude, topography, microclimate, existing development, existing vegetation and planned uses and densities. Solar access ordinances may include, but are not limited to, standards for:

(a) The orientation of new streets, lots and parcels;
(b) The placement, height, bulk and orientation of new buildings;
(c) The type and placement of new trees on public street rights of way and other public property; and
(d) Planned uses and densities to conserve energy, facilitate the use of solar energy, or both (Oregon Revised Statutes 1989).

Comprehensive Energy Plans

Some municipal comprehensive plans are required to include an energy plan. In the state of Vermont, the energy plan must include an analysis of energy resources, needs, scarcities, costs and problems within the municipality; a statement of policy on the conservation of energy, including programs, such as thermal integrity standards for buildings, to implement that
policy; a statement of policy on the development of renewable energy resources; and a statement of policy on patterns and densities of land use likely to result in conservation of energy (Vermont Statutes Annotated 1989).

Solar Reflection

Cities can counteract the heat island effect by mixing asphalt with light-colored sand, which reflects heat instead of retaining it, and by encouraging the use of lighter-colored paints and building materials. In temperate climates, the gains from lighter surfaces in summer are significantly greater than any corresponding losses in winter, because the amount of solar radiation in winter is much smaller. The US National Academy of Sciences has estimated that strategic use of white surfaces and vegetation could save $2.6 billion in energy costs (Lowe 1991).
4-E. Waste Reduction and Recycling

Designing for Total Recycling (Knapp 1990)

- "Waste" is not waste until it's wasted.
- Recyclers handle discards, not wastes. Recyclers sometimes waste things, but their ultimate goal is to waste nothing.
- Recycling manages the supply of discards, not wastes. The term "waste management" should be reserved for the garbage disposal industry.
- Recycling is a form of disposal.
- Gaining access to the disposal fee is the key to unlocking recycling's potential.
- All of what is now garbage can be sorted into twelve broad categories of recyclable material (see below).
- To plan a discard management system in which recycling is the preferred disposal technology, begin with a composition study to establish the proportion and volume of each of the twelve master categories.
- Each locality should do composition studies, and results should be made public and shared. Observational studies that sort and weigh are preferable to "desktop studies" that import data from other localities or use esoteric methodologies.
- A comprehensive recycling system is one in which there are opportunities to recycle all twelve of the master discard categories. Recycling systems should not be called comprehensive until all twelve of the master categories are provided for.
- The twelve master categories provide a way to estimate progress toward the goal of total recycling.
- We will move toward total recycling in incremental steps, not all at once.
- Banning and precycling (source reduction) are valid and useful tools for achieving the goal of total recycling.

The Twelve Master Categories for Recycling

1. Reusable goods, including but not limited to intact or repairable home or industrial appliances; household goods; clothing; intact materials in demolition debris, such as lumber; building materials such as doors, windows, cabinets, and sinks; business supplies and equipment; lighting fixtures; and any manufactured item or naturally occurring object that can be repaired or used again as is.

2. Paper, including but not limited to newsprint; ledger paper; computer paper; corrugated cardboard; and mixed paper.

3. Metals, both ferrous and nonferrous; including but not limited to cans; parts from abandoned vehicles; plumbing; fences; metal doors and screens; and any other discarded metal objects.

4. Glass, including but not limited to glass containers and window glass.
5. **Textiles**, including but not limited to nonreusable clothing; upholstery; and pieces of fabric.

6. **Plastics**, including beverage containers; plastic packaging; plastic cases of consumer goods such as telephones or electronic equipment; and tires.

7. **Plant debris**, including but not limited to leaves and cuttings; trimmings from trees; shrubs; and grass.

8. **Putrescibles**, including garbage; animal, fruit, and vegetable debris; and offal.

9. **Wood**, including but not limited to nonreusable lumber; and pallets.

10. **Ceramics**, including rock; ceramic; brick; and concrete.

11. **Soils**, including but not limited to excavation soils from barren or developed land; and excess soils from yards.

12. **Chemicals**.

13. (**Garbage** – this category is reserved for unrecyclable mixtures of recyclable materials.)

**Pollution Prevention**

In the US, state governments have led the transition to pollution prevention. Several state have passed laws which rest on a simple argument: the use of every toxic chemical should be reduced or eliminated. These new laws bypass debates over acceptable levels of toxicity and the risks of specific exposure levels or releases; they neither require risk assessments nor establish thresholds for chemical exposure. Instead, they set up reporting and planning responsibilities for firms that handle specified toxic substances. Many of the laws set a statewide goal for stemming the use of toxic chemicals or the amount of hazardous wastes generated, but they leave it up to firms to design their own "facility plans" for how to meet the goals. In other words, the plans give firms the responsibility to reduce the use of toxics.

These laws stretch the boundaries of pollution prevention in several significant ways. First, they focus on chemicals in use rather than on wastes. Second, firms must set goals and make plans, not just comply with an emissions limit. This emphasizes creativity and innovative technology. Third, the laws encourage continuous improvement, not simply reaching a regulatory threshold.

Toxics use reduction foreshadows the idea of sustainable industry by focusing on materials policy as much as on environmental or waste policy. The "precautionary principle" contrasts with policies that simply seek to keep risks to a supposedly manageable level. Precaution shifts the burden of proving safety from those who would protect the environment to those who would release chemicals into it. And like toxics use reduction, it bases decisions about releases on available options, not on the environment's assimilative capacity. The new adage is "When in doubt, don't throw it out" (Geiser 1991).
Toxics use reduction

There is only one effective way to prevent toxic contamination: by reducing the use of hazardous substances and the generation of hazardous wastes at the source of production. This can be accomplished through strategies such as:

- Shifting to a product where the manufacturing process requires less production of hazardous waste
- Substituting a less hazardous substance as part of the production process
- Conserving the use of hazardous substances by using more efficient housekeeping practices
- Designing new processes and equipment that result in less waste production
- Recycling hazardous waste, preferably at the site where it is produced

Three basic strategies are available to local governments to help industries reduce the amount of hazardous waste they produce: educational programs, technical assistance programs, and regulatory programs (Local Government Commission 1990).
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

4-F. Water and Sewage

Some Sewage Definitions (Marinelli 1990)

Sewage – The slurry that travels through municipal sewer pipes and includes mostly water from toilets, sinks, washing machines and dishwashers, but also human excreta, detergents, cleaners, decloggers, tampons, condoms, other miscellaneous items, and industrial wastes.

Septage – The truly disgusting stuff pumped out of septic tanks by "honey wagons." Often includes restaurant greases, toxic industrial byproducts, and hospital wastes.

Sludge – The thick slurry of "solids" removed from sewage at treatment plants.

Biological Oxygen Demand (BOD) – The dissolved oxygen needed to decompose organic matter in water. BOD is used as a measure of pollution, since heavy waste loads need lots of oxygen to be broken down.

Nitrogen – A nutrient most commonly found in sewage in the form of ammonia and nitrates. Too much nitrogen in waterways causes algae blooms, and ammonia is toxic to fish.

Phosphorous – A nutrient most commonly found in sewage in the form of phosphates from detergents. A primary cause of algae blooms in waterways.

Suspended Solids – Tiny pieces of pollutants floating on or suspended in sewage.

Preliminary Treatment – The first thing that happens at any treatment plant: large objects (tampons and condoms) and "floatables" (plastic tampon applicators) are screened out and grit is removed.

Primary Treatment – The first stage of sewage treatment. The wastewater is held in settling tanks or basins so that roughly one-third of the biological oxygen demand and two-thirds of the suspended solids are removed.

Secondary Treatment – The second stage of sewage treatment, in which bacteria are used to treat the wastes. Removes about 90 percent of the biological oxygen demand and the suspended solids.

Tertiary Treatment – Advanced cleaning of wastewater that goes beyond the secondary stage and removes nutrients such as nitrogen and phosphorous and most suspended solids.

Wetlands – The trendy term for what used to be known as marshes, swamps, and bogs.

Land applications of municipal waste water

A significant amount of research has been done over the past twenty years which has shown that forests can be used as land treatment systems to renovate secondary treated waste water for direct recharge to the groundwater table... A land application of municipal waste water provides many advantages to a community beset with waste water disposal problems... It provides an opportunity for water pollution abatement. It provides an opportunity for the recycling and beneficial use of the nutrients contained in the waste water. It allows for the replenishment of local groundwater supplies and for the preservation of open space or open greenbelts (Sopper 1990).
### Comparing Sewage Treatment Technologies (Marinelli 1990)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>ADVANTAGES</th>
<th>LIMITATIONS</th>
<th>BEST FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Sewage Treatment</td>
<td>Old technology, so engineers know exactly what to expect; doesn't require a lot of land</td>
<td>Expensive; cranky; &quot;shock loadings&quot; or sudden inflows of toxics (usually from industry) often upset the bacterial balance, sending barely treated sewage into the local waterway; energy intensive; advanced wastewater treatment often involves the use of toxic chemicals; hard to site (would you want a sewage plant next door?); sludge disposal is a major headache.</td>
<td>Big cities</td>
</tr>
<tr>
<td>Man-Made Marshes (with open water)</td>
<td>Cheap; no sludge; good removal of nitrogen, toxic chemicals, and trace organics; can survive toxic overload better than conventional treatment; can be used for secondary or advanced treatment without chemicals or a lot of energy; wastewater can be used to restore wetlands habitat; nice to look at.</td>
<td>Require lots of land; plants may have to be harvested occasionally.</td>
<td>Small communities with a lot of land.</td>
</tr>
<tr>
<td>Man-Made &quot;Rock Marshes&quot; (submerged flow systems)</td>
<td>Efficient; can include showy ornamental plants; routine harvesting of plants unnecessary.</td>
<td>Rocks can be expensive; not as extensively tested as open-water marshes.</td>
<td>Small communities with extra land.</td>
</tr>
<tr>
<td>Solar Aquatics</td>
<td>Virtually purifies water; effective in cold climates; creates substantially less sludge than conventional treatment; can treat extremely concentrated wastes such as septage; may cost significantly less than conventional treatment; sewage is treated as a resource, not as a waste; produces potentially valuable plants and fish; nice to look at; requires less land than marshes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leading-edge technology not as extensively tested as the other systems; requires a different kind of expertise to operate; the greenhouse is an added cost and must be heated in winter.</td>
<td>Communities that have to meet stringent water-quality requirements; communities that have a septage problem; could prove to be a natural alternative for land-short cities.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4-G. Greening the City

Integrated Pest Management

In response to these severe problems with pesticides, integrated pest management concepts have been developed. Put very simply, integrated pest management is the use of all available tools and methods to suppress, but not to control, insect populations and keep damage to acceptable levels using the safest, most effective and most economical means. That is rather a tall order, and it requires thought about all the kinds of controls that can be used. There is no one magic chemical or one magic bullet, or one magic predator, or one magic technique. We have to think about using many techniques together (Gilkeson 1990).

Planting Trees to Save Money and Energy

A recent study examines the use of vegetation and high albedo materials in Toronto, Montreal, Edmonton, and Vancouver to modify the urban microclimate, thus saving on residential energy for heating and cooling. It shows that simply planting trees can produce significant savings of money and energy. The annual household savings range, depending on the structure, from $30 to $180 in urban areas and from $60 to $400 in rural zones (Akbari and Taha 1991).

Conservation Commissions

Many local governments establish a conservation commission to protect the natural resources and the watershed of their community. In the state of New Hampshire, conservation commissions may receive gifts of money and property, both real and personal, in the name of the city or town. They may also "acquire in the name of the town or city by gift, purchase, grant, bequest, devise, lease or otherwise the fee in such land or water rights, or any lesser interest, development right, easement, covenant, or other contractual right including conveyances with conditions, limitations or reversions, as may be necessary to acquire, maintain, improve, protect, limit the future use of or otherwise conserve and properly utilize open spaces and other land and water areas within their city or town, and shall manage and control the same," although they do not have the right to condemn property for these purposes (New Hampshire Title III).
Sustainability as Public Policy

The sooner we embrace the principles of sustainability as an essential goal of public policy, the less traumatic the transition will be. An early decision to alter or abandon environmentally destructive practices is likely to cause fewer economic problems or job losses than a reactive policy. Although the short-term costs of redesigning products and production technologies can be high, delaying a response until it is dictated by sheer ecological necessity would be even more costly... A sustainable society will have to give greater emphasis to conservation and efficiency, rely more on renewable energy, and extract nominally renewable resources only to the degree that they can regenerate themselves. It will need to minimize waste, maximize reuse and recycling, avoid the use of hazardous materials, and preserve biodiversity. And it will need to develop more environmentally benign production technologies, and design products to be more durable and repairable (Renner 1991).

Local Self-Reliance

Self-reliance in socioeconomic systems has its analogue in natural systems. As a general rule of natural process, energy (and subsequent action) are captured or expended as close to the point of origin as possible. The diversity of ecosystems is a reflection of the diversity of local conditions and ways of responding to them. Our built systems often impose homogeneity upon highly diverse natural systems. This results in dislocations of materials and disruption of system dynamics, leaving us with what we call waste or pollution.

Local self-reliance does not mean isolation, either in natural or built systems. It means creating an organizational system that enhances the internal economy and cohesiveness of a place, reduces entropy, and provides the base for import/export relationships with other communities. It is an integrative process that links the consumer sector of the local economy with the producer sector and through the relationship strengthens both.

One way to enhance the self-reliance of a community is to identify the imports and, where possible, substitute local products. Import substitution can dramatically improve the "balance of payments," but its real value lies in creating momentum. As communities organize to find substitutes for imports, they begin to think consciously about self-reliance – and this releases a certain inventiveness and drive for efficiency. Inventiveness and efficiency help a community reduce imports still more, but they also allow the community to develop exports – and in our information-laced society, ingenuity itself is exportable...

Communities that recover materials from the trash stream and use them as resources for local production will realize the full potential of waste recycling as a tool for economic development. Colonized nations often point out that colonizers extract raw materials cheaply, refine them at home, and then sell them back to the colonized countries for a large profit. U.S. cities are like colonized countries in that they export what little recycled material they do collect. The two leading exports from the port of New York are scrap metal and paper. Other countries are importing these materials, processing them, and then often exporting them back to the U.S. For example, Japan imports scrap paper from us and turns it into boxes for exports (Martin 1988).

Sustainable Employment

Community Development Corporations

Community Development Corporations (CDCs) are democratic firms designed to be accountable to all the residents of the community, not just special interests like producers and
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

consumers. Residents become members for a small fee and may participate equally with one vote in shaping community policy. The CDC is a planning and governance vehicle organized in the private sector to help meet local needs. It has an overall responsibility to help develop land, labour, and capital and, by implication, the responsibility to help redress any imbalance of power within the exchange system. It is like a municipal government, except that its task is simply to coordinate local economic development. The CDC does not replace the local government in any real sense, but it can reduce the need for services (and thus for taxes) by encouraging local corporations to meet the needs of their stakeholders. Where possible, it can help reduce the need for competitive motives serving as the driving force of the local economy and increase the possibility for cooperative motives and mutual aid to become the basis of local economic organization (Bruyn 1987).

Community Development Credit Unions

A credit union is a cooperative, nonprofit corporation created by and for people affiliated by a common bond, for the purpose of promoting thrift among its members and of loaning funds to its members at reasonable interest rates. A Community Development Credit Unions (CDCU) is a specific type of credit union. CDCUs are based on a residential common bond and serve low-to moderate-income communities and individuals. Of the 19,000 credit unions in the US, approximately 400 are community development credit unions. CDCUs share two common themes: All CDCUs serve people who need financial services but cannot get them readily from banks, and all CDCUs are motivated by a vision of community economic empowerment (Swack 1987).

Community Loan Funds

A community loan fund (CLF) is a not-for-profit corporation, or a program within a not-for-profit corporation, that accepts loans from individuals and institutions and uses this capital to make loans for community development projects within its own geographic area. A CLF typically borrows and lends at below-market interest rates, and places a high-priority on making loans to community-based organizations that are unable to get them from conventional sources. With its specialized knowledge of local housing and other community economic development activities, a CLF is able to evaluate loan requests from local groups in a way that most investors and investment professionals cannot. A CLF is also able to help these groups develop sound financial plans and identify and approach other sources of capital. As both lender and technical assistant, a community loan fund is a bridge between investors and community groups in need of capital (Swack 1987).

Trust Funds

One source of public capital for local governments is a dedicated, renewable trust fund. Trust funds are characterized by the establishment of a permanent endowment, dedicated to the investment of capital assets in housing or other community economic development activities. A trust fund's endowment may be capitalized by one-time contributions, or by annually renewable revenue sources. Trust funds established by one-time allocations of funds provide for loans from their endowment or grants from the endowment's investment earnings. Those capitalized by annually renewable revenues can afford to grant or lend funds from the trusts principal. Trust fund capital assets are stable and predictable, and may be relied upon for long-term financial commitments necessary for capital development, particularly housing development (Rosen 1988).

Reinvestment Policies

Reinvestment policies are a source of public capital for local governments. Reinvestment policies address the issue of available credit and insurance for community economic development. US depository institutions which extract capital from communities in the form of deposits have an obligation to reinvest significant portions of their assets in those communities. Reinvestment policies apply most directly to commercial banks and savings
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

and loan associations. However, reinvestment principles may be applied to the insurance industry as well, which not only extracts capital from communities, but whose own self interest dictates that communities remain economically stable. Community economic stability is largely dependent on the availability of investment capital. Thus, the insurance industry can simultaneously serve its self interest and the public interest by assuring that a significant portion of its capital assets is reinvested in community economic development for the benefit of low income areas (Rosen 1988).

Recycling vs. Incineration Employment

Recycling in the U.S. may already be as important a source of jobs as coal mining. Compared with incineration and landfiling, recycling offers more employment and is still the cheaper alternative, due to its lower capital requirements. The construction of waste-burning plants and the manufacturing of the machinery they use create more temporary jobs than the more modestly equipped recycling centers do, but recycling offers a large number of permanent jobs in operations and maintenance activities. In New York City, the cost of building an incinerator (about $500 million) is three times that of recycling facilities that can handle the same amount of trash. Boosting the city's recycling rate from 18 percent to a modest 25 percent -- as mandated by law by April 1994 -- would create about 1,400 jobs, or more than four times the number generated if the same volume of waste were incinerated (Renner 1991). These jobs would be in addition to the jobs created by the remanufacturing process -- taking the recycled materials and turning them into new goods.

Community Supported Agriculture

Community Supported Agriculture (CSA) is catching on as a way for city dwellers to supply themselves with fresh vegetables while supporting small local organic farms. Some 100 CSAs were in operation in the US during 1991. Urban families or individuals typically pay a yearly fee of $200 to $600, and in return receive a weekly supply of fruits and vegetables. Buyers either pick up the produce at the farm itself or receive weekly shipments delivered to the city. Purchasers share the risks of farming with farmers -- they may receive less of one vegetable than expected, but more than another -- but gain a sense of connection with local farmers and the bioregion (Urban Ecologist 1991).

Community Forestry

There are several examples of community forests in Canada, including the county forests in southern and central Ontario, and the Mission Tree Farm and the North Cowichan Municipal Forest, both in British Columbia...

There are several ways of administering a community forest, including the use of cooperatives, regional trusts, and public or private ownership. Each has its own strengths and weaknesses, and success depends on the political attitudes and economic realities prevailing in the locality. However, throughout all of these approaches there is a set of fundamental principles that are applicable in most community forest projects.

First of all, the principle of local control in order to produce and retain local benefits, is paramount. Next, this local control has to be based on a very good knowledge and understanding of what the local people want, what will work in their area now, and what could be tried to develop new ideas and outputs. Finally, the community forest should be developed and managed so as to promote economic diversification, rather than stifle it by placing a continued reliance on only one commodity output such as raw timber for export away from the locality (Ontario Conservation News 1989).
Economic Demand Management

Trip Reduction and Affordable Housing

A 1990 paper drafted by the staff of the Maryland-National Capital Park and Planning Commission as part of the Planning Department's Comprehensive Growth Policy Study examined the links between trip reduction and affordable housing. Below is the abstract of that three-part paper:

A) Trip Reduction, Surplus Surface Parking, And Provision Of Housing Near Jobs

Trip reduction measures can reduce the need for parking, and free land from surface parking for new development opportunities. That land could be used for both market rate and affordable housing. The housing would also be near jobs, which would both reduce vehicle trips and shorten average vehicle trip lengths, reducing demand for road capacity. The profit potential of market rate housing on land freed from surface parking would provide owners of existing office and research developments with the incentive to implement trip reduction measures and provide some affordable housing.

B) Making Housing Affordable By Giving Up The Second Car

Second car ownership costs about $3000/year. By giving up a second car and using public transportation, an entry level household would save between $150 and $250 a month which could be spent on housing. Means are proposed to help County residents turn savings from single car ownership into increased buying power for housing. These means include designing subdivisions in ways that make second car ownership unnecessary, County provided private mortgage insurance to increase borrowing power for single car households, and public education that buying where two cars are necessary is buying into a $3000 a year habit.

C) Charging Separately For Parking To Lower Housing Costs, Car Ownership, And Trip Generation

Most residents of multi-family housing do not know that they are paying approximately $50 a month for each parking space. Requiring landlords and condominium associations to price housing and parking separately would spur some people into giving up cars. It would also make the average rental unit in the County 8-9% more affordable for those without cars. As a result of lower car ownership, it should also result in lower trip generation rates (Maryland-National Capital Park and Planning Commission 1990).

Community Land Trusts

Although similar to the conservation land trusts described in the Land Use chapter, a community land trust is not simply a land trust that happens to be in a community. As developed by the Institute for Community Economics, a community land trust (CLT) is an organization created to hold land for the benefit of a community and of individuals within the community. It is a democratically structured nonprofit corporation, with an open membership and a board of trustees elected by the membership. The board typically includes residents of trust-owned lands, other community residents, and public-interest representatives. Board members are elected for limited terms, so that the community retains ultimate control of the organization and of the land it owns (ICE 1982).

The CLT acquires land through purchase or donation with an intention to retain title in perpetuity, thus removing the land from the speculative market. Each land trust writes its own bylaws and defines its own goals, priorities and structure. Appropriate uses for the land...
are determined in a process comparable to public planning or zoning processes, and the land is then leased to individuals, families, cooperatives, community organizations, businesses, or for public purposes.

CLTs in rural areas are working to provide access to land and decent housing for low-income people, to preserve family farms and farmland, and to facilitate sound, long-term land and forest management. Urban CLTs have formed to combat speculation and gentrification, to preserve and develop low- and moderate-income housing, and to maintain useful urban open spaces (ICE 1982).

Given their community-wide scope and varied memberships, CLTs tend to be, and should be, expansive organizations, taking on new projects at the same time that they perform a stewardship role in relation to past projects (ICE 1989).

Government Partnerships With Community Land Trusts

Local governments are recognizing the advantages of partnerships with community land trusts (CLTs). These include quick response, flexibility, cost-effective protection of historic or environmentally significant land, and increasing the stock of permanently affordable housing. Governments have formed several kinds of partnerships with CLTs, including: allocating funds to CLT programs; allocating city-owned lands to CLTS; using "linkage" programs to foster CLT development; using municipal zoning powers to negotiate commitments from developers to make donations of land and to build affordable housing for a CLT; and placing publicly owned lands, such as bike paths, conservation areas, and community gardens, under the care and management of a CLT.

Employment Impacts of Sustainability Policies

The employment impacts of sustainability policies are a frequent concern and highly variable. For example, mandatory container reuse and recycling, many energy conservation measures, and enhanced public transportation may involve more rather than fewer job opportunities, while energy efficiency standards for appliances and automobiles may be employment neutral. Where there are significant dislocations, special job training programs and new forms of social safety nets may have to be implemented to serve those people in transition from unsustainable forms of employment.

Many other sustainability measures are inherently positive in their distributive effects. For example, more efficient land use and tax policies to discourage land speculation will increase the affordability of housing in the city and enable people to live closer to work. Shifting some of the public subsidy from automobile use to improved public transit will improve access to the city for lower income groups while attracting more riders from all social strata. All such effects are much in need of further research. However, in the final analysis, to the extent improving the health, access, and livability of our cities contributes to the long-term survival of society, we all benefit in equal measure (Rees and Roseland 1991).
Sustainable Industry

Sustainable industry means converting the material basis of society. While the shape of sustainable industry is still emerging, several features will be critical:

- technologies appropriate to the desired ends;
- safe and environmentally compatible materials;
- products that meet basic social needs and some individual wants;
- low- and no-waste production processes;
- safe and skill-enhancing working conditions;
- energy efficiency;
- resource conservation to meet the needs of future generations.

Sustainable industry encompasses the entire social, economic, and technological system by which we produce goods. This systems-wide perspective unites prevention policies, the precautionary principle, and clean technology into an integrated view that regards economic and environmental goals as equal determinants in a healthy society.

From this point, it is a short jump to considering the entire industrial system as an environment and health issue. The design of new production processes would take into account both occupational and community health. The consumption of materials, water, and energy would be evaluated in determining efficiencies.

In short, policies to promote sustainable industry would consider the risks of materials throughout their full life cycle – from synthesis or extraction through processing, distribution, and application to final disposal. The use of existing materials would be carefully tailored to fit into natural ecological systems. The design and selection of new materials would be consciously directed toward enhancing the quality of the environment and public health (Geiser 1991).

Community Economic Development

Whether CED (community economic development) is practised in hinterland resource towns, urban ghettos, obsolescent manufacturing cities, or Native communities reserves, the general objective is the same: to take some measure of control of the local economy back from the markets and the state. Within this common objective, CED practice is variously oriented to controlling the local economy for narrow ends (increasing the capacity of a community to make money), for broader purposes (e.g., to increase economic stability and control of resources) or to serve fundamental goals of economic justice. That is to say, CED varies according to whether "economic," "development," or "community" is emphasized (Boothroyd 1991).
4-I. Community Development

Safety Audits

Metro Action Committee (METRAC), which evolved out of a 1982 Toronto panel on public violence, developed the idea of "safety audits" of city streets, lanes, and parks. Informal groups of four to six people, mostly women, evaluated lighting, access to emergency phones, overgrown shrubbery near bus shelters, and so on. The information collected was given to the appropriate authorities (transit, parks, engineering, etc.), which began to take steps to improve safety within their jurisdiction. Lighting in public places such as railway stations has been improved, landscaping around universities and schools has been designed with security in mind, and buses will stop anywhere along their routes after dark so women have shorter distances to walk. Safety audit programs are now being used in Hamilton, Ontario and on several university campuses (Hamilton Spectator 1991; Taylor 1991; Canadian Press 1991b).

Urban Design and the Elderly

An Australian study highlighted the vulnerability of the elderly in a car-dependent city by showing that they are:

- less transport independent due to a much higher proportion who do not drive;
- more isolated due to the physical distances and poor public transport in low density suburbs; and
- more prone to injury from vehicles while walking.

Solutions to these problems, as part of a wider agenda of urban reform, include enhanced transit (especially light rail), traffic calming and urban villages. The study suggests that the time to provide these improved urban design options for the elderly is before the aging of the "baby boom" generation is felt in 20 years (Newman 1991).

Cohousing Developments

Cohousing is a grass-roots movement that grew directly out of people's dissatisfaction with existing housing choices. Its initiators draw inspiration from the increasing popularity of shared households, in which several unrelated people share a traditional house, and from the cooperative movement in general. Yet cohousing is distinctive in that each family or household has a separate dwelling and chooses how much they want to participate in community activities.

Cohousing developments are unique in their extensive common facilities and in that they are organized, planned, and managed by the residents themselves. Pioneered in Denmark some 20 years ago, there are now over 100 cohousing developments in Denmark, plus many more in the Netherlands, Sweden, Norway, France, and Germany. In North America over 40 cohousing communities are now in the planning stages.

Cohousing developments vary in size, location, type of ownership, design, and priorities, but all share four common characteristics:
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

Participatory Process: Residents organize and participate in the planning and design process for the housing development, and are responsible as a group for all final decisions.

Intentional Neighbourhood Design: The physical design encourages a strong sense of community.

Extensive Common Facilities: An integral part of the community, common areas are designed for daily use, to supplement private living areas.

Complete Resident Management: Residents manage the development, making decisions of common concern at community meetings (McCamant and Durrett 1988).

Aims of Environmental Education

The aims of environmental education apply equally well in both schools and the community more generally. Environmental education aims to develop:

• a greater awareness of the environment and the consequences of human interactions with it;

• an understanding of how life is sustained and supported on earth both locally and globally;

• a wide range of knowledge and skills from different fields to assist in investigating environmental issues and choosing appropriate courses of action;

• an appreciation of the range of perspectives that impinge upon environmental issues – for example, the biological, the economic and the technological aspects;

• an environmental ethic which clarifies and enhances environmental values, leading to the appreciation of natural and human-made beauty, valuing a healthy environment, concern for the welfare of people and other living things, and belief in the wise use of resources;

• a commitment to work, personally and cooperatively, for a better physical and social environment and a willingness to apply the knowledge and skills acquired in action programs to improve or protect students' own environment;

• an understanding of the need to balance development and conservation to meet the needs of society (Ministry of Education (Victoria, Australia) 1990).

Environmental Education in Schools

To be fully effective, environmental education in schools needs to be covered in a diversity of ways. For example:

• an appropriate environmental education dimension needs to be included in every area of the curriculum (the arts and humanities have just as crucial a contribution to make as the sciences);
all students need at some stage to be involved in studies which bring the range of subject areas together to focus on environmental issues of clear importance to the students' own lives;

a specialist environmental education subject is needed at senior level for students intending environment-related careers (VEEC 1991).
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

4-1. Investment and Purchasing

The Valdez Principles

The Coalition for Environmentally Responsible Economies (CERES) is a broad coalition of environmental organizations and socially responsible investment groups formed to promote environmental responsibility among businesses and local governments. In September 1989 CERES set forth the Valdez Principles as broad standards for evaluating corporate activities that directly or indirectly affect the biosphere. The Principles were adopted to help investors make informed decisions and in the hope of working with companies to create a voluntary mechanism of self-governance. The Valdez Principles call for elimination or minimization of pollution, sustainable use of natural resources, reduction and safe disposal of waste, energy conservation, environmental risk reduction, marketing of safe products and services, damage compensation, hazard disclosure, selection of environmental directors and managers, and annual environmental audits.

Canadian corporate signatories include McDonald’s Restaurants of Canada, Delta Hotels, Air Canada, VanCity Savings, and B.C. Tel. At least 40 local governments are considering environmental investment guidelines based on the Valdez Principles; at least five jurisdictions have already adopted guidelines.

CERES provides information and assistance in relation to the Valdez Principles, corporate shareholder campaigns, and community efforts to encourage local governments to adopt environmental investment policies.

The Environmental Charter for New York City

Introduced by New York City Comptroller Elizabeth Holtzman in conjunction with Earth Day 1990, this is a generic document that can be adapted by other North American local governments. The Environmental Charter pledges local governments to develop programs to provide clean water (assure water quality, conserve water, and improve sewage systems); improve air quality (reduce vehicle pollution, incineration, and other emissions); expand recycling and minimize waste; foster sound energy policy; plan for environmentally responsible growth; implement environmentally sound procurement policies; enforce laws and improve oversight capacity; encourage environmentally responsible business practices; maximize citizen education and involvement; and implement the goals of this charter (develop timetables, annual audits, periodic re-evaluation, environmental subcabinet of key government agencies, collaboration with colleges and universities, and public involvement in monitoring implementation and compliance).
4-K. Leadership by Example

Environmental Auditing

An environmental audit (EA) is based on an assessment of the environmental impacts of the authority's policies and practices. In some cases these will be known, or easily identifiable, whilst in others, it will be possible only to indicate the likely consequences. The policy review should encompass all activities of the authority, and all departments and arms of the service. It should not be restricted to "official" or approved policy, because much local government practice has evolved through tradition, or results from informal decisions of staff.

Given the wide-ranging nature of such a review, and the differences which exist between authorities, only a general indication can be given here of the matters to be covered. However, many features will be common to most authorities. These might include:

- the authority's existing environmental objectives and policy statement(s) strategy/charter
- mechanisms and structures for co-ordinating environmental issues and inputs into all departments and service delivery
- purchasing policy
- use, conservation and recycling of resources and materials by/within the authority
- vehicle fleet management
- health and environment of the workplace and public areas managed by the authority
- estate management (land and buildings) and design
- consumer advice and protection
- environmental education
- transport policies and their implementation
- waste management policies and their implementation
- land use planning policies and their implementation
- environmental enhancement and conservation policies and their implementation
- energy consumption, energy policy and energy efficiency measures
- investment policy
- mechanisms for involving staff in the EA and securing their co-operation
- mechanisms for monitoring the effectiveness and implementation of the EA (ACC 1990).
Local Authority (LA) Mechanisms for Conducting an Environmental Audit (ACC 1990)

<table>
<thead>
<tr>
<th>Cost</th>
<th>1) In-house team (existing staff)</th>
<th>2) In-house team (new specialist staff)</th>
<th>3) External consultant</th>
<th>4) Combined in-house and consultants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cheapest</td>
<td>Most expensive but could be the most cost-effective long term</td>
<td>More expensive than 1</td>
<td>More expensive than 1</td>
</tr>
<tr>
<td>Overall environmental expertise</td>
<td>may not be comprehensive</td>
<td>Excellent and LA controls what it gets</td>
<td>Excellent (if right consultant selected)</td>
<td>Excellent (if right consultant selected)</td>
</tr>
<tr>
<td>Knowledge of authority</td>
<td>Excellent</td>
<td>Limited at first but will grow</td>
<td>Likely to be nil or very limited</td>
<td>Good</td>
</tr>
<tr>
<td>Knowledge of area</td>
<td>Excellent</td>
<td>Limited at first but will grow</td>
<td>Depends on firm's experience but could be nil or limited</td>
<td>Good</td>
</tr>
<tr>
<td>Objectivity</td>
<td>Bound to be affected by LA culture</td>
<td>Good to excellent</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td>Ease of management and control</td>
<td>Good</td>
<td>Good</td>
<td>Not as easy as 1 or 2</td>
<td>Not as easy as 1 or 2</td>
</tr>
<tr>
<td>Commitment to long-term implementation</td>
<td>Depends on other duties and priorities</td>
<td>Excellent</td>
<td>Non-existent</td>
<td>Mixed</td>
</tr>
<tr>
<td>Continuous involvement in monitoring and review</td>
<td>Depends on other duties and priorities</td>
<td>Excellent</td>
<td>Non-existent</td>
<td>Mixed</td>
</tr>
</tbody>
</table>

Staff Training

If environmental initiatives are to be integrated effectively into mainstream services, particular effort is needed to ensure that the authority's own staff are properly involved. Before staff can be asked to develop and pursue initiatives, they must first understand and support the reasons for what they are being asked to achieve. This applies as much to junior field staff as to senior managers within service departments. A range of devices will be needed, such as seminars and staff newsletters, which have been used successfully in the past. Whatever the methods, key staff and elected members need to understand:
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

• the environmental agenda: staff must be familiar with global, regional and local environmental issues, and grasp their political and economic implications

• the environmental lobby: an appreciation of the demands and attitudes of local and national interests

• the environmental impact of their own service: the influence of the day-to-day services for which they are responsible

• the environmental role of their own service: how their department or section can contribute to solving environmental problems

Promoting such understanding does not necessarily require formal training. But it does require some thought as to how the authority can tap into available expertise (in the form of published material, its own staff, local environmental groups) and disseminate it (through in-house journals, environment newsletters, departmental briefing) to staff (ACC 1990).

Eco-Counselling

More than 500 eco-counsellors are at work throughout Europe (Germany, Switzerland, Austria, Italy, Spain, the UK, France, Luxembourg, and Belgium). The concept of environmental counselling was originally developed in Germany (in 1985) as a means of providing detailed, impartial and practical environmental advice to individuals on an individual or small-group basis (e.g., schools, women's groups, businessmen, households) on matters ranging from energy conservation to water pollution. The central idea is that the environmental adviser, largely by virtue of his or her personal contact with members of the community in which he or she works, can achieve small-scale but long-term behavioural change which in turn can lead to a large-scale improvement in the environment.

Eco-counsellor training programs and even masters degree programs in environmental counselling are now being offered in Europe. While courses on law and economy, etc. are offered, the central foci are environment and communications. Trainees gain expertise in technical, legal, administrative and economic fields, but most important is their experience in animating discussions, presenting issues clearly and simply, diplomacy, team-work and cooperation with different partners.

While financing is necessary to cover training, salaries and materials, local authorities are increasingly accepting that these costs are low compared with a) the potential job-creation possibilities and improved market standing for those involved in the clean technology and environmentally oriented sectors, and b) the avoided economic and social costs of environmental damage. Estimates from Austria indicate that local eco-counsellors typically produce savings double to their costs through identification of waste reduction measures. Often local authorities are able to co-finance schemes with the assistance of government aid, local businesses or sponsorship (Eco-Conseil 1991; World Congress of Local Governments for a Sustainable Future 1990).

State of the Environment (SOE) Reporting

Some local governments are considering a community-based state of the environment (SOE) report for their region. Inspired by national and international SOE reports, the idea of these efforts is to develop broad perceptions of ecosystems and our relationships with them,
and to identify ecological approaches to planning and designing urban areas, on which residents and governments can ponder and act. As with all SOE reporting, the question of appropriate indicators presents a major challenge, especially at the local government level. Ideally, SOE indicators should be key measures that most represent the state of the environment and that collectively provide a comprehensive profile of environmental quality, natural resource assets, and agents of environmental change.

Environmental Impact Assessment

Environmental impact assessment is a planning tool that integrates environmental considerations into project planning, development and implementation. In order to be effective, environmental assessment has to be a decision making tool. The application of an effective environmental assessment process ensures that potential environmental effects – physical and social – are identified and mitigative measures put in place to minimize or eliminate these impacts. Effective environmental assessment requires that the environmental implications of a proposal be considered prior to taking or making irrevocable decisions and as early in the planning process as possible. The assessment of a proposal should include the concerns of the public with regard to both physical and social environmental evaluation (City of Ottawa 1990).
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

4-L. Environmental Administration

Principles

Principles for Sustainable Development and Urban Management

- Local governments/authorities must assume the responsibility and marshall the resources to address the environmental problems facing their communities.
- Present and future generations have a right to a healthy and productive environment.
- Sustainable development approaches must give priority to the alleviation of poverty.
- Development strategies and projects should be judged from their long-term environmental impacts not just from their short-term gains.
- Polluters should pay for the costs of remediation, but it is even more important to prevent pollution and the waste of resources in the first place.
- Human communities must understand and respect the ecosystem processes of which they are an integral part.
- Those potentially affected by the environmental risks of development projects should have the opportunities to participate with full information in decisions about them (Toronto Declaration on World Cities and Their Environment 1991).

Principles for Innovative Policy Making

The Organization for Economic Cooperation and Development's (OECD) Group of Urban Environmental Experts believes this set of principles could form the basis for ambitious, far-sighted urban environmental policy making (OECD 1991):

1. There is a need to redefine and intensify co-operation between different levels of government. Each governmental level – local, regional, national – is responsible for taking the initiatives to protect the environment.

2. Co-operation between the public and private sectors must grow. The private sector should be involved in designing solutions to environmental problems. The financial participation of the private sector is indispensable if urban environmental projects, above all those involving major infrastructure planning on the local level, are to be successful.

3. Minimum environmental standards must be established – and enforced. In some cases, enforcing existing standards may produce better results than creating new ones. Proper enforcement cannot take place without the involvement of local authorities. Wherever possible, local authorities should endeavor to go beyond minimum requirements proposed at a higher governmental level.

4. The local community must take part in devising and implementing environmental policies. Local initiatives stimulate greater awareness of local problems and potential. Innovative local approaches should be widely disseminated.
5. **Prices must incorporate environmental and social costs.** Sustainable development requires that environmental capital not be dissipated. Until environmental impact is internalised in accounting procedures, decisions by investors and consumers will not be based on realistic information. Certain kinds of information on environmental and social effects may be available most readily at the local level. Local taxes and fees may be the most appropriate way to internalise some of these costs.

6. **Synergies that can contribute to environmental protection must be identified.** In a synergistic relationship, mutually enhancing activities are more productive when they are co-ordinated than when they are carried out separately. Classic examples are production processes in which excess heat is used as part of a district heating system or in combined heat and power provision.

7. **Short-term decisions must be taken within the framework of long-term strategies.** Political as well as private sector decision making often tends to be based on short-term considerations, while a great deal of urban planning is necessarily long-term. Short-term economic growth which exploits non-renewable resources is increasingly seen as producing only illusory income, and a permanent loss of wealth.

**Operating Principles**

In thinking about how to achieve environmental objectives, it is important to establish "operating principles." For example, a local government might decide that, in pursuing its objectives, it will (ACC 1990):

- consult widely and welcome comment about its current performance and potential contribution
- seek to promote freedom of information on all matters relating to the local environment
- work in partnership to pool resources and expertise
- seek to promote an awareness and understanding of environmental issues throughout the local community
- recognise that prevention is better than cure and seek to ensure that its own action and that of others reflects this principle
- employ a careful approach in its own practices, and encourage others to do the same, by assuming that an activity is environmentally damaging unless proven otherwise, and recognising that where the environmental consequences of an action have not been properly established, it should seek other methods which are known to be environmentally safe
- recognise that long-lasting or irreversible changes are more significant than those which are short-lived or easily reversed
- seek to prevent pollution wherever possible, but when it does occur, accept that the polluter should pay and ensure that its own committees take account of this principle in decisions about council services
- ensure equal access and opportunities for all sections of the community, including disadvantaged groups, to a safe and pleasant environment
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

Process

Good Practice

Good practice is marked by the implementation in particular of three principles (ACC 1990):

- The principle of partnership. The recognition that no one organisation or profession has the capacity on its own significantly to advance environmental protection: hence the need for partnership with other professions and organisations

- The principle of proactivity. Prevention is not only better than cure, it is a vital ingredient when it comes to environmental protection issues

- The principle of participation with the community. Sound environmental protection will only be secured if the community is encouraged to participate in formulating and implementing policy

Getting Public Involvement and Commitment

To gain and maintain involvement and commitment (ACC 1990):

- The authority must put its own house in order. It will need to acknowledge its own shortcomings (in its purchasing practice and so on) and show a commitment to overcoming them

- The authority must demonstrate a willingness to listen and to learn. In this field more than most, local authorities are slowly acquiring expertise. The best way of doing this is to canvass the views and draw on the expertise of others

- It is important to match words and deeds. The local authority may not succeed in achieving all of its environmental targets, but it must make a serious attempt at doing so.

- The commitment needs to be visible. Using news-sheets, departmental briefings, open meetings, the local media and other means, the authority must inform both its own staff and external audiences of its efforts

- Policies must be understood. Complex environmental issues must be translated into objectives and measures that can be easily grasped by staff, other organisations, and the general public.

Facilitating Community Participation

Community participation helps ensure that decisions are sound and all parties will support them. It is facilitated by (IUCN 1991):

- conducting consultations where the people are;
• working with traditional leaders, and the full range of community groups and organizations;

• ensuring that the scope of consultation is appropriate to the decision being made;

• limiting the number of management and consultative bodies to which communities have to relate;

• giving communities and other interested parties adequate, readily intelligible information and enough time to consider it, contribute to proposals themselves and respond to invitations to consult;

• ensuring that consultations are in a culturally acceptable form. For example, indigenous people with a tradition of decision making by communal discussion should not be expected to respond with a written submission from one representative. If indigenous consultation mechanisms exist, they should be used;

• ensuring that the timing of consultations is right. Consultation must not take place so early that no useful information is available, or so late that all people can do is react or object to detailed proposals.

Community Involvement

Communities should initiate and be involved in all stages of environmental action, from setting objectives and designing activities to doing the work and evaluating the results. Participation should be as broad as possible, involving all segments of the community, and emphasizing that individual actions can make a difference. The participatory approach aims for fair consideration of all viewpoints in reaching reasoned and informed decisions. It takes all factors into account, including people's feelings and values. It draws on all relevant knowledge and skills, and uses "expert" assistance with care and sensitivity.

Evaluation should be continual; objectives should be re-examined and (if necessary) redefined. Plans should be subject to modification in light of experience. Information should be exchanged among the participants and, if possible, with others engaged in similar activities. Assessment, monitoring and evaluation are essential, preferably using participatory methods. Monitoring helps to inform people of progress, since they sometimes forget how far they have come. Independent evaluation is useful so that people can develop a body of experience from which everyone may learn (IUCN 1991).

Strategies

Preparing Local Strategies

Preparation of local strategies enables communities to express their views on conservation and development issues, defining their needs and aspirations, and formulating a plan for the development of their area to meet their social and economic needs sustainably.

Local strategies enable the communities involved to define and achieve the kind of development that is most appropriate for them. If approved by the responsible government, each such strategy could form the basis of land-use policies and a land-use plan for the area. Local strategies could usefully be undertaken as part of a national or subnational strategy,
but if neither of these is available there is no reason why local strategies should not be done independently.

The geographical scope of a local strategy should be defined by the community (or communities) undertaking it (IUCN 1991).

Means of Implementation

In general, municipalities have a number of means of implementing sustainable development in their communities (Reeve 1988):

Regulations
- emission standards, environmental quality standards, subdivision codes, building codes, health codes, zoning by-laws, development charges, land use plans, covenants, restrictions on the operation of vehicles or industries during certain hours, etc.

Incentives and Disincentives
- preferential taxation, transfer of development rights, easements, bonus and penalty provisions, pricing policies (e.g., for solid waste disposal), effluent fees, low-interest loans, etc.

Public Investment
- in highways, sewers, schools, open space, public housing, community centers, direct land purchases, etc.

Education
- demonstration projects, public meetings, mall displays, etc.

Implementation Strategies

An implementation strategy for municipal sustainable development will require the following (Ryan 1991):

1. Undertaking an awareness/education program for city staff, businesses, institutions and the general public in order to develop an understanding of the concept of sustainable development and the need for its implementation.

2. Reviewing the official plan and strategic plan of the municipality in the context of sustainable development, and implementing the appropriate zoning and environmental site plan techniques.

3. Undertaking energy and environmental audits of the municipality's operations, making them less material and energy intensive.

4. Investigating the social and environmental cost of municipal programs/services and development, bringing the true cost of resources onto the balance sheets.

5. Developing appropriate incentive/inducement programs to secure the cooperation of developers, builders, businesses and householders using by-laws, levies, permit fees, user fees, fines and bonusing.

6. Lobbying senior levels of government for the legislation and regulations necessary to meet the municipality's sustainable development objectives.
Strategies for Sustainability

Successful strategies have four components in common:

• consultation and consensus building;
• information assembly and analysis;
• policy formulation;
• action planning and implementation.

Demonstration projects may also be undertaken so that participants can see concrete results from the strategy while it is being developed.

A local strategy by a single municipality can be developed within a year. Strategies involving several communities are likely to require more time, because of the need to reach agreement among them all.

The results of a strategy are the agreed policies and the actions taken to put the policies into practice. A key step in the development of a strategy is the preparation of a strategy document. This provides a summary description and analysis of the people, economy, environment, and institutions of the area; and sets out the agreed policies and action plan.

The basic organization of a strategy consists of a steering committee and a secretariat. The steering committee should be representative of the main participants in the strategy. It is responsible for overall direction of the strategy, and ensuring the full participation of all interest groups.

The secretariat undertakes the day-to-day management of the strategy’s development. It is responsible for organizing consultation and consensus building, assembly and analysis of information, and drafting the strategy document. The secretariat also produces a newsletter or equivalent to keep everyone informed of the strategy’s progress (IUCN 1991).

Revising Official Community Plans (OCPs)

Where official community plans already exist, but do not appropriately address sustainable development concerns, municipalities could revise the contents of their current official plans to provide (Reeve 1988):

• a full description of the municipality’s natural systems and processes;
• a full description of the flow of energy and materials through the urban ecosystem (especially toxic wastes and their disposal sites);
• explicit policy statements on conservation and related goals;
• environmental, social, and economic policies to realize these goals;
• a listing of environmentally sensitive areas to be protected and explanations for this listing; and
• ways to encourage landowners to exercise stewardship.
Rethinking Property Taxes

Several economists ... have called for differentiated treatment of land and buildings in property taxation. Whereas a higher tax on buildings encourages holding land unused or allowing buildings to deteriorate, a higher tax on land often encourages efficient use of the property... Several cities, including Pittsburgh, have put [this approach] into effect. The results have been impressive. None of these cities has abolished the tax on buildings. Chiefly they have simply raised the taxes on land and lowered those on buildings. In Pittsburgh, city taxes on land were raised to 12.55% while leaving the tax on buildings at 2.475%. Since county and school taxes were not adjusted, the actual relation of the two rates was about three to one. This was sufficient to precipitate a major building program in the city. It also brought additional funds into the city treasury...

Land should be taxed at a higher rate than improvements... Just what difference in rate is required to encourage improvements cannot yet be stated, but the experience of Pittsburgh and other Pennsylvania cities suggests that even a two-to-one ratio gets results... even a reduced version of this tax would meet all local needs by capturing much of the gain from rising land values. To put this land tax into local hands, is, therefore, to free localities from depending on state and federal financial help and the accompanying control... (Daly and Cobb 1989).

The Environmental Charter for Local Government (Friends of the Earth (U.K.) 1989)

Declaration of Commitment

This authority will seek to promote the conservation and sustainable use of natural resources and to minimise environmental pollution in all of its own activities, and through its influence over others. This authority will review all of its policies, programmes and services and undertakes to act wherever necessary to meet the standards set out in this charter.

Policy development

1. Develop an energy policy based on energy conservation and clean technology, and establish a cross-departmental Energy Management Unit.

2. Develop a recycling policy including provision of public collection or deposit facilities, a recycling officer, an in-house recycling scheme, a commitment to using recycled materials and payment of or lobbying for rebates for recyclable material taken out of the waste stream.

3. Develop a strategy for monitoring and minimising pollution in the local environment including pollution caused by its own activities. It will make use of all available measures, including publicity and enforcement.

4. Develop transport and planning policies to minimise the use of cars, and encourage public transport, cycling and walking. Also to encourage fuel efficiency, the use of unleaded fuel and the fitting of catalytic converters to minimise pollution from vehicle emissions.

5. Develop an environmental protection and enhancement strategy including measures to protect and enhance public open spaces, wildlife habitats and streets. Full consideration will be given to the particular needs of disadvantaged groups. The authority will adopt environmentally sustainable methods of land management (which do not threaten
wildlife interest) for parks, open spaces, and verges, and promote organic and sustainable methods in agriculture and countryside management.

6. **Develop a health strategy** which recognises the links between the environment and public health and includes implementation of an amended health and safety policy which has full regard to environmental hazards.

**Implementation mechanisms**

7. Reform the internal mechanisms of the council such that an adequately resourced cross-departmental body such as an *Environmental Protection & Monitoring Committee* exists to develop and monitor environmental strategies and policies.

8. Commission a regular *Environmental Audit* covering the state of the local environment, and the impacts of all existing policies and practices on the local and wider environment.

9. Encourage and enable public participation in all council activities through *freedom of information*, consultation and publicity. Provide environmental *information and education services* for the public and businesses.

10. Make environmental requirements part of its *purchasing and procurement policy*, including its building specifications and in selection of investments.

11. Revise the relevant statutory and non-statutory *development plan(s)* to take into account the environmental policies outlined by this charter.

12. Through its *planning functions*, promote sustainable development, in particular through the explicit use of environmental criteria in development control and the provision of information on relevant environmental issues to all developers.

13. Implement the policies of this charter in *grant aid conditions* and in *contract tender specifications*.

14. Require committees and departments to consider the environmental implications of their policies and activities as a routine part of *policy development and performance review*. The authority will require all reports prepared by or for it to include a statement of the expected environmental impacts.

15. Support and promote measures through local authorities' associations and other bodies for changes in *national legislation* to improve authorities' powers to implement these policies.
APPENDIX 2: Tools for Designing Sustainable Community Initiatives

4-M. Beyond Municipal and Local Government

Regional Cooperation

Compact growth of cities also hinges on regional cooperation, an important tool for handling conflicts between the interests of individual localities and those of the broader region. For instance, many municipalities compete for high tax-yielding development and misuse their zoning powers to shut out land uses that yield little tax revenue or require public spending for social services. Such "fiscal" zoning leads communities to exclude low-income housing, which leaves neighboring jurisdictions with the burden of providing affordable homes. Fiscal zoning can also accelerate the economic drain from central cities, as suburbs seek to replenish public coffers by establishing massive commercial zones to attract taxpaying businesses. Cooperation among competing localities is difficult to achieve without specific laws at the state or provincial level (Lowe 1992).

Mayors Commitments

Recognizing the significance of local efforts to solve global environmental problems, and frustrated by lack of leadership from senior levels of government, some 130 mayors from 75 countries gathered in Toronto on August 25-28, 1991 to sign "The Toronto Declaration on World Cities and Their Environment." The declaration noted that cities provide enormous, untapped opportunities to solve environmental challenges; that local governments must and can pioneer new approaches to sustainable development and urban management; and that local governments must assume the responsibility and marshall the resources to address the environmental problems facing their communities. Among other things, the mayors pledged that their local governments will:

- be models of environmental responsibility;
- establish detailed plans for sustainable management and development;
- provide incentives and restructure fines, taxes, and fees to discourage pollution;
- establish the means and capacity to enforce compliance with environmental laws and agreements;
- urge other levels of government and international agencies to provide resources and support for the financing, management and policy-making authority necessary to achieve sustainable development and to alleviate poverty in their communities;
- work together on a regional basis to address common environmental challenges;
- establish programs whereby the cities of the developed world will devote resources, if feasible under law, to environmental projects in the developing world;
- call on national governments to seize the current opportunity for redirecting military expenditures into environmental and social programmes (Toronto Declaration on World Cities and Their Environment 1991).
Goal-Oriented Planning

Sustainable community planning works best in the context of a supportive regional, provincial or state planning framework. The key is goal-oriented planning – that is, planning for sustainable community development. Governance systems in some regions have been relatively successful in planning and managing for a healthy environment. Some of the characteristics of those systems are:

- A regional or provincial/state framework which requires all municipalities to create plans for achieving a set of regional or provincial/state planning goals.

- Coordination of all plans and programs adopted by local governments and provincial/state and federal agencies.

- Provincial/state agency programs that affect land use and resource management are reviewed to see that they are consistent with the planning goals.

- Affected agencies have opportunities to comment on or object to local comprehensive plans as they are being drawn up.

- Once a local plan has been acknowledged, the agencies are obligated to carry out their programs in accordance with it.

- After its acknowledgement, a local comprehensive plan becomes the controlling document for land use and resource management in the area it encompasses.

Some examples of supportive planning contexts in France, Norway, Finland, Holland and Oregon are described in Appendix 1. The Oregon program is an example of goal-oriented planning that provides a North American model for sustainable development planning.