Sustainable Development in Urban Areas- An Overview

Wahdat Wahidi

M.A History, Modern College of Arts, Science and Commerce,

Ganeshkhind, Pune- 411016

Abstract

As a concept, the notion of sustainable urban development is simple, appealing, and an essential component of global sustainability. On a technical level we already have many of the pieces that we need to construct communities that would be much more sustainable than those we inhabit today. We can even identify working examples of urban activities that are more sustainable than the typical ones. However, the incentive structure of regulations, prices, and taxes does not encourage the diffusion of these improved practices. We need to put into place the regulations—such as a tax on car-bon emissions—that will create a marketplace that rewards those people who behave in a more sustainable way. Despite the fact that national governments sign agree-mints—such as the Convention on Climate Change—that form the framework for new national regulations, the best hope for implementing more sustainable practices is at the level of local government and its communities, as well as individual households. In order to encourage change at this level, we should provide the information that people need to measure their impact on the planet and encourage them to develop strategies to reduce that impact.

Key Words: Abstract, Introduction, Sustainable Development, Origins of the Concept of Sustainable Development, The Industrial Revolution, The Lingering Paradox, What Does "Sustainable Urban Development" Mean Organizationally?, How Might Sustainable Urban Development Work Technically?, Household Water Usage, Household Energy Usage, Implications of Sustainable Urban Development, Examples of Sustainable Urban Development, Conclusion, Bibliography.

1. Introduction

The prevailing pace and pattern of urbanization obviously has enormous potential to severely dim the prospects of global sustainability. At the same time, the economies of scale and agglomeration economies associated with the city might well be exploited to enhance the future of humanity. The critical question is: How can we reconcile the expected use of so much more of every-thing with the accumulating evidence that the human "load" on the ecosphere already exceeds global carrying capacity. Despite the potentially pivotal role of cities, and despite two UN Habitat conferences on urban prospects (Vancouver in 1976 and Istanbul in 1996), the future role of the city has been all but ignored in the mainstream sustainability debate. For example, the World Conservation Strategy of 1980, which apparently first explicitly used the term "sustainable development," paid no special attention to accelerating urbanization. The Brundtland report did raise the issue, but kept the main emphasis on the urban crisis in developing countries, effectively letting more prosperous nations off the sustainability hooks.

Overlooking the future impact of the city on sustainability—particularly rich cities—is difficult to reconcile with physical reality. Up to 80 percent of the populations of high-income countries already live in cities and, as noted, half of humanity will be urbanized by early in the twenty-first century. High-income cities in particular

impose ever greater burdens on nature. Since the wealthiest 25 percent of the human population consumes 80 per-cent of the world's economic output (WCED 1987), approximately 64 per-cent of the world's economic production/consumption and pollution is associated with cities in *rich* countries. Ten percent or less is tied to cities in the developing world.

In short, approximately "half the people and three-quarters of the world's environmental problems reside in cities; and rich cities, mainly in the developed Northern Hemisphere, impose by far the greater load on the ecosphere and global commons" (Rees 1997: 304). "Today, with [increasing numbers of] megacities feeding off a global hinter-land, new popular ideas are required to ensure the sustainability of our cities" (Girardet 1992: 40). A sustainability assessment of urbanization is clearly long overdue.

2. Sustainable Development in Urban Areas

Sustainable development was initially associated with sustainable environmental development in response to the degradation and destruction of ecosystems and species that have occurred as a side-effect of the growth of the human economy and population over the last 200 years. No sooner was the term coined when critics pointed out that a strictly physical interpretation of the crisis seemed to imply assigning a lower priority to human needs, both economic and social. In fact, this assumption is counterproductive to the goals of sustainable development and is very rarely implied by its advocates because the growing weight of human poverty demonstrates the continuing need for the expansion of economic and social opportunity. Thus, most seekers of sustainable development assume that these opportunities should expand in order to become available to all, while remaining within the physical bounds of what can be maintained indefinitely. We must keep in mind that there is a very important distinction between the social, economic, and physical aspects of sustainability. Whereas poor decisions regarding social and economic aspects might be terminal for an individual, or smaller groups of individuals, they are rarely so for the entire human species. This is not true for the physical aspect; our global society is making irreversibly destructive choices every day, such as allowing the loss of biodiversity (and hence the extinction of species) and by changing the composition of the atmosphere in ways that cannot be reversed in the lifetime of people living today.

Sustainable development became an issue of widespread concern with the publication in 1987 of "Our Common Future," the summary report of the World Commission on Environment and Development (the Brundtland Commission), which had been holding meetings around the world for the previous two years (WCED 1987). The commission produced a carefully balanced assessment that attempted to determine the severity of the world's deepening environmental predicament without sounding alarmist or trig-Gering despair. The phrase "sustainable development" itself is characteristic of that balancing act and therein creates an apparent paradox. The development path charted by today's wealthier countries is anything but sustainable on a global scale, so how can we conceive of "development" that operates in a radically different way? That is a question that this book explores at the local level.

For many years—indeed, since the earliest civilizations—observers have commented on the destructive side-effects of many human endeavors, including major economic activities such as mining, agriculture, transportation, and industry. Some side-effects were slow-moving processes such as soil erosion, deforestation, and depletion of fisheries, acid deposition, and eutrophication of water bodies. Locally, these processes might occur in accelerated form such as landslides and forests fires, but on the global scale the changes were incremental and rarely triggered widespread alarm.

This complacency was shattered in the 1980s by the realization that human activity was changing the composition of the atmosphere quite rap-idly with potentially irreversible impacts that might be highly detrimental to the health of all members of the human species, whether rich or poor (White 1994). It became

clear that the depletion of the stratospheric ozone layer and the accumulation of greenhouse gases in the atmosphere have the potential to destabilize humanity's planetary niche. At the very least, this kind of documented atmospheric change has injected a large amount of uncertainty into human affairs and the negative side-effects can no longer be safely assigned to just the poorer members of society (as could many previous environmental stresses, such as polluted drinking water). It has become increasingly apparent that not even the advanced technology and ingenuity of modern science can find substitute products to compensate for the increased penetration of ultra-violet radiation or the loss of reasonably predictable climatic regimes. The prospects of these kinds of atmospheric changes that cannot be reversed in the lifetime of this generation have finally seized the popular imagination as a potentially very serious problem for us all.

It was this fear that was the impetus behind the conception of a development path that was sustainable, defined by the Commission as, "Development that meets the needs of the present generation without compromising the needs of future generations." This simple aspiration is understandable enough as a goal, but it remains unclear whether we—as a global community of human beings—can put it into operation. Despite the uncertainty regarding the practicality of the goal, the search for "sustainable development" has become a concept with a life of its own. Why is it only now just beginning to be part of our consciousness?

2.1 Origins of the Concept of Sustainable Development

An idea as fundamental as this must have its precursors and indeed it does. Throughout human history, there have always been writers and artists who have imagined a world more harmonious than the one they inhabited. Such harmony is not confined to the physical environment, but also embraces the cultural environment and the concept of justice. One of the most famous books on this theme, *Utopia*, was written by Thomas More (originally published in Latin in 1516) to describe another country, one most unlike the England in which he lived. King Henry VIII, the monarch at the time, so strongly objected to More's opinions that more was beheaded. Although most of *Utopia* is devoted to social, religious, and political matters, it also describes physical details of everyday life, including buildings, the provision of food and water, and the importance of farming, which is practiced by every member of this idyllic society, on a rotational basis. These ideas resonate through the ages, down to Ernest Callenbach's *Ecotopia* (1975).

It says a great deal for human aspirations and imagination that writers such as these can portray living conditions so unlike anything they could have experienced. Before the Industrial Revolution, except for deforestation, the land had not been so extensively ravaged. Living conditions, however, were appalling compared with the conditions enjoyed by most families in industrialized nations today. Ironically, it was the Industrial Revolution— and the agricultural revolution which accompanied it—that gradually improved the standard of living for the common man, not just the elite. Yet it was these modern production processes that have also inflicted the deepest and most long-lasting damage on the biosphere on which humans and all other species depend.

3. The Industrial Revolution

The Industrial Revolution is a simple phrase that encapsulates a complex range of interlinked processes, some of which were extremely beneficial for the human species and others which were detrimental to the environment in the longer term. Consequently, people reached only for the benefits and ignored the depletion of natural, or ecological, capital. In physical terms, the revolution included a dramatic switch from the reliance on organic materials and energy sources to inorganic sources—that is, from wood and thatch for construction to bricks and iron; from human, water, wind, and animal power to fossil fuels. This had profound implications for the accumulation of waste in the water, on the land, and in the air. The subsequent development of chemical industry also made the waste stream from human activities more complex and problematical.

Not only did the mix of wastes change, but also the volume of waste increased exponentially. Rivers that had once broken down human and animal wastes naturally became sewers. Village rubbish dumps grew into vast pits of no degradable materials. Spoil heaps from small scale, artisanal mines became towering slag heaps and major features of the industrial land-scape. Economist Herman Daly describes this transformation as increasing "throughput" of the materials, energy, and water that people now required for their daily needs (Daly and Cobb 1990).

After the more acute deficiencies of the Industrial Revolution (labor exploitation, lack of sanitation, and so on) were addressed, the human population in the industrial regions began to soar. People had larger families and they began to live much longer. As they became wealthier, they required more "throughput" and, consequently, they created more waste.

In retrospect, from an end-of-the century perspective, this process of human enrichment based on fossil fuels, chemically controlled agriculture, deforestation, depletion of marine resources, and so on, was not without its dangers. Yet until quite recently such concerns would have been dismissed by the population at large and nearly all of their elected leaders. As noted recently by the World Bank, "These losses were once viewed as the price of economic development" (World Bank 1998). What most people saw was the positive side of these economic changes—literacy, longer life, higher incomes, and more consumer goods. In the 1960s, the accumulation of these goods was celebrated as a goal in itself; indeed Walter Rostow viewed it as the ultimate stage of economic growth, when all consumers would enjoy the "age of high mass consumption" (Rostow 1969). Society's goal had shifted from a modest "chicken in every pot" to a television in every room and three automobiles in every garage.

Can the alarming side effects of this level of accumulation be controlled? The possibilities are diminished as the population in the richest countries move from urban living to lower density suburban living. One negative effect of living at lower densities is that under our present incentive structure, public transportation is not convenient or economically self-sufficient; hence, owning an automobile is currently a necessity for all suburban residents. With a way of life so ingrained, how can we begin to implement sustainable urban development?

4. The Lingering Paradox

Modern cities in wealthy nations epitomize the benefits of the fossil fuel-based development path; they offer the best access to high-paying jobs, entertainment, health care, and educational opportunities. They are also profligate in their use of energy, water, and materials; the built environment absorbs heat during the day and thereby creates its own "heat island effect," which requires more energy for cooling homes, offices, and hotels. Even in winter, in a northern city like Toronto, large buildings use energy for cooling. In the words of a colleague, the modern "built environment" is nothing but a "heated rock pile" (Hansel 1997). None of this is sustainable, in terms of the situation we will bequeath to the next generation.

The term "sustainable urban development"—like its parent, "sustainable development"—represents an aspiration only (Stren et al. 1992; Atkinson and Atkinson 1994; Nijkamp and Capello 1998). We do not know if it is attainable or not, but clearly it is a desirable goal. If we observe the modern industrial and post-industrial city, we see an assemblage of immensely wasteful processes dedicated to a range of activities, many of which are seemingly futile. The use of the automobile as a means of mass transportation is the most obvious case of wastefulness and futility. In virtually every major modern city, "rush hour" has now become the "crush hour," consisting of dense packs of slowly moving, or stationary, vehicles. New freeways bring temporary relief and then become as clogged as the streets they replaced. The management of the hydrological cycle is scarcely

more efficient, as we all use far more water than we need, and then we poison it with the pollutants produced in our cities, thereby making it much more expensive to clean and return to use.

Although today's richer cities are much cleaner now than they were when in the throes of the nineteenth-century Industrial Revolution, opportunities for reducing the production of troublesome residuals, or pollutants, abound as we shift from an industrial economy to an information economy. Information technology now makes the possibility of "telecommuting"—working from home—a reality for some businesses. Yet the proliferation of the use of automobiles for non-commuting trips has negated any reduction in transportation demand this shift in the employment profile has produced.

Is the modern city a hopeless case in our search for sustainability? On the contrary, the very wastefulness of our current activities implies that opportunities for making our cities more sustainable do exist in abundance. Thus, we can imagine making future decisions that move us toward sustainability by reducing our impact on the natural, or ecological, capital on which future generations depend.

There still remains an inherent ambiguity in the search for sustainability at the local level, such as an urban system. Does usage of the term, and declaring it as desirable societal goal, mean that each local area, each rural and urban system must now be self-sufficient? Does this mean that each city must now identify a surrounding "bioregion" from which it must draw all its supplies and treat all its wastes? It has been calculated that we will need the resources of the equivalent of three planet earths, if the world's current population continues to live at the OECD average of today (Wackernagel and Rees 1996). Given the ambiguous, even contradictory, nature of the term "sustainable urban development," it may be useful to put it aside for the time being and replace it with a more readily operational concept such as "the ecological city," which can be described as "a built environment that operates in harmony with the ecosystems on which it depends." Even if for the time being we replace the difficult goal of sustainability with the even more ambiguous term, "harmony," there still remain some very difficult proposals to consider. For example, is the ultimate goal to establish self-sufficient bioregions, each with an "ecological footprint," greatly reduced from those currently found in the more prosperous nations? Would there be no trade in goods—or export of residuals, such as air pollution—permitted across the boundaries of these regions? How big would they be? Could they change in size or composition over time? Would we have to assume that the world population was down to replacement level to even think about such a scheme as viable?

2.2 What Does "Sustainable Urban Development" Mean Organizationally?

The physical problems inherent in trying to devise a sustainable society are daunting, yet the organizational challenge poses even more difficult questions, at every level from individual behavior to global government. The organizational issues will be discussed here, and the physical issues in the next section. As the human impact on the biosphere has increased, environmental issues have steadily climbed up the hierarchy of human organizations. Environmental issues such as air and water pollution were not dealt with at the local level until the 1950s when national governments first enacted clean air legislation. In the 1960s and 1970s the problems of regional scale acid deposition and the pollution of international waterways led to the first international agreements, in Western Europe and North America, for example. In 1988 at the conference "The Changing Atmosphere," it was recognized that the composition of the atmosphere was a problem of the global commons and that all sovereign nations would have to work toward an agreement (Environment Canada 1988). The Earth Summit, at Rio de Janeiro in 1992, was the first time that all countries of the world met together, whatever their level of wealth or ideological persuasion.

The perceived urgency of the global environmental challenge had driven the leaders of nearly all the world's nations to consult one another and attempt to map out a future path for human development on Earth. The outcome from Rio included a set of con-venations and an ambitious handbook for environmental reform, Agenda 21, a blueprint for the twenty-first century (Grubb, et al. 1993).

It is commendable and encouraging that the world's leaders got this far and were able to maintain a regular schedule of subsequent meetings on the Convention on Climate Change. International rhetoric is, not surprisingly, very rarely matched by positive action; this level of dialogue is only the most visible part of what is nothing less than a revolution in the way all the world's people live. At its simplest level, this means, first, as the Brundtland Commission (WCED 1987) recognized, that the commitment to eliminate world poverty must be accepted as a priority, while simultaneously the wealthier people of the world must radically change their lifestyle to reduce the volume of the "throughput" of materials, energy, and water that they currently use. All of this implies the involvement at every level of society, from national governments through regional and municipal governments, down to smaller neighborhoods and individual households.

The need for this kind of multi-level participation was anticipated at the Rio Conference where a commitment was made to develop "Local Agenda 21s" at the local government level. This recognition is a logical continuation of the injunction to "think globally and act locally," proposed at the United Nations Conference on Human Development, held at Stockholm in 1972. Admirable as that slogan is, the intervening years have seen little organized action to put it into practice. The emergence of a new type of global governance based on the recognition of the need for simultaneous social and environmental reform now provides hope that significant action at the local level can form a valuable—if not *the* most valuable—contribution to implementation of the conventions that have been signed at the international level. For example, at the second United Nations Conference on Human Settlements (Habitat II) in Istanbul in 1995 many representatives of urban governments and NGOs presented contributions to Local Agenda 21. Organizations such as the International Council for Local Environmental Initiatives have helped to build networks of reform-minded urban groups, including many municipalities and some regional governments. At the Kyoto Conference of the Par-ties to the Convention on Climate Change in 1997 municipal governments played an official role for the first time; they also demonstrated their support to the venture by producing a ranking of cities that had gone furthest to reduce greenhouse gas emissions within their jurisdictions.

This is no small achievement; indeed, several significant barriers had to be overcome simply to get this far. First, these global negotiations between sovereign states are the exclusive responsibility of central governments, not provinces or municipalities; up until this point central governments had retained exclusive control. Second, political pressure exists at the opposite end of the scale by voters in local elections who are generally reluctant to fund international activities by their representatives. It is often construed as a duplication of effort and a waste of scarce local revenues by voters. Thus, we can assume that considerable momentum lies behind the recent steps toward forming an environmentally active international network of local governments.

We do not yet know if this emerging infrastructure of global environmental governance will one day be capable of implementing the physical changes that will be necessary to build our sustainable cities, or ecologically benign, settlements. But at least an encouraging start has been made.

2.3 How Might Sustainable Urban Development Work Technically?

Although sustainability will require agreements between many organizations in order to become operational, the fundamental building block for its survival is household and individual behavior. Much of the change may hap-pen voluntarily, at or least willingly, following effective leadership at the local level. A first step toward

this change is knowledge of the environmental implications of our current behavioral modes. This may be accomplished through a number of channels of communication simultaneously.

First, environmental education must occur at every level, formal and informal. Many people still regard the environment as something "technical" or "scientific" that they cannot, or need not, understand. This assumption immediately closes the individual off from any personal engagement with the challenge of sustainability. As quickly as possible people need to understand that the "environment" is what keeps us alive, through breathing, eating, drinking, and so on. It is not separate or extraneous; it permeates every aspect of our lives and is something for which we not only have a responsibility, but a vital need. It should be made clear through this type of education that the environment is as important for our well-being as shelter from the elements and money in the bank. As a society, we need to take "the environment" out of the realm of science and re-install it as common knowledge, just as it was for our pre-industrial forbears.

Second, each individual and household should be made aware of their impact on the environment through the measurement of their "ecological footprint," which estimates the amount of land it takes to support the cur-rent lifestyle. Invariably, people in prosperous nations are astonished to learn just how much land and energy they do require. It is this kind of awareness that encourages them to assume personal responsibility for sustainability.

Third, in order to provide incentives to reduce that footprint, we need visible indicators around us to monitor our ongoing use of certain resources in the house, such as water, electricity, and natural gas. All of these uses are (or can be) metered, but the meters are usually placed in out-of-the-way corners of the house; instead, they should be located in a prominent position, such as on the kitchen wall, where everyone would have a visible incentive to use less and keep the system running at the minimum usage necessary. Rate structures should also be changed so that the unit cost increases above a certain threshold of reasonable use.

These knowledge gaps can be summarized as:

The technical challenges for an ecological city (as defined above) fall into three broad categories, among which there is always some overlap—these are water, energy, and materials. Although water is rarely seen as a critical factor in many wealthy countries of the Organization for Economic Cooperation and Development (OECD), it is already at a critical point in the poorer nations of the world. It is just a matter of time before even in the most developed countries it will become more salient. Just as living plants have factors that limit their growth such as temperature, water, and nutrients, so does human society; of these factors, water is probably the most critical because there is no substitute for it, and water, in turn, is a determining factor in the world's food production.

The following ideas are suggestive only, as it is too early in our search for sustainability to be prescriptive. There may be better alternatives that may emerge that we cannot even imagine today. However, the prescriptive terms "should" and "must" are used as a stimulus for debate until those better alternatives are identified.

5. Household Water Usage

The improvement of household water quality was probably the most important factor in reducing mortalities during the Industrial Revolution, although water-related diseases like typhoid, cholera, and yellow fever continued to be an intermittent problem even for the more prosperous countries throughout the nineteenth century. Once the water quantity/quality problem was solved, people in these countries lost sight of its critical importance to their well-being. Water was cheap and abundant, with many house-holds paying only a token amount for an unlimited supply. Water use was, and continues to be, abused under this system. While it is important for public health reasons to make good quality water readily available for every household, the current system must be revamped from the benign neglect into which it has fallen in the public consciousness.

All households should have their water supply metered and higher prices should be charged for non-essential uses such as washing automobiles and maintaining water-demanding yards and gardens. As an industrial material, it should be charged at the full price for delivery and restoration for all commercial uses in industry and agriculture.

6. Household Energy Usage

Energy has also been made available very cheaply through the widespread use of fossil fuels, with no forethought of the environmental cost, such as acid deposition, climate change, ozone impacts on health, and so on. Cheap energy, like cheap water, was often seen as a key component of economic growth, and there has been an unwillingness to take a comprehensive view of the costs of this policy. The ramifications of this uncritical provision of cheap energy have been apparent since the 1950s, but even now there is a resistance to stand back and see what our policies have wrought. As a result, our modern settlements are comprised of thousands of separately heated and cooled buildings that are supplied by independent power plants requiring enormous amounts of water for cooling, while this warmed water is then dissipated into a nearby cold water body. Ideally, district or neighborhood-wide heating and cooling systems should be used for efficiency, but not within a system that removes choice of temperature from a particular building or room. We also need to replace the automobile as a mass transportation system with a public rail and bus system wherever it can be supported by the density of population. Because density is the key to efficient public transport, higher density must be maintained as an essential characteristic of our settlements.

As previously noted in an earlier section, the Industrial Revolution brought about a shift from the predominant use of organic materials to the use of the inorganic. This meant, at the simplest level, that human waste was no longer "carried away" by microorganisms that broke them down and used them in their own biological cycles. Instead, our solid wastes began to accumulate, requiring transportation (and energy) to take them away and land in which to bury them. Other wastes were discharged directly to the ground, to water bodies, and into the air. Waste management is still viewed in a piecemeal fashion, with various authorities carrying away solid waste, others in charge of restoring water quality, and still others trying to restore air quality. None of these various agencies have time or incentive to get together and review the whole implication of the growing impact of human waste products on the natural recycling processes of the biosphere. Ideally, the search for sustainability should include a review of the activities and the re-use of human wastes in a strictly biological context.

2.4 Implications of Sustainable Urban Development

None of the ideas presented so far are likely to occur spontaneously under the present "rules of engagement" with the biosphere. Clearly, these rules will have to change significantly if any improvement is to be expected. This section will introduce only a few key rules, while the detailed implications will be found later in this book. Development along the material path stimulated by the Industrial Revolution is epitomized by the capture of stored energy from fossil fuels. Gradually, this discovery has freed humanity from the constraints of growing wood for fuel and timber, which was a land-use in competition with every other land-use, such as agriculture. Once energy could be excavated, this tight constraint of competing land-uses was broken. The Industrial Revolution made many individuals enormously wealthy; it also reduced the human mortality rate to the extent that the species multiplied at a rate biologists typically associate with a pest outbreak. Pest outbreaks occur when a species suddenly finds itself in a situation where it can reproduce much more effectively, either because the conditions that support its life have improved (like humans discovering coal), or a predator has suffered a reversal in numbers.

The pest then rapidly exploits its expanded niche, until ultimately, it crashes. In other words, the population falls to its lowest historical level or possibly even becomes extinct. Like all pest outbreaks, the very rapid expansion of our species will come to an end. We may be unique among other species on this planet in that we have the capacity to examine our situation as we go along; we also have the ability to regulate our situation if we can achieve consensus as to how to do that.

The attempts to develop a global consensus on our predicament are an indication that this examination and regulation process has begun. If we are going to move toward sustainability, the next step is to change the current incentive structure, which has produced the current crisis.

The guideline for changing this incentive structure is that we should pay more, through pricing and taxation, for the activities that harm the planet and pay less for activities that make a positive contribution. A tax on carbon is one sweeping measure that could have immediate and far-reaching consequences. In the short run, it would drive the economy toward more efficient use of fossil fuels and simultaneously discourage non-essential or substitutable uses. This kind of tax would raise the cost of transportation, thereby giving local products (or substitutes) a pricing advantage over international trade. The world would become a more bioregional sort of place, as entrepreneurs would begin to re-examine local opportunities. The increased cost of transporting solid wastes far from the point of production would be yet another long-term beneficial side-effect of such a tax. These kinds of shifts would not happen easily because people would more than likely object to tax increases and overall price increases, along with diminution in their choice of goods. Another probable reaction by the public to overcome is the typical "not-in-my-backyard" (NIMBY) reactions to dealing with wastes locally.

A second change concerns the cost of labor relative to the cost of materials. Under the present incentive structure there is very little reason to conserve materials because they are inexpensive. On the other hand, labor is relatively expensive. This incentive structure has produced a "throwaway society" with a growing problem of solid waste disposal and a seemingly permanent body of unemployed; it runs counter to the recognition of the need to reduce, re-use, and recycle. If the full costs of waste disposal, including polluted water and polluted air, were paid for by the users of the goods and services that produced the wastes, then those costs would rise dramatically. It then makes economic sense to employ people to use, and re-use, materials more efficiently.

This shift would put people back to work to repair the damage they have done, and are continuing to do, to the planet. In this way, people could take care of the planet on which they depend, instead of continuing to abuse it with their thoughtless use of its resources. Positive initiatives to develop this opportunity should be encouraged at the local level.

At first glance, it may seem improbable and unrealistic to discuss such massive changes in incentive structures, yet several changes at similar societal scales have taken place very recently. Examples include the dismantling of apartheid in South Africa, the (fairly) peaceful disaggregation of the Soviet Union, the apparent end of the Cold War, and the successful suing of tobacco companies in North America to pay for their 100-year assault on public health. If anyone had predicted any of these events even twenty years ago, they would not have been taken seriously. Compared with these changes, the ones proposed above are relatively benign; there would be many winners and very few losers.

2.5 Examples of Sustainable Urban Development

Only a few, partial examples will be offered here—few, because the remain-der of this book will provide many examples of themes that have been introduced in this chapter; partial, because there is no working example of an urban system that is "sustainable" in the sense of the Brundtland Commission's definition. Even the most ecologically benign settlements are depleting nature's capital.

One of the most comprehensive attempts to design a sustainable urban settlement was made by Ebenezer Howard with his plans for "garden cities" (Howard 1985). Paradoxically, Howard's motivation was social improvement and his principal concern for sustainability was financial, for which he pro-posed a form of cooperative ownership. Nevertheless, his design included details of land-use, transportation, and economy that would have been substantially greener than anything we have today. Since he worked in the pre-automobile age, everyone traveled by foot, bicycle, or train; his design called for plenty of green space within the urban area and surrounding agricultural land, which would provide most of the food and material needs of the city—a bioregion, in fact. Sadly, only the low-density land-use parts of the design were put into effect in his lifetime, and even those communities became absorbed into London's suburban sprawl. His concept was revived in the post-World War II development of new towns in Britain and continental Europe, but these communities involved a high percentage of automobile use and the local employment intentions were partly lost as the towns were drawn into the commuter sheds of the major cities. Nevertheless, the proposal remains on the table and it could be implemented today, as designed.

The town of Curitiba, Brazil, is frequently held up as an example of what could be achieved even in adverse conditions. In the 1970s, when the city embarked on its reform, there was already an unpromising mix of widespread poverty and reliance (among those who had a well-paying job) on the automobile (Rabinovitch 1992). The city invested in a high-capacity public transport system based on buses running in dedicated lanes, hence providing a rapidity of travel that enabled it to compete with the automobile. The gradual extension of this service eventually won 75 percent of commuters to the bus system. Finding even one such example proves that the drift towards a deteriorating modal split, losing public transport commuters to the automobile, can be reversed if the will is there. In Dorchester, England, there is a large extension of the town being built on a Greenfield site called Pound bury (Krier, 1989). A driving principle behind the design of Pound bury is the provision of well-serviced neighborhoods to which residents can walk to shops, and in which some of them would work, hence eliminating the need for most automobile-based trips. It is too early to know which activities will evolve in this experimental community, but at least the land-use design permits a very different travel behavior option from the norm in the wealthier cities of the world.

In terms of solid waste reduction through recycling, there are many examples around the world where schemes have been put in place which substantially reduce the volume of household waste that goes to landfill. In Toronto, for example, a combination of composting and curbside collection of garden waste, paper, metals, and plastics can reduce household solid waste generation by 75 percent. However, the financial viability of these efforts depends on the value of the recycled materials and the markets for them are not yet mature.

After several years as a voluntary measure, Toronto is now introducing compulsory metering of water use. On average, it is found that metering reduces household use by as much as 20 percent. These are only a few examples and nowhere do we see, yet, a determined move to make our urban settlements more sustainable. However, every successful change provides a demonstration effect that can be emulated wherever the political will can be found.

7. Conclusion

The notion of sustainable urban development is simple and appealing. It is also a necessity if human beings are to develop a sustainable lifestyle because more than half the world's population is already urban, and the trend toward further urbanization is strong, especially in the poorer countries of the world. However, we are a very long way from knowing how to turn the concept into practice.

The difficulty is based on the historical fact that the prosperity of wealthier nations has been achieved through the widespread use of fossil fuels and other non-renewable sources of energy. This energy path now can be seen as a dead-end in that the modern expansion of human activities has resulted in a massive loss of biodiversity and a changing composition of the atmosphere which will alter the climate in ways we cannot yet predict.

There is no question that we already have the technology to handle or to greatly reduce our negative impacts on the biosphere and to move toward a more sustainable way of life (von Weizsacker et al. 1998). We can also see the emergence of new forms of global governance through networks of urban communities willing to implement the necessary changes, and it is probably these local initiatives that will provide the momentum and determination to meet the commitments that are being signed between national governments.

However, the implementation of the more environmentally benign technology will require substantial changes in lifestyle, and this will, in turn, require changes in the incentive structures that govern contemporary urban life in the richer countries of the world. This alternative lifestyle needs to be demonstrated as a viable choice so that the poorer countries do not emulate the environmentally destructive practices that are the norm in richer cities today, such as widespread reliance on the automobile as a means of mass transportation. In the most general terms, we need to develop an incentive structure that will encourage society to reduce, re-use, and recycle. Through regulation, markets, and taxes we could substantially reduce our use of energy, water, and materials, and with technology that is available now, reduce the production of solid, liquid, and gaseous wastes. We can identify examples around the world where some of the correct steps have been taken and sustained. However, there is, as yet, no strong movement towards making these practices a worldwide standard.

8. Bibliography

[1] Atkinson, A. and F. K. Atkinson, eds. 1994. "Sustainable Cities," special issue of *Third World Planning Review* 16, 2.

[2] Callenbach, E. 1975. *Ecotopia. The Notebooks and Reports of William Weston*. New York: Ban-tam Books.

[3] Daly, H. E and J. B. Cobb. 1990. *For the Common Good*. London: Green Print. Environment Canada. 1988. *The Changing Atmosphere: Implications for Global Security*. Ottawa: Environment Canada.

[4] Grubb, M., M. Koch, A. Munson, F. Sullivan and K. Thompson. 1993. *The Earth Summit Agreements: a Guide and Assessment*. London: Earth scan. Hansell, R. I. C. 1997. Personal communication.

[5] Howard, E. 1985 (originally published in 1898). *Garden Cities of Tomorrow*. Builth Wells: Attic Press.

[6] Krier, L. 1989. Master plan for Poundbury development in Dorchester. *Architectural Design Profile*:46 55.

[7] More, T. 1974 (originally published in 1516). *Utopia*. New York: Washington Square Press. Nijkamp, P and R. Capello, eds. 1998. "Sustainable Cities," special issue of *International Jour- nal of Environment and Pollution* 10, 1.

[7] Onisto, L.J., E. Krause and M. Wackernagel. 1997. *How Big Is Toronto's Ecological Footprint? Using the Concept of Appropriated Carrying Capacity for Measuring Sustainability*. Toronto: Centre for Sustainable Studies and the City of Toronto.

[8] Rabinovitch, J. 1992. Curitiba: Towards sustainable urban development. *Environment and Urbanization 4*, 2: 62-73.

[9] Rostow, W. 1969. *The Stages of Economic Growth*. Cambridge: Cambridge University Press.

[10] Stren, R. E., R. R. White and J. B. Whitney, eds. 1992. *Sustainable Cities: Urbanization and the Environment in International Perspective*. Boulder: Westview.

[11] Von Weizsacker, E., A.B. Lovins and L. H. Lovins. 1998. *Factor Four: Doubling Wealth—Halv- ing Resource Use*. London: Earthscan.

[12] Wackernagel M. and W. E. Rees. 1996. *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: The New Society Publishers.

[13] White, R. R. 1994. *Urban Environmental Management: Environmental Change and Urban Design*. Chichester: John Wiley & Sons.

[14] World Bank. 1998. *World Development Report 1998/99: Knowledge for Development.* Oxford: Oxford University Press.

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