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Research Paper

ECONOMIC, SOCIAL, AND ENVIRONMENTAL SUSTAINABILITY IN DEVELOPMENT THEORY AND URBAN PLANNING PRACTICE

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In ten years, more than half the world's population will be living in cities. The United Nations ZUN ملخص that this will threaten cities with

ated 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 intraurban 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 mexamination 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'.

Economic, social, environmental الكلمات sustainability , development ,

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 Žsee Dixon and Fallon, 1989..

Ž1798., Malthus framed *An Essay on the Principle of Population* In the fundamental tenet of environmentalism }namely, that because human population tends to grow in a geometric progression while subsistence can grow in only an arithmetic progression, population growth is destined to be checked by natural resource depletion and inevitable human want and misery Žsee 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 Žsee Freeman, 1973..

-In recent decades, global concern has emerged about the non renewability of natural resources as a factor limiting production and

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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 , 1996.. As an antidote *Los Angeles Times*collapse of basic services Ž 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 'sustainable cities', for each city has unique historical, cultural, political, and environmental circumstances. However, planning regimes oriented to- wards '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 intraurban 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 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

right to 'a healthy and productive en- vironment'. Participants addressed transboundary pollution, cooperative management of shared re- sources and the global commons, and agreed to open their courts to transboundary proceedings ŽBoyle, 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 ŽBoyle, 1995..

In the early 1970s, Daly proposed a 'steady- state economics' challenging prevailing dogmas based on the efficiency of resource use. In stanConservation of Nature ŽIUCN. in 1980. It should be advanced through 'conservation', defined as 'the management of human use of the biosphere so that it may yield the benefit to present generations while maintaining *sustainable* greatest its potential to meet the needs and aspirations of future generations' ŽEblen 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, safe- guard the environment, and feed the world in 1987 .The Brundtland , defined 'sustainable *Common FutureOur* Commission Report, development' as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' ŽWCED, 1987.. This definition has been widely circulated and is accepted as authoritative.

At the UN's Conference on Environment and Development Žor 'Earth Summit'. held in Rio de Janeiro in 1992, diplomats from over 120 nations signed five pacts framing 'sustainable development' as *The* the overarching policy of the 21st century. The 27 principles of 'define the rights *elopment¨ironment and De¨Rio Declaration on En* 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 is 'a blueprint on how to make *Agenda 21* environmental protection. development socially, economically and environmentally sustain- avows the responsibility *The Statement of Principles on Forests* able'. of countries to manage, con- serve, and develop world forests in a *tion on en¨The United Nations Framework Con*sustainable manner. seeks 'to stabilize green- house gases in the *Climate Change* atmosphere at levels that will not dangerously upset the global implores *ersity ¨ention on Biological Di¨The Con*climate system'. nations to 'adopt ways and means to conserve the variety of living species' ŽKeating, 1993..

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 con- temporary course of economic development is 'sustainable'.

The first influential work examining whether the current paradigm *The Limits to* of world economic development is 'sustainable' was ŽThe Club of Rome, 1972.. A team led by Donald and *Growth* Donella Meadows at the Massachusetts Institute of Technology simulated a computerized world model Ž'World 3'. and entered into it data assuming that population, industrial production and pollution would continue to grow exponentially in the future Žas 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 depreci- ation, and to both reduce consumption and change its emphasis from the consumption of goods to the consumption of services ŽKrier and Gillette,1985.. This controversial study, distributed in millions of copy worldwide, made many fear a looming Malthusian crisis of the environment and 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 sub- system 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 development.to achieve a state of equilibrium with it ŽDaly,

were echoed *The Limits to Growth* The concerns expressed in ŽEditors of The *al ¨i¨A Blueprint for Sur*internationally. In 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 and which will give the 1973; Daly, 1974; Daly, 1991; *sustainable* is 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.

World The term, 'sustainable development', first appeared in the drafted by the United Nations Environment *ation Strategy Conser* Programme fullest possible satisfaction of its members', they ŽUNEP. and the International Union for the 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

also proposes a number of tangible strategies to bring *Agenda 21* calls for *Agenda 21* about 'sustainability' in the environmental realm. 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 trans- port over automobiles, municipal development designed to reduce commuting, and land use that contains urban sprawl and prevents it from encroaching upon agricultural land and environ- mentally sensitive areas are enunciated ŽKeating,1993..

introduces a*Agenda 21* In terms of planning principle, however, 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 Ž1995. writes that the paradigm of 'sustainable development' , in fact, rests on three conceptual pillars. *Agenda 21*described in These pillars are 'economic sustainability', 'social sustainability', and 'environmental sustainability' ŽTable 1..

, by way of growth, development, and *Economic sustainability* productivity, has guided conventional development science in the past. Market allocation of resources, sustained levels of growth and consumption, an assumption that natural re- sources 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 ŽKahn, 1995..

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

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 ŽKahn, 1995..

involves ecosystem integrity, carrying *ironmental sustainability ¨En* capacity and biodiversity. It re- quires 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 ŽKahn, 1995..

The theoretical framework elaborated by Kahn posits that economic, social and environmental 'sustainability' must be 'integrated' and 'inter- linked'. They must be coordinated in a compre- hensive manner. A hypothetical case of deforesta- tion 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.

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' Žsee 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 'sustainability' of a city, its potential 'to reach *economic* terms of the qualitatively a new level of socio-economic, demographic and technological output which in the long run reinforces the foundations of the urban system' Žsee Ewers and Nijkamp, 1990.. Others, notably environmental ativists, link 'urban sustainability' to principles of futurity, equity, and participation, *social* broader especially involvement of public citizens in the land development planners speak of *ironmentalven*process Žsee FoE, 1994.. When 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 Žsee 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 Žsee Basi- ago, 1995..

Perhaps this confusion in planning circles about what 'urban , the *Agenda 21*sustainability' will require stems from the fact that '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 , which are specific *guidelines*circles has tended to conflate planning *et* in nature and applicable on a case-by-case basis Žsee Calthorpe , which, by definition, must be *principles* .,1991.and planning *al* general and of universal applicability Žsee McDonough, 1992..

proposes a *Agenda 21* In terms of practical planning guidance, number of concrete measures to achieve 'sustainability' in the socio- economic realm. These include equity, entrepreneurship and ties access to land, security of land *21 Agenda* technology transfer. 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 ŽKeating, 1993..

}for *elopment ¨de* with a new doctrine of economic*growth* economic 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 ap- proach is found in Lerner's work for the Brazilian city of Curitiba ŽTable 2..

The centerpiece of Lerner's revitalization pro- gram for Curitiba is its bus system. The city of Curitiba permits only high-rise apartment buildings 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 ŽMoore, 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

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

Means	Criteria	Element
1. Launch program to reduce automobile use	Growth	Economic
2. Establish a modern bus mass transit scheme	Development	Sustainability
3. Enhance bus system efficiency to draw riders	Productivity	
4. Make bus transit fast, cheap and comfortable	Trickle Down	
	5. Place high density living near major arterials	
		6. Zone for mixed residentialrcommercial use
		7. Make downtown streets pedestrian malls
		8. Expand green zones to safeguard open space
		9. Enlarge the amount green *per capita* of space
		10. Enact regulations to protect every urban

If a man in a rural area lacks a job Žeconomic., he is likely to be poor and disenfranchised Žsocial.. If he is poor and disenfranchised, he has an incentive to engage in practices that harm ecology, for example, by cutting down trees for fire- wood to cook his meals and warm his home Ženvironmental.. 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 Ženvironmental.. 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 Žeconomic.. If productivity stagnates Žeconomic., poor people will remain poor Žsocial., 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 Žeconomic.. If he accumulates cap- ital, he can spend it by employing other poor people or buying their products, thereby alleviating poverty Žsocial.. If poverty is alleviated, poor people will be less likely to cut down trees out of necessity. This will help preserve the soil Ženvironmental., and thereby sustain productivity *.et cetera*Žeconomic.,

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

Economic sustainability

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'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 Ž1939; second edition 1946., Hicks defined *Value and Capital* work '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, how- ever, 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 Ž1995. writes that to speak accurately in terms of 'economic sustainability', it is necessary to 'extrapolate the definition of Hicksian income from Žits. sole focus on human-made cap- ital and its surrogate Žmoney. ... to embrace the other three forms of capital Žnatural, social and human.'.

An economic system designed in light of the theory of 'economic sustainability' is one con- strained 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

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 precondition 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 Repetto, 1992..Žsee

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 re- source base of a society.

Social sustainability in planning practice

The theory of 'social sustainability' calls for eco- nomic growth constrained by the requirements of social equity. In order to link these, an enabling environment must be created that optimizes re- source use, prioritizes resource allocation, and fosters equitable resource distribution. This form of social organization has emerged in the Indian State of Kerala ŽTable 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 participants 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 Ž1994. 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

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 per- son a hundredfold in 30 years ŽMoore, 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 Goodstein, 1992, Kepp, 1992 and Margolis, *see also* ŽMoore,1994; 1992..

Lerner's approach to recycling was similarly clever. Rather than ordering residents to recycle, Curitiba simply asked them to separate dry trash Žsuch as plastic, paper, metal, and glass. from wet 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' ŽMoore, 1994..

Social sustainability

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In the most basic sense, 'social sustainability' implies a system of social organization that alleviates poverty. In a more fundamental sense, how- ever, 'social sustainability' establishes the nexus between social conditions Žsuch as poverty. and environmental decay Žsee

political participation } without emphasizing economic growth ŽRatcliffe, 1978; Alexander, 1994.. Kerala's Gross National Product is very small, yet its rates of high school *per capita* of $350 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 ŽAlexander, 1994..

Alexander Ž1994. 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 Žsuch as rice, wheat, sugar, palm oil, and kerosene. sold at 'fair price shops' at controlled prices. Despite this subsidy, food intake Žexcept 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 house- hold health. Education is focused upon the primary and secondary levels, where it is most socially beneficial ŽAlexander, 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 ŽFranke 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 ŽAlexander,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 deemphasized and society is organized

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

Means	Criteria	Element
1. View natural resources as limited in nature	Equity	Social
2. Cultivate the lushness of the settlement area	Empowerment	Sustainability
3. Stress equitable distribution over production	Accessibility	
4. Rely on information, not machinery	Participation	
5. Establish deliberative decision process	Sharing	
6. Value familyrcommunity over individuals 7. Work for enjoyment rather than avoiding toil	Cultural Identity Institutional Stability	
	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

7. Identify social opportunitiesrconstraints
8. Identify cultural opportunitiesrconstraints
9. Apply ecoprinciples 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' ŽGoodland 1995.. This requirement will be met in the planning regime that has been proposed for the Mexican state of Nayarit ŽTable 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? ŽMurphy,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' ŽMurphy,1992; Basiago, 1994..

First, the Cousteau Society assembled a team of Mexican resource 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 ŽAlexander, 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 suggests, involves a transition from the quantitative to the qualitative pursuit of human betterment.

Environmental sustainability

'Environmental *elopment theory ¨ironmental sustainability in de¨En* sustainability' requires maintaining natural capital as both a provider of economic inputs Žcalled 'sources'. and an absorber Žcalled 'sinks'.of economic outputs Žcalled ' wastes'.ŽDaly, 1973; 1974; , 1990a; *et al.*World Bank, 1986; Pearce and Redclift, 1988; Pearce 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 ŽGoodland,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 development 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. GoodlandŽ 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 environmental 'sustainability', in which *and* economic, social economic reforms and social reforms are as important.

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

Means	Criteria	Element
1. Propose a plan to protect natural systems	Eco-System Integrity	Environmental
2. Form team of indigenous resource managers	Carrying Capacity	Sustainability
3. Educate the team in environmental planning	Biodiversity	
	4. Survey the landscape's natural attributes	
		5. Identify natural opportunities and constraints
		6. Identify sensitivities of plants and animals

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 communiqu´es and workshops, that local concerns and issues are adequately ad- dressed ŽMurphy, 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 ŽMurphy, 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' ŽMoore, 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 Žsuch as providing mass transit for those who cannot afford private automobiles. have seldom been linked to environmental planning measures Žsuch as providing recycling opportunities for the conscientious.. By linking equity planning measures with environmental ones Žfor 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 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 implemente ŽMurphy, 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 ŽMurphy, 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 aqua- culture ponds. Farther to the south, a neovolcanic zone is characterized by a narrow coastal plain and relatively steep mountains supporting a subdeciduous 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 ŽMurphy, 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 1994..ŽMurphy, 1992; Basiago,

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 suit- ability 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 ŽMurphy,1992; Basiago, 1994..

The Nayarit plan, if implemented as suggested by The Cousteau Society, will incorporate a number 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 Žand that development programs in- tended 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 , those of environmental, community, and local *e.g.*development Ž

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 innercity 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 pollution }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 subsystem. 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 ŽAlexander, 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 Žman-made capital. and relatively full of other species and their habitats Žnatural 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, how- ever, 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 ŽAlexander, 1994..

Today, a societal consensus is forming that the development of the the natural *apart from* rather than *a part of* urban environment is 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' ŽWirth, 1994..

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 , the *talcapi* , the maximum of *work* , the maximum of *needs* of , the maximum *ambition* , the maximum of *return* maximum of , the maxi- *external capital* , the maxi- mum of alteration of *power* of . This set of maxima is Europe or *relationships and exchanges* mum of the image of Europe ŽValery, 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 con- sumerism, 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 em- ployment 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 Žsee 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 pro- motes 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 Žsuch as light rail. rather than single-passenger automobile schemes, and public rather than private access to natural amenities Žfor example, enhancement of

sustainability but of urban vitality. Curitiba has thrived by building an efficient intraurban 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 re- quires 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'.

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Hence, the implications of Nayarit for 'urban sustainability' are that planners must view them- selves 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 *ab initio* areas of outstanding natural value and 'green- lining' these, 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 ŽNash, 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 contaminated 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 pat- terns 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 Ž1990; 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.

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استنتاج

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

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