



Economic, social, and environmental sustainability in development theory and urban planning practice

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Summary. In ten years, more than half the world's population will be living in cities. The United Nations (UN) has stated that this will threaten cities with social conflict, environmental degradation and the collapse of basic services. The economic, social, and environmental planning practices of societies embodying 'urban sustainability' have been proposed as antidotes to these negative urban trends. 'Urban sustainability' is a doctrine with diverse origins. The author believes that the alternative models of cultural development in Curitiba, Brazil, Kerala, India, and Nayarit, Mexico embody the integration and interlinkage of economic, social, and environmental sustainability. Curitiba has become a more livable city by building an efficient intra-urban bus system, expanding urban green space, and meeting the basic needs of the urban poor. Kerala has attained social harmony by emphasizing equitable resource distribution rather than consumption, by restraining reproduction, and by attacking divisions of race, caste, religion, and gender. Nayarit has sought to balance development with the environment by framing a nature-friendly development plan that protects natural systems from urban development and that involves the public in the development process. A detailed examination of these alternative cultural development models reveals a myriad of possible means by which economic, social, and environmental sustainability might be advanced in practice. The author concludes that while these examples from the developing world cannot be directly translated to cities in the developed world, they do indicate in a general sense the imaginative policies that any society must foster if it is to achieve 'urban sustainability'.

Introduction

In May 1996, the United Nations Population Fund reported that in the year 2006 more than half the world's projected 6.6 billion people will be living in urban areas. This raises the prospect of crowded, violent and unhealthy cities threatened by the escalation of social conflict, and intolerable environmental degradation, and the collapse of basic services (*Los Angeles Times*, 1996). As an antidote to these economic, social, and environmental ills, city and regional planning regimes embodying 'urban sustainability' must be constituted. There is no universal archetype, 'the sustainable city', but thousands of possible 'sustaina-

ble cities', for each city has unique historical, cultural, political, and environmental circumstances. However, planning regimes oriented towards 'urban sustainability' can be adapted from approaches formulated in cities and regions where problems of infrastructure, social equity, and urbanization of the environment have been creatively addressed.

Visionary planner Jaime Lerner has designed urban planning solutions for the Brazilian city of Curitiba that meet the service needs of the general public while enhancing the naturalness of the urban environment. He has given particular attention to designing an efficient and desirable intra-urban bus system, to expanding urban green space, and to meeting the basic needs of the urban poor. Curitiba demonstrates that the goal of making cities more 'green' to mitigate their

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impact on the environment can be embodied in infrastructure projects which make cities more livable for humans.

The communitarian culture of Kerala, a state in India, has reduced social conflict by emphasizing the equitable distribution of economic resources rather than merely their production. Kerala strives for low rates of reproduction and consumption, manufactures only that which is necessary and does so in a deliberate manner, and has tried to eliminate discrimination based upon race, caste, religion, and gender. Kerala shows that a society characterized by a high degree of mutuality can be very resource efficient and attain a high quality of life.

The conservation group The Cousteau Society has proposed a nature friendly development plan for the Mexican state of Nayarit that allows for economic growth while protecting the integrity of natural systems. The Nayarit plan begins the development process by asking which aspects of the natural environment should be saved from development, and contains effective provisions for public participation. The Nayarit plan reveals how the natural environment, placed in its proper perspective, should act as both an opportunity for development and a constraint upon development.

In this paper, the author grapples with the question of how an integrated paradigm of social, economic and environmental sustainability suggested by these models might inform the practice of city and regional planning throughout the world.

Historical background

The doctrine of 'sustainable development' derives from a discipline in economics that has been evolving for almost two centuries. The debate about whether Earth's limited natural resources will continue to provide life support for humanity's burgeoning population began with the work of the English political economist Thomas Malthus in the early 1800's (see Dixon and Fallon, 1989).

In *An Essay on the Principle of Population* (1798), Malthus framed the fundamental tenet of environmentalism—namely, that because human population tends to grow in a geometric progression while subsistence can grow in only an arith-

metic progression, population growth is destined to be checked by natural resource depletion and inevitable human want and misery (see Eblen and Eblen, 1994).

Since the days of Malthus, economists have tended to ignore the dilemma of resource depletion. Traditionally, economists have been concerned with the efficiency of resource use. They have been slow in developing economic models that adequately account for resource scarcity and pollution. Only rarely have economists worried that some resources may be in short supply, and that if these resources are used indiscriminately, they may become exhausted and constrain the very growth for which they are developed. Hence, economic theories explaining long-term growth and technical progress have remained unsettled into the modern era (see Freeman, 1973).

In recent decades, global concern has emerged about the non-renewability of natural resources as a factor limiting production and the threat to long-term economic growth caused by environmental destabilization and pollution. Economists have begun to address the question first posed by Malthus whether exponential growth in population and in resource use but only linear growth in technology and in subsistence is bound to lead to a social catastrophe—in a word, whether the contemporary course of economic development is 'sustainable'.

The first influential work examining whether the current paradigm of world economic development is 'sustainable' was *The Limits to Growth* (The Club of Rome, 1972). A team led by Donald and Donella Meadows at the Massachusetts Institute of Technology simulated a computerized world model ('World 3') and entered into it data assuming that population, industrial production and pollution would continue to grow exponentially in the future (as they have in the past). The Meadows' team concluded that since the world is physically finite, exponential growth of these three key phenomena must eventually hit a limit. They predicted that as of 1972, the limit was only a generation away. Absent an emergency mobilization, it would likely be reached not through a smooth transition to more frugal lifestyles, but by a crash from good to very bad conditions—a poor, crowded, hungry, and polluted planet. They advised that averting catastrophe would require

radical 'value changes', such as policies to recycle resources, to put birth rates into parity with death rates, to hold capital investment equal to depreciation, and to both reduce consumption and change its emphasis from the consumption of goods to the consumption of services (Krier and Gillette, 1985). This controversial study, distributed in millions of copy worldwide, made many fear a looming Malthusian crisis of the environment and development.

The concerns expressed in *The Limits to Growth* were echoed internationally. In *A Blueprint for Survival* (Editors of *The Ecologist*, 1972), a distinguished British panel wrote that our 'industrial way of life with its ethos of expansion' is not 'sustainable'. Rates of growth in population and consumption are undermining human survival prospects by disrupting ecosystems and depleting resources. The panel concluded that a stable society would cause minimum ecological disruption, practice maximum conservation, and maintain a constant population. 'Our task is to create a society which is *sustainable* and which will give the fullest possible satisfaction of its members', they wrote.

The apprehension that industrial production is eroding the natural resource base upon which economic development depends led to the UN Conference on the Human Environment at Stockholm in 1972. The Stockholm conference brought representatives of developed and developing nations together for the first time to debate humanity's right to 'a healthy and productive environment'. Participants addressed transboundary pollution, cooperative management of shared resources and the global commons, and agreed to open their courts to transboundary proceedings (Boyle, 1995).

Stockholm set the stage for later treaties protecting the global commons, for example, the World Heritage Convention, the Whaling Convention, and the Montreal Protocol on Ozone Depletion. These agreements created the doctrine of 'global trusteeship' upon which the doctrine of 'sustainable development' would later be founded (Boyle, 1995).

In the early 1970s, Daly proposed a 'steady-state economics' challenging prevailing dogmas based on the efficiency of resource use. In stan-

dard economics, ever-growing cycles of production and consumption are addressed, but not the limits of the supporting ecosystem. This view can strain the environment. In 'steady-state economics', the economy is viewed as but a subsystem of a closed, finite ecosystem. A 'steady-state economy' neither depletes the environment beyond its regenerative capacity nor pollutes it beyond its absorptive capacity, but instead, tries to achieve a state of equilibrium with it (Daly, 1973; Daly, 1974; Daly, 1991; Alexander, 1994). It is this 'holistic' view of economics upon which all modern 'sustainability' thinking is based.

In the late 1970s and early 1980s, Brown, founder and president of the Worldwatch Institute, championed the theme of a 'sustainable' world society in many learned writings addressing such problems as overpopulation, non-renewable energy sources, and harms done by industrial production to natural systems.

The term, 'sustainable development', first appeared in the *World Conservation Strategy* drafted by the United Nations Environment Programme (UNEP) and the International Union for the Conservation of Nature (IUCN) in 1980. It should be advanced through 'conservation', defined as 'the management of human use of the biosphere so that it may yield the greatest *sustainable* benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations' (Eblen and Eblen, 1994).

During the 1980s, the results of international development policies caused many to question basic assumptions about economics, society, and the environment. In the post-war era, the conventional development strategy had been unitary, primarily concerned with the alleviation of poverty through economic growth. International development organizations, led by the World Bank and the International Monetary Fund, had financed substantial improvements in developing nations to better their economic conditions, including roads, power plants, and hydroelectric dams. However, the social and environmental consequences of this approach, embodied in the Third World debt crisis and environmental destruction caused by large construction projects, became evident in the 1980s. A global consensus formed that development had aggravated social disparities in

developing nations and accelerated the loss of biodiversity. Hence, in the future, economic development would have to be constrained by social and environmental considerations.

The UN's World Commission on Environment and Development, chaired by Gro Harlem Brundtland of Norway, renewed the call for 'sustainable development' to alleviate poverty, safeguard the environment, and feed the world in 1987. The Brundtland Commission Report, *Our Common Future*, defined 'sustainable development' as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). This definition has been widely circulated and is accepted as authoritative.

At the UN's Conference on Environment and Development (or 'Earth Summit') held in Rio de Janeiro in 1992, diplomats from over 120 nations signed five pacts framing 'sustainable development' as the overarching policy of the 21st century. The 27 principles of *The Rio Declaration on Environment and Development* 'define the rights and responsibilities of nations as they pursue human development and well-being'. Its many references to 'sustainable development' suggest a form of development that integrates economic growth and environmental protection. *Agenda 21* is 'a blueprint on how to make development socially, economically and environmentally sustainable'. *The Statement of Principles on Forests* avows the responsibility of countries to manage, conserve, and develop world forests in a sustainable manner. *The United Nations Framework Convention on Climate Change* seeks 'to stabilize greenhouse gases in the atmosphere at levels that will not dangerously upset the global climate system'. *The Convention on Biological Diversity* implores nations to 'adopt ways and means to conserve the variety of living species' (Keating, 1993).

The 'Earth Summit' was the largest gathering of world leaders in human history. Thus, its enshrinement of the doctrine of 'sustainable development' in public international law is significant. While it is unclear whether or not 'sustainable development' will remain the prevailing paradigm of world economic development, it is certain to greatly influence future discourse in development science.

Theoretical framework of urban sustainability

The advent of 'sustainability' in development science has led planners to apply evolving notions of 'sustainability' to the contemporary debate over how cities and regions should be revitalized, redeveloped, and reformed. 'Sustainability' is regarded alternatively as either the proper means or the proper end of urban development.

Today, it is common in planning circles for urban planners to describe efforts to reverse problems of urban sprawl, congestion, and decline as a search for 'urban sustainability' (see Basiago, 1996). This is the case even though in urban theory no consensus exists as to which human settlements embody 'sustainability'. 'Urban sustainability' might imply the vitality of a city as a complex system, the quality of life of its citizens, or the capacity of nature to support its activities. Some commentators define this concept narrowly in terms of the *economic* 'sustainability' of a city, its potential 'to reach qualitatively a new level of socio-economic, demographic and technological output which in the long run reinforces the foundations of the urban system' (see Ewers and Nijkamp, 1990). Others, notably environmental activists, link 'urban sustainability' to broader *social* principles of futurity, equity, and participation, especially involvement of public citizens in the land development process (see FoE, 1994). When *environmental* planners speak of urban 'sustainability', they mean the pursuit of urban form that synthesizes land development and nature preservation. Hence, for environmental planners, the pursuit of 'urban sustainability' becomes a matter of placing the development of land into cities and the protection of natural systems into a state of vital equipoise (see Lyle, 1994). It is as if city and regional planners have seized upon the ideal of 'sustainability' as a tangible goal, a particular societal end-state, rather than properly viewing it as an organizing principle governing activity at all levels of an urban system, a process for selecting urban alternatives that will yield vitality (see Basiago, 1995).

Perhaps this confusion in planning circles about what 'urban sustainability' will require stems from the fact that *Agenda 21*, the 'Earth Summit' pact that addresses the 'sustainable development' of

cities, both mandates concrete planning measures and implies abstract concepts that should guide planning generally. This is not inconsistent; nonetheless, the tumult over 'sustainability' in planning circles has tended to conflate planning *guidelines*, which are specific in nature and applicable on a case-by-case basis (see Calthorpe *et al.*, 1991) and planning *principles*, which, by definition, must be general and of universal applicability (see McDonough, 1992).

In terms of practical planning guidance, *Agenda 21* proposes a number of concrete measures to achieve 'sustainability' in the socio-economic realm. These include equity, entrepreneurship and technology transfer. *Agenda 21* ties access to land, security of land tenure, tenants' rights, liberalized credit policies, and low-cost building material programs to 'sustainable' urban living for the homeless and for the urban poor. It calls upon developing countries to foster small businesses in the informal economic sector and developed countries to provide developing countries monetary and technical aid to educate environmental managers. Within nations, wealthy districts are asked to provide clean water, sanitation, and waste collection services to poorer ones (Keating, 1993).

Agenda 21 also proposes a number of tangible strategies to bring about 'sustainability' in the environmental realm. *Agenda 21* calls for appropriate technology, transport reform, and urban renewal. Governments are asked to improve rural areas and urban slums, to build moderately sized cities that promote job creation and housing, and to build cities invulnerable to natural disasters. National construction programs based on technologies that utilize local materials and are energy-efficient, non-polluting and labor-intensive, as well as action programs in energy conservation and renewable energy, such as wind, solar, hydro-electric and biomass, are urged. Transport policies that favor public, bicycle, and foot transport over automobiles, municipal development designed to reduce commuting, and land use that contains urban sprawl and prevents it from encroaching upon agricultural land and environmentally sensitive areas are enunciated (Keating, 1993).

In terms of planning principle, however, *Agenda 21* introduces a new paradigm of urban

development. It is this paradigm, rather than the litany of urban reform proposals recited above, that relates 'sustainability' in development theory to 'sustainability' in city planning practice. A lack of understanding in planning circles as to what this urban development paradigm entails may explain why 'urban sustainability' is so often misconstrued as merely an environmental doctrine.

Kahn (1995) writes that the paradigm of 'sustainable development' described in *Agenda 21*, in fact, rests on three conceptual pillars. These pillars are 'economic sustainability', 'social sustainability', and 'environmental sustainability' (Table 1).

Economic sustainability, by way of growth, development, and productivity, has guided conventional development science in the past. Market allocation of resources, sustained levels of growth and consumption, an assumption that natural resources are unlimited and a belief that economic growth will 'trickle down' to the poor have been its hallmarks. 'Sustainable development' expands development's concern with monetary capital to consider natural, social and human capital. Restraint upon economic growth and consumption which deplete these is favored (Kahn, 1995).

Social sustainability encompasses notions of equity, empowerment, accessibility, participation, sharing, cultural identity, and institutional stability. It seeks to preserve the environment through economic growth and the alleviation of poverty.

Table 1. The paradigm of sustainable development in *Agenda 21* as elaborated by Kahn (1995)

Element	Criteria
Economic Sustainability	Growth Development Productivity Trickle Down
Social Sustainability	Equity Empowerment Accessibility Participation Sharing Cultural Identity Institutional Stability
Environmental Sustainability	Eco-System Integrity Carrying Capacity Biodiversity

Some commentators have suggested that poor countries must accept environmental degradation as a short term consequence of economic development. Others have argued that an enabling environment that optimizes resource allocation can obviate the need for such a trade-off (Kahn, 1995).

Environmental sustainability involves ecosystem integrity, carrying capacity and biodiversity. It requires that natural capital be maintained as a source of economic inputs and as a sink for wastes. Resources must be harvested no faster than they can be regenerated. Wastes must be emitted no faster than they can be assimilated by the environment (Kahn, 1995).

The theoretical framework elaborated by Kahn posits that economic, social and environmental 'sustainability' must be 'integrated' and 'interlinked'. They must be coordinated in a comprehensive manner. A hypothetical case of deforestation in a developing country context follows to illustrate this 'integration' and 'interlinkage'. This example amounts to a gross oversimplification, but it nonetheless describes how the economic, the social, and the environmental substrates of 'sustainability' relate to one another.

If a man in a rural area lacks a job (economic), he is likely to be poor and disenfranchised (social). If he is poor and disenfranchised, he has an incentive to engage in practices that harm ecology, for example, by cutting down trees for firewood to cook his meals and warm his home (environmental). As his actions are aggregated with those of others in his region cutting down trees, deforestation will cause vital minerals to be lost from the soil (environmental). If vital minerals are lost from the soil, regional inhabitants will be deprived of the dietary nutrients required to sustain the intellectual performance needed to learn new technologies, for example, how to operate a computer, and this will cause productivity to stagnate (economic). If productivity stagnates (economic), poor people will remain poor (social), and so on.

On the contrary, if a man in a rural area is given a job, he has a greater opportunity to accumulate capital (economic). If he accumulates capital, he can spend it by employing other poor people or buying their products, thereby alleviating poverty (social). If poverty is alleviated, poor

people will be less likely to cut down trees out of necessity. This will help preserve the soil (environmental), and thereby sustain productivity (economic), *et cetera*.

Only by 'integrating' and 'interlinking' economic, social and environmental 'sustainability' can negative synergies be arrested, positive synergies fostered, and *real* development encouraged. Economic, social, and environmental 'sustainability' form elements of a dynamic system. They cannot be pursued in isolation for 'sustainable development' to flourish.

Economic sustainability

Economic sustainability in development theory

'Economic sustainability' implies a system of production that satisfies present consumption levels without compromising future needs. The 'sustainability' that 'economic sustainability' seeks is the 'sustainability' of the economic system itself. The notion of 'economic sustainability' was originated by Hicks. In his classic work *Value and Capital* (1939; second edition 1946), Hicks defined 'income' as 'the amount one can consume during a period and still be as well off at the end of the period'.

Traditionally, economists, assuming that the supply of natural resources was unlimited, placed undue emphasis on the capacity of the market to allocate resources efficiently. They also believed that economic growth would bring the technological capacity to replenish natural resources destroyed in the production process. Today, however, a realization has emerged that natural resources are not infinite. The growing scale of the economic system has strained the natural resource base.

This has caused many commentators, such as Goodland, to question the feasibility of uncontrolled growth and exponential consumption. Goodland (1995) writes that to speak accurately in terms of 'economic sustainability', it is necessary to 'extrapolate the definition of Hicksian income from (its) sole focus on human-made capital and its surrogate (money)...to embrace the other three forms of capital (natural, social and human)'.

An economic system designed in light of the theory of ‘economic sustainability’ is one constrained by the requirements of ‘environmental sustainability’. It restrains resource use to ensure the ‘sustainability’ of natural capital. It does not seek to achieve ‘economic sustainability’ at the cost of ‘environmental sustainability’.

In the literature of sustainable development, it has become commonplace to call for supplanting the prevailing doctrine of economic *growth* with a new doctrine of economic *development*—for pursuing a form of qualitative growth rather than quantitative growth.

Economic sustainability in planning practice

A way to implement the theory of ‘economic sustainability’ in a practical sense is to fashion a method of urban design that meets the urban service needs of the general public, particularly the urban poor, while enhancing the naturalness of the urban environment. This planning approach is found in Lerner’s work for the Brazilian city of Curitiba (Table 2).

The centerpiece of Lerner’s revitalization program for Curitiba is its bus system. The city of Curitiba permits only high-rise apartment build-

ings near its major bus lines, and in the bottom two floors of these are located stores. With stores nearby, residents need to travel less. The proximity of the major apartment complexes to the buses gives a large number of commuters convenient access to transportation. The bus system is the right mix of red express buses on special lanes that speed past slower traffic, local feeder buses, and buses that allow riders to circulate in the downtown area. Riders insert tokens to enter giant, steel-and-glass boarding tubes located at bus stops, and then wait for the buses to dock. This increases the efficiency of the bus system by saving time usually wasted in fare-paying. The specially designed buses themselves are faster, cheaper, and more comfortable than automobiles, which may explain why more than 900 000 riders a day, or two-thirds of Curitiba’s population, rely on them. As a result of its popularity, Curitiba’s public transit system pays for itself (Moore, 1994).

Curitiba is also a ‘green city’. Lerner has promoted the creation of public parks, placed a lush botanical garden downtown, and established ‘green zones’ to safeguard its open space. Busy downtown avenues have been converted into pedestrian malls, causing businesses there to flourish. The law protects every tree in the city. A

Table 2. Substrates of economic sustainability in planning practice—Curitiba, Brazil

Element	Criteria	Means
Economic Sustainability	Growth Development Productivity Trickle Down	<ol style="list-style-type: none"> 1. Launch program to reduce automobile use 2. Establish a modern bus mass transit scheme 3. Enhance bus system efficiency to draw riders 4. Make bus transit fast, cheap and comfortable 5. Place high density living near major arterials 6. Zone for mixed residential/commercial use 7. Make downtown streets pedestrian malls 8. Expand green zones to safeguard open space 9. Enlarge the amount of <i>per capita</i> green space 10. Enact regulations to protect every urban tree 11. Allow poor to swap their garbage for food 12. Encourage residents to separate their garbage 13. Set up programs to recycle recyclables 14. Produce civic theater to promote recycling 15. Enlist the aid of children in recycling efforts 16. Develop a low emissions industrial zone 17. Enact policies to give the poor basic services 18. Give poor free medical and dental care 19. Give poor free child care so they can work 20. Nurture civic enthusiasm, brightness and zest

tree, once planted, can be cut down only with a special permit, and substantial fines are imposed upon those who fell trees illegally. Two trees must be planted for every tree cut down. By favoring urban gardens, open space, and trees, Curitiba has increased its amount of green space per person a hundredfold in 30 years (Moore, 1994).

The population of Curitiba has grown five-fold in 20 years, as displaced rural farmers have flocked to its shantytowns, called 'favelas'. In many Brazilian cities, the narrow, dirt roads of the 'favelas' are strewn with rotting garbage. This is not the case in Curitiba. Lerner convinced the city that it would be more cost effective to divert money from garbage collection and use it to buy food to distribute to the poor of the 'favelas'. In exchange for six bags of trash, residents are given one bag of groceries consisting of dietary staples such as rice, beans, eggs, bananas, and onions. This innovative program, which feeds over 100 000 people and collects 400 t of garbage per month, has made the streets of the 'favelas' clean (Moore, 1994; *see also* Goodstein, 1992, Kepp, 1992 and Margolis, 1992).

Lerner's approach to recycling was similarly clever. Rather than ordering residents to recycle, Curitiba simply asked them to separate dry trash (such as plastic, paper, metal, and glass) from wet trash (such as potato peels and orange rinds). Lerner toured the public schools with an inexpensive stage play in which actors dressed as leaves—the Leaf Family—educated children why recycling is important and how to sort trash. Soon, children became the leaders of household recycling efforts, teaching parents how to prepare trash for collection by the specially equipped green trucks that began appearing on their streets. To recycle even more thoroughly, Curitiba allows private cadres of cart people and street sweepers to buy recyclables from residents and groom the streets. Curitiba now recycles 70 percent of its paper and 60 percent of its plastic, metal, and glass—a rate better than that of Japan (Moore, 1994).

Curitiba has not only become more livable by improving its environment, but by enhancing the vitality of its citizens. It provides free medical care, dental care, and child care for the poor. This has caused Curitiba's infant mortality rate to

decline by 60 percent in 20 years. Improved health and the availability of child care has allowed the poor to work more and to be more productive members of society. A policy of investing in 'human capital' has given the people of Curitiba 'a palpable enthusiasm, a brightness and zest' (Moore, 1994).

Social sustainability

Social sustainability in development theory

In the most basic sense, 'social sustainability' implies a system of social organization that alleviates poverty. In a more fundamental sense, however, 'social sustainability' establishes the nexus between social conditions (such as poverty) and environmental decay (see Ruttan, 1991).

This theory of social organization identifies a negative linkage between sustained colonization, sustained poverty levels, and sustained natural resource exploitation. There is a divergence of opinion in development theory whether 'environmental sustainability' is a prerequisite of economic growth and poverty alleviation, or economic growth and poverty alleviation are needed before 'environmental sustainability' can even be addressed.

There is some evidence that 'environmental sustainability' may be a necessary pre-condition of sustained economic growth. For example, the United States has been expanding the amount of its land area covered by trees since the 1920s and actively managing its soils since the 1930s. These measures have greatly improved America's productivity in paper products and foodstuffs since the Great Depression. On the other hand, some developing countries, for example, Costa Rica, are jeopardizing their long-term socio-economic prospects by engaging in rapacious resource depletion. Net losses of natural capital in these nations imperil social gains from improvements in financial, technical and human capital (see Repetto, 1992).

The latter position was defended by the late Indian Prime Minister Indira Gandhi, on the grounds that very poor countries must accept temporary environmental degradation in order to

meet immediate needs of food and shelter before they can pursue permanent economic and environmental improvements. Her view was that developing countries simply cannot afford to put environmental protection before economic development. In contrast to this view, the theory of 'social sustainability' posits that the alleviation of poverty need not entail environmental decline. It aims to alleviate poverty within the existing resource base of a society.

Social sustainability in planning practice

The theory of 'social sustainability' calls for economic growth constrained by the requirements of social equity. In order to link these, an enabling environment must be created that optimizes resource use, prioritizes resource allocation, and fosters equitable resource distribution. This form of social organization has emerged in the Indian State of Kerala (Table 3).

Visitors to Kerala cannot help but notice how housing there is of a higher quality than in the rest of India; how beggars are generally absent; how women are strong and independent partici-

pants in society; and how citizens complete tasks in a relaxed manner, building a society that is both beautiful and efficient. Kerala seems to have passed through 'the demographic transition' in a remarkable way.

Alexander (1994) writes that Kerala may present the best example of how civilization can cope with burgeoning human population in an era of dwindling natural resources. Kerala's fertility rate of two children per female and very low consumption levels, he suggests, characterize the prudence that will permit human society to attain a high quality of life in the 21st century. Historically, most human societies were organized around large families and low consumption levels. This remains the norm in the developing world. Societies in the developed world have made a transition to small families and high consumption levels. A few exceptions to this pattern exist in the modern world, for example, resource-rich countries like Saudi Arabia, which can afford large families and high consumption levels. What distinguishes Kerala as a possible future world norm, among other things, is its small families and low consumption levels.

Of probably even greater significance than its small family formation is that Kerala has achieved

Table 3. Substrates of social sustainability in planning practice—Kerala, India

Element	Criteria	Means
Social Sustainability	Equity	1. View natural resources as limited in nature
	Empowerment	2. Cultivate the lushness of the settlement area
	Accessibility	3. Stress equitable distribution over production
	Participation	4. Rely on information, not machinery
	Sharing	5. Establish deliberative decision process
	Cultural Identity	6. Value family/community over individuals
	Institutional Stability	7. Work for enjoyment rather than avoiding toil
		8. Cherish folk life rather than entertainment
		9. Reduce family size and resource use
		10. Eliminate divisions of clan, caste, class
	11. Practice gender-neutral opportunity policies	
	12. Strive for universal education of population	
	13. Address disparities in economic attainment	
	14. Level the economic playing field for all	
	15. Make all citizens economic stake-holders	
	16. Sponsor land reform to give land to its tillers	
	17. Subsidize food, health care, and education	
	18. Work deliberately to use resources efficiently	
	19. Address 'wellness needs' of the population	
	20. Meet 'wellness needs' on an all-for-one basis	

high social development levels—such as low infant mortality rates, long life expectancy, and high rates of literacy, education and political participation—without emphasizing economic growth (Ratcliffe, 1978; Alexander, 1994). Kerala's Gross National Product of \$350 *per capita* is very small, yet its rates of high school enrollment and life expectancy are almost as high as those in developed countries. Almost 95 percent of females in Kerala enroll in high school and life expectancy there is 72 years. By comparison, only 31 percent of Indian females enroll in high school and life expectancy in India is only 59 years. These figures suggest that Kerala citizens are attaining 'wellness' despite Kerala's low rate of economic development (Alexander, 1994).

Alexander (1994) explains the high level of social attainment in Kerala as the result of both efficiency and equity. He found that Kerala's citizens demonstrate high skill in the application of time to small amounts of available resources. They have a slow, deliberate style of work. They do not manufacture things that are unnecessary, but the things that they do manufacture they make with care and skill. In the interests of equity, tasks that call for resources not available to all are usually not performed. Kerala has also shifted its focus from the production of more goods to the equitable distribution of those goods that are produced. This is a departure from the conventional development scheme, in which varying levels of skill are applied to both produce more goods and waste more goods.

Underlying 'social sustainability' in Kerala is an emphasis upon satisfying human needs in such essential areas as nutrition, health care, and education. Each household receives a ration card that allows them to buy limited amounts of basic commodities (such as rice, wheat, sugar, palm oil, and kerosene) sold at 'fair price shops' at controlled prices. Despite this subsidy, food intake (except in Vitamin C and calcium) is lower in Kerala than recommended. Yet, through equitable food distribution and efficient use of available nutrients for child nutrition by women in a society in which 86 percent of females are literate, Kerala has virtually eliminated malnutrition. In health care, Kerala practices the ayurvedic and homeopathic traditions while adopting methods

from Western medicine. A visiting nurse system maintains a high level of individual and household health. Education is focused upon the primary and secondary levels, where it is most socially beneficial (Alexander, 1994).

'Social sustainability' in Kerala seems to have emerged as the result of both progressive political reform and cultural factors. Kerala elected a communist regime in its first parliamentary elections in 1957, but instead of dictatorship, the proletariat retained power over its leadership. The result was an emphasis on land reform and a leveling of the economic playing field. Hence, Kerala avoided the political repression and economic stagnation that has bedeviled other communist states (Franke and Chasin, 1989; Baird, 1993; Alexander, 1994). Instead, cooperation among a 'synergistic mix' of Muslims, Christians, and Hindus emerged. A matrilineal cultural tradition permitted gender equality to take hold. A Gandhian campaign against the caste system fostered the forces of communitarianism (Alexander, 1994).

When one contrasts social organization in Kerala with social organization in the developed world, one finds a number of critical differences. Kerala manages natural resources with a view in mind that they are limited, whereas the dominant ideology that has guided development science regards natural resources as unlimited. The economic objective in Kerala is not production but equitable distribution. The technological emphasis in Kerala is not machinery and equipment but information and organization. In this manner, Kerala has avoided heavy industry. The decision system in Kerala is not executive and hierarchical, as in the West, but deliberate and lateral. Individualism is de-emphasized and society is organized around the family and community. The work attitude in Kerala is one of enjoyment rather than avoidance, which afflicts industrial societies. Lastly, in the area of leisure, the people of Kerala have not forsaken traditional forms of amusement, such as talk and games, for their surrogates in the developed world, entertainment and travel (Alexander, 1994).

These differences may serve as indicators of how other societies can foster social 'wellness' in an era of overpopulation and resource depletion. The path to 'social sustainability', Kerala sug-

gests, involves a transition from the quantitative to the qualitative pursuit of human betterment.

Environmental sustainability

Environmental sustainability in development theory

'Environmental sustainability' requires maintaining natural capital as both a provider of economic inputs (called 'sources') and an absorber (called 'sinks') of economic outputs (called 'wastes') (Daly, 1973; 1974; World Bank, 1986; Pearce and Redclift, 1988; Pearce *et al.*, 1990a; 1990b; Serageldin, 1993). At the 'source site', harvest rates of resources must be kept within regeneration rates. At the 'sink site', waste emissions from industrial production must be controlled so as to not exceed the capacity of the environment to assimilate them without impairment (Goodland, 1995).

It has become commonplace for 'sustainable development' or 'sustainability' to be defined strictly in terms of 'environmental sustainability'. This misconception holds that what is wrong with the contemporary pattern of international devel-

opment is simply that it is destroying the environment. This view is superficial in the extreme, however, for it ignores the market forces and social inequalities that are driving environmental degradation.

Goodland (1995) has identified the overlap among economic, social, and environmental 'sustainability', particularly the strong linkage between 'economic sustainability' and 'environmental sustainability'. It is fitting that unprecedented attention has been given to 'environmental sustainability' in recent years, given the fact that development theory has focused on matters of economic underdevelopment and poverty alleviation in developing countries, and was late in responding to unprecedented threats to the global environment. Nonetheless, it would be mistaken to conflate the doctrine of 'sustainable development' into one of achieving 'environmental sustainability'. The protection of natural systems represents not an overarching panacea for achieving economic vitality and social justice, but a necessary component of an entire system for achieving economic, social *and* environmental 'sustainability', in which economic reforms and social reforms are as important.

Table 4. Substrates of environmental sustainability in planning practice—Nayarit, Mexico

Element	Criteria	Means
Environmental Sustainability	Eco-System Integrity Carrying Capacity Biodiversity	<ol style="list-style-type: none"> 1. Propose a plan to protect natural systems 2. Form team of indigenous resource managers 3. Educate the team in environmental planning 4. Survey the landscape's natural attributes 5. Identify natural opportunities and constraints 6. Identify sensitivities of plants and animals 7. Identify social opportunities/constraints 8. Identify cultural opportunities/constraints 9. Apply eco-principles from other regions 10. Adapt environmental laws from other regions 11. Draft a nature friendly development plan 12. Recommend land development suitabilities 13. Recommend land conservation suitabilities 14. Establish nature reserves and protected areas 15. Establish environmental protection council 16. Provide 'one-stop' development permission 17. Establish community participation committee 18. Hear local citizens affected by development 19. Host democratic fora of citizen participation 20. Integrate social and economic factors in plan

Environmental sustainability in planning practice

In practical terms, the theory of 'environmental sustainability' suggests a planning process that allows human society to 'live within the limitations of the biophysical environment' (Goodland, 1995). This requirement will be met in the planning regime that has been proposed for the Mexican state of Nayarit (Table 4).

Puerto Vallarta, the famed resort town south of Nayarit on Mexico's western coast, has been impacted by growth, and tourism has degraded the natural beauty that attracted people to it initially. For this reason, Mexican and foreign investors are looking to Nayarit for future development. But how is the development of Nayarit to be balanced with the preservation of its natural beauty, its 180 miles of nearly pristine beaches, its verdant mountains and vital wetlands? (Murphy, 1992; Basiago, 1994).

Nayarit's response was to ask The Cousteau Society, the international environmental group, to draft a sustainable development plan. In the process, Nayarit and The Cousteau Society have become what the 'Earth Summit' referred to as 'partners for sustainable development' (Murphy, 1992; Basiago, 1994).

First, the Cousteau Society assembled a team of Mexican resource managers. It felt that a team of nationals, rather than 'outsiders', would produce the most culturally appropriate plan. They would also be most qualified to adapt its suggestions to changing conditions and see them implemented (Murphy, 1992; Basiago, 1994). Second, these managers were enrolled in an academic program at the University of Florida's Center for Wetlands. There they took courses in systems ecology, ecological engineering, environmental economics, resource evaluation techniques, and resource management. They studied resource management strategies pioneered by environmental scientist H.T. Odum. The Odum method compares affected resources and development alternatives, using energy value as a common denominator (Murphy, 1992; Basiago, 1994). Third, the affected environment was considered. Nayarit's coastline is a region of remarkable geographic diversity and exceptional natural beauty. A broad coastal plain unrolls to the north, comprising a carpet of lagoons and wetlands, marshes

and sandbars. Mangroves provide a nursery for shrimp and other marine life, though in some areas the trees have been cut for firewood and construction or the lagoons excavated for aquaculture ponds. Farther to the south, a neovolcanic zone is characterized by a narrow coastal plain and relatively steep mountains supporting a sub-deciduous forest. Behind the rugged coastline with its beautiful beaches, many of the valleys and gently sloping hills support both irrigated and non-irrigated agriculture. Even farther south, the mountainous Sierra Madre coastal zone gradually gives way to the floodplain of the San Marcos River, which supports intensive agriculture. The diverse ecosystems of this highly varied geographical region support 16 endangered species (Murphy, 1992; Basiago, 1994).

The University of Florida team studied the attributes of Nayarit's landscape—its vegetation, land use, soils and geology—identifying them as either constraints on or as opportunities for development. Based on this information, the sensitivities of the marine and terrestrial ecological communities were explored from the viewpoint of minimizing the eventual impacts of development. Social and cultural constraints and opportunities were also analyzed and integrated into the recommendations. The primary goal was to foster a process of development that would not destroy Nayarit's environment (Murphy, 1992; Basiago, 1994).

The outcome of this process was a set of recommendations for Nayarit based on sound ecological principles and legislation from other regions of the world. These guidelines identify the suitability of lands in the coastal zone for different types of development, including tourism, aquaculture, fisheries, retail, marine commerce, housing, transportation, parks, public facilities and recreation. However, they also identify the suitability of lands in the coastal zone for different types of conservation, including natural areas to be protected from development, for economic, public safety, ecological and aesthetic reasons. Nine categories of reserves and protected areas have been proposed to protect Nayarit's terrestrial environment and marine resources (Murphy, 1992; Basiago, 1994).

The Nayarit plan, if implemented as suggested by The Cousteau Society, will incorporate a num-

ber of creative political approaches. Believing that, too often, a distant and elite group within a country attempts to determine what is best for local people (and that development programs intended to help them are then imposed from above without any local involvement) the Cousteau Society has suggested the founding of a Nayarit Coastal Zone Environmental Protection Council. This is proposed to act as 'one-stop' permitting agency for anyone who intends to design or construct projects within Nayarit's jurisdictional boundaries. This Council will oversee the creation and implementation of the management plan and will approve projects for the state. Constituencies affected by development (e.g., those of environmental, community, and local government) will be represented on the Council. In addition, a Community Participation Committee will act as a liaison between local citizens who may be affected by a proposed development and the Council. This should guarantee, through a process of advising, reviewing and monitoring, involving town meetings, media communiqués and workshops, that local concerns and issues are adequately addressed (Murphy, 1992; Basiago, 1994).

The Cousteau Society believes that the quality of life depends on the appropriate interplay of nature and humanity. It hopes that the Nayarit coastal plan will be implemented, thereby establishing an environmentally responsible policy, based on the integration of social, economic and ecological factors (Murphy, 1992; Basiago, 1994).

Implications for urban sustainability

Curitiba, Brazil

Curitiba has been called 'the most environmentally advanced urban area on Earth' and Jaime Lerner 'a figure of international interest among green thinkers' (Moore, 1994). There is good cause for this assessment, because in Curitiba, Lerner has constructed one of the world's leading laboratories for achieving 'urban sustainability'. Curitiba represents a fascinating synthesis of the equity planning model and the environmental planning model. In the past, equity planning measures (such as providing mass transit for those who cannot afford private automobiles) have sel-

dom been linked to environmental planning measures (such as providing recycling opportunities for the conscientious). By linking equity planning measures with environmental ones (for example, public nutrition with refuse collection), Curitiba has shown that positive synergies result in a fundamental economic sense.

Hence, the implications of Curitiba for 'urban sustainability' are that social and environmental 'sustainability' are closely linked, and that by implementing imaginative policies to pursue both, planners can nourish 'economic sustainability'. With an average annual family income of \$5,200, Curitiba is a relatively poor metropolis. However, by combining environment-based policies like efficient public transportation, urban greening and recycling schemes with equity-based policies like free medical, dental and child care for the urban poor, Curitiba has shown how poor cities in developing countries can be made livable and affordable.

The lesson of Curitiba is that its vision of the 'green city' is not merely an Ecotopian one. Environmentally responsible policies in mass transit, urban greening, and recycling are 'integrated' and 'interlinked' to programs to foster the health and economic well-being of the urban poor. This widens the definition of the 'livable city'. To achieve 'urban sustainability', planners must not only address the ecological concerns of cities, but the vitality of citizens.

Kerala, India

Kerala represents a unique cultural approach to sustainable development. The debate over how to achieve 'sustainability' has tended to focus on the economic, environmental, and technological dimensions of development. Moreover, these discussions have emphasized 'curative' rather than 'preventive' means. Kerala is a valuable case to study because it provides a model of 'urban sustainability' that is both social and preventive.

This is significant because the primary impediment to 'sustainable development' emanates from the social realm. The ever more voracious habits of production and consumption are the greatest threat to natural capital. The post-industrial phenomena of consumerism and materialism, which began in the West, have been globalized by virtue

of mass media, notwithstanding the dangers they pose to cultural integrity and planetary ecology. In the process, the very high quality of life attained in some non-European societies like Kerala has been obscured.

Paul Valery, the French poet, essayist, and social critic, once described the European cultural spirit as follows:

Wherever the European spirit dominates one sees the appearance of the maximum of *needs*, the maximum of *work*, the maximum of *capital*, the maximum of *return*, the maximum of *ambition*, the maximum of *power*, the maximum of alteration of *external capital*, the maximum of *relationships and exchanges*. This set of maxima is Europe or the image of Europe (Valery, 1922).

It is this 'culture of maxima' of which the entire world has become enamored. The contemporary dominant world culture rushes towards an individualistic lifestyle obsessed with personal needs, work, income, accomplishment, and status. The fact that this 'culture of maxima' carries in its wake environmental destruction and social disintegration practically goes unchallenged. It is doubtful if it is even feasible to speak in terms of 'sustainable development' in such a culture.

Kerala, and societies like it, testify to the fact that at the very time that the 'culture of maxima' was advanced through the hegemony of Western nations, there have existed other cultures, guided by such philosophies as Buddhism, Sufism, and Gandhism, that have professed frugality as an inspired way of life. With the rise of Eurocentrism, and the advent of Western societies as the world's leading political, economic, and military powers, these alternative cultures, which in the past have attracted millions of adherents, have been weakened or, sadly, become extinct. The rise of Reaganism in the 1980s, which made consumerism, materialism, and greed not only acceptable but respectable, further discredited the 'culture of moderation'. However, it is apparent that unless the demand side of dwindling resources, rising expectations and technological limitations is confronted, and drastic and immediate things to curb consumption are undertaken, no methodological or technological advances of any kind will enable 'sustainable development' to be achieved.

Hence, the implications of Kerala for 'urban sustainability' are that planners must help society make the transition from a 'culture of maxima' to a 'culture of moderation'. While few societies can be transformed into communitarian enterprises, most societies have available a myriad of means to wrest individuals from the private realm of maxima into the public realm of moderation. In economic terms, planners must defend full employment policies, a shorter work week, and more evenly distributed leisure hours to reform a modern economy plagued by systemic unemployment, underemployment, and overwork of the employed (see Rifkin, 1994). This will mitigate the excessive competition that is destroying society in the developed world and remind individuals that the economy is fundamentally a societal and not an individual enterprise. Only in the wake of such practical reforms can an ethos of cooperation like the one that exists in Kerala re-emerge. In social terms, planners must organize public relations campaigns to make the 'culture of moderation' a more respectable way of life. These appeals can be patterned after the television advertisements produced by church groups urging parents to spend more time with their children. 'Social sustainability' requires a lifestyle lived as a search for 'goodness'. In terms of the urban environment, this transition implies planning that promotes public goods over private goods. Planners must recommend community parks rather than destination super-stores, public schools for the many rather than private schools for the few, public transit systems (such as light rail) rather than single-passenger automobile schemes, and public rather than private access to natural amenities (for example, enhancement of public rather than private beaches). This transition is already emerging in public ride-sharing and recycling programs designed to reduce private energy consumption and material waste.

None of these measures taken alone will bring about 'social sustainability'. However, even a planning approach as simple as re-establishing a town center with a community marketplace as an inner-city traffic-calming measure has positive ramifications in the social realm. As individuals are drawn out of their automobiles and toward such a venue, they save money on gasoline, they meet their neighbors, they produce less air pollu-

tion—they are enveloped by society and are reminded of their connections to it.

The lesson of Kerala is that ‘sustainability’ has profoundly social substrates, for it depends upon individuals acting in regard to the interests of the collective. The goal is a society in which people behave less selfishly. For ‘social sustainability’ to be achieved, therefore, planners must devise methods to reach people in ways that change their behavior, and do so permanently.

Nayarit, Mexico

The Nayarit plan is a thoughtful and well-crafted example of the environmentally responsible master plan. Plans such as these give considerations of natural resource protection heretofore unprecedented priority at the outset of the development process and view burdens placed on natural, particularly biological, systems as major limiting factors on development. The emergence of development plans of this type is significant, because it reveals a shift in the way Western civilization views the development of nature.

Traditionally, the West has tended to regard the economy as a total system and nature as its sub-system. In this view, nature may be finite, but it is deemed just one sector of the economy, for which other sectors can be substituted without limiting overall growth (Alexander, 1994). The corollary of this philosophy in city and regional planning is that planners have tended to assume that the city is a total system, of which the environment, including its resources for economic production and urban amenity, is but a sub-system.

This view has gradually eroded as cities have spread geographically and extended their reach into natural realms. Alexander, the American social scientist, was referring to this progression when he wrote:

Long ago the world was relatively empty of human beings and their belongings (man-made capital) and relatively full of other species and their habitats (natural capital). Years of economic growth have changed that basic pattern. As a result, the limiting factor on future economic growth has changed. If man-made and natural capital were good substitutes for one

another, then natural capital could be totally replaced. The two are complementary, however, which means that the short supply of one imposes limits. What good are fishing boats without populations of fish? Once the number of fish sold at market was primarily limited by the number of boats that could be built and manned; not limited by the number of fish in the sea (Alexander, 1994).

Today, a societal consensus is forming that the development of the urban environment is *a part of* rather than *apart from* the natural environment. The future economic and social ‘sustainability’ of cities has become more evidently, even urgently, linked to the ‘sustainability’ of natural systems. ‘The economy’, the American Undersecretary of State Timothy Wirth, has observed, ‘is a wholly-owned subsidiary of the environment’ (Wirth, 1994).

Hence, the implications of Nayarit for ‘urban sustainability’ are that planners must view themselves as engaged not merely in environmental ‘development’, but in some measure of environmental ‘undevelopment’, and plan with heightened regard for the viability of natural systems. On the threshold level, this involves identifying areas of outstanding natural value and ‘green-lining’ these, *ab initio*, in the plan. The ‘urban growth boundary’ enacted by Portland, Oregon to save the beautiful Willamette Valley from sprawl is an example of this approach.

At a deeper level, however, this principle implies that planners must not merely draw boundaries around protected areas, but work with lawyers, zoning officials, and resource economists to determine how access to such areas should be granted and what uses should be permitted in them. To be sensitive to the dynamic relationship between built and natural systems, planners must craft protocols of ‘use’ and ‘non-use’ of natural systems. Nash’s proposal that access to America’s national parks be limited in order to save these repositories of wilderness (Nash, 1967) and the ‘limited access fisheries’ of Polynesia exemplify the types of protocols that must be included in any environmentally responsible master plan.

To these passive measures, planners must add active ones. These include provisions in the plan to redevelop derelict land, to reclaim contami-

nated soils, to plant urban forests, to recultivate devastated wetlands, to re-establish natural relationships between the city and its waterways, to logically relate development areas to natural patterns of resource availability, and so on.

The lesson of Nayarit is that 'sustainability' depends upon managing the built and the natural environments in light of their interdependence. The ideal is a city with a 'circular' rather than a 'linear' metabolism. Girardet (1990; 1992) distinguishes the 'circular metabolism' of 'sustainable' cities from the 'linear metabolism' of modern cities. In the 'linear metabolism' of modern cities, natural resources are converted to waste in a wasteful input-output energy pattern. Food and water, fuels and energy, processed goods, timber, and pulp, and building materials are imported into the city. They are exported as sewage, exhaust gases, household and factory wastes, or wanton refuse. For cities to be 'sustainable', urban metabolism must be made 'circular'. Food production must be based on plant nutrient recycling. Clean energy technology and maximum efficiency must intercept sulfur and nitrates. Processed goods must use recycled materials. Forests must be augmented with large-scale tree planting. For 'environmental sustainability' to be attained, therefore, planners must seek patterns of urban form and resource use that synthesize with, rather than parasitize, surrounding natural systems.

Conclusions

The alternative models of cultural development in Curitiba, Brazil, Kerala, India, and Nayarit, Mexico examined here embody the substrates of economic, social, and environmental sustainability. In light of the widespread pathology that characterizes urban development in many of the world's cities, these models are significant, as harbingers not merely of urban sustainability but of urban vitality.

Curitiba has thrived by building an efficient intra-urban bus system, expanding urban green space, and meeting the basic needs of the urban poor. It suggests that economic sustainability requires planning for *people*, making the city more 'green', and, hence, more livable, for *people*.

Kerala has attained social harmony by emphasizing equitable resource distribution rather than consumption, by restraining reproduction, and by attacking divisions of race, caste, religion, and gender. It suggests that social sustainability requires planning that encourages people's cooperative rather than their competitive impulses.

Nayarit has sought to bring development and the environment into balance by framing a nature-friendly development plan that protects natural systems from urban development and that involves the public in the development process. It suggests that environmental sustainability requires planning that provides for ecological conservation in the formative stage of the development plan.

A detailed examination of these alternative cultural development models reveals a myriad of possible means by which economic, social, and environmental sustainability might be advanced in practice. While these examples from the developing world cannot be directly translated to cities in the developed world, they do indicate in a general sense the types of imaginative policies that any society must foster if it is to achieve 'urban sustainability'.

Acknowledgments

The author is indebted to Dr M. Adil Khan of the United Nations Development Programme, Yangon, Myanmar, for providing the conceptual framework upon which this paper is based. The author also wishes to thank Curtis A. Moore, former counsel to the US Senate Committee on Environment and Public Works, for his reportage on Curitiba; Emeritus Professor William M. Alexander of the College of Liberal Arts of the California Polytechnic State University at San Luis Obispo, for his research in Kerala initiated by the Institute for Food and Development Policy and sponsored by Earthwatch Expeditions; and Dr Richard C. Murphy, Dr Javier Venegas, and Agustin Gonzalez, M.Sc for their description of the Nayarit plan formulated by The Cousteau Society and the State of Nayarit as 'partners for sustainable development'.

References

- Alexander, W. M. (1994). Humans sharing the bounty of the Earth: hopeful lessons from Kerala. *Proceedings of the International Congress on Kerala Studies, Kerala, India*, Aug. 27–29, 1994.
- Baird, V. (1993). Paradox in paradise: Kerala, India's radical success. *New Internationalist*, **241**, 4.
- Basiago, A. D. (1994). Sustainable development in tropical forest ecosystems. *The International Journal of Sustainable Development and World Ecology*, **1**(1), 34–40.
- Basiago, A. D. (1995). Methods of defining 'sustainability'. *Sustainable Development*, **3**(3), 109–119.
- Basiago, A. D. (1996). The search for the sustainable city in 20th century urban planning. *The Environmentalist*, **16**, 135–155.
- Boyle, A. (1995). Human rights approaches to environmental protection: unnecessary, undesirable and unethical? Remarks delivered at the Research Centre for International Law, University of Cambridge, Febr. 17.
- Calthorpe, P., Corbett, M., Duany, A., Moule, E., Plater-Zyberk, E., Polyzoides, S. (1991). *Ahwahnee Principles for Resource-Efficient Communities*. Sacramento, CA: Local Government Commission, 1–2.
- Daly, H. E. (ed) (1973). *Towards a Steady State Economy*. San Francisco: Freeman.
- Daly, H. E. (ed) (1974). The economics of the steady state. *American Economic Review*, **May**, 15–21.
- Daly, H. E. (1991). *Steady-State Economics*. Washington, DC: Island Press, 180.
- Dixon, J. and Fallon, L. A. (1989). *The Concept of Sustainability: Origins, Extensions and Usefulness for Policy*. Environment Division Working Paper No. 1. Washington, DC: World Bank.
- Eblen, R. and Eblen, R. (1994). *The Encyclopedia of the Environment*. New York: Houghton Mifflin Company, 432–433.
- Editors of the Ecologist. (1972). *A Blueprint for Survival*. Harmondsworth: Penguin Books Ltd., 15–29.
- Ewers, H. and Nijkamp, P. (1990). Urban sustainability. In: Nijkamp, P. (ed), *Urban Sustainability*. Avebury: Gower, 8–10.
- FoE (1994). *Planning for the planet: sustainable development policies for local and strategic plans*. London: Friends of the Earth, 10.
- Franke, R. and Chasin, B. (1989). *Kerala: radical reform as development in an Indian State*. San Francisco: Institute for Food and Development Policy.
- Freeman, C. (1973). Malthus with a computer. *Futures*, **Feb.**, 5.
- Girardet, H. (1990). The metabolism of cities. In: Cadman, D. and Payne, G. (eds) (1990). *The Living City: Towards a Sustainable Future* London: Routledge.
- Girardet, H. (1992). *Cities: New directions for sustainable urban living*. (London: Gaia Books), 23.
- Goodland, R. (1995). Environmental sustainability: universal and rigorous. *Sustainable Development*, (under review).
- Goodstein, C. (1992). From Curitiba to the world. *E: The Environmental Magazine*, **3**, 10–11.
- Hicks, J. R. (1946). *Value and Capital* (2nd ed.). Oxford: Clarendon Press.
- Kahn, M. (1995). Concepts, definitions, and key issues in sustainable development: the outlook for the future. *Proceedings of the 1995 International Sustainable Development Research Conference, Manchester, England, Mar. 27–28, 1995*, Keynote Paper, 2–13.
- Keating, M. (1993). *The Earth Summit's agenda for change*. Geneva: Centre for Our Common Future, viii, x, 12–13, 63–67.
- Kepp, M. (1992). Curitiba's creative solutions: learning from Lerner. *Choices*, **1**: 22–26.
- Krier, J. E. and Gillette, C. P. (1985). The un-easy case for technological optimism. *Michigan Law Review*, 405.
- Los Angeles Times*. (1996). Big growth in cities projected for 2006. May 30.
- Lyle, J. T. (1994). *Regenerative design for sustainable development*. New York: John Wiley & Sons, Inc.
- Margolis, M. (1992). A third-world city that works. *World Monitor*, **5**, 42–46.
- McDonough, W. (1992). *The Hannover Principles*. New York: Self-Published, 1–2.
- Moore, C. A. (1994). Greenest city in the world! *International Wildlife*, **24**, 38–43.
- Murphy, R. C. (1992). Responsible coastal management for the State of Nayarit, Mexico. *Calypto Log*, **4**, 6 Chesapeake, VA: The Cousteau Society, Inc.
- Pearce, D. W. and Redclift, M. (eds) (1988). Sustainable development. *Futures*, **20** (Special Issue).
- Pearce, D. W., Barbier, E. and Markandya, A. (1990a). *Sustainable Development: Economics and Environment in the Third World*. Aldershot: Elgar.
- Pearce, D. W., Markyanda, A. and Barbier, A. (1990b). *Blueprint for a Green Economy*. London: Earthscan.
- Ratcliffe, J. (1978). Social justice and the demographic transition: lessons from India's Kerala state. *International Journal of Health Services*, **8**(1).
- Repetto, R. (1992). Accounting for environmental assets. *Scientific American*, June, 94–100.
- Rifkin, J. (1994). *The End of Work*. New York: G. P. Putnam & Sons.
- Ruttan, V. W. (1991). Sustainable growth in agricultural production: poverty, policy and science. Unpublished paper prepared for International Food Policy Research Institute Seminar on Agricultural Sustainability, Growth, and Poverty Alleviation, Feldafing, Germany, Sept. 23–27.
- Serageldin, I. (1993). *Developmental Partners: Aid and Cooperation in the 1990's*. (Stockholm: SIDA).
- Wirth, T. E. (1994). Sustainable development: a progress report. Remarks delivered at the National Press Club, Washington, DC July 12.
- World Bank (1986). *Environmental Aspects of Bank Work*. The World Bank Operations Manual Statements, OMS 2.36. Washington, DC: World Bank.
- WCED (1987). *Our Common Future*. World Commission on Environment and Development. Oxford: Oxford University Press.