

**POPULATION/DEVELOPMENT/ENVIRONMENT TRENDS**  
**IN A GLOBALIZED CONTEXT: CHALLENGES FOR THE 21<sup>st</sup> CENTURY**

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**Abstract** - The analysis of current population dynamics within the context of globalized development highlights the mounting importance of spatial redistribution in environmental outcomes. More specifically, the inevitable and unprecedented growth of towns and cities sets the stage for the major PDE interactions of the 21<sup>st</sup> century. Huge increases in urban population are foreseen, especially in Asia and Africa, and these will have enormous environmental implications. The importance of cities in the environmental sphere is multiplied by their critical role in the current development framework. Despite current disadvantages, urban concentration could turn out to be a more sustainable form of land use and, overall, a critical ally of sustainability. For this to happen, however, a proactive and interventionist approach needs to be urgently adopted with regards to inevitable urban growth in order to reduce its negative impacts and to maximize its potential economic, social, demographic and ecological advantages. Where cities are located, how and where they grow, how they deal with various environmental challenges as well as with the needs of the poor, are all decisive issues for the PDE equation.

## **Introduction: Refocusing the Population/Environment Agenda**

Population and environment linkages have received considerable scholarly and public attention over the last few decades. Most of this has focused on whether, and to what extent, population growth is responsible for the aggravation of environmental problems. That debate is by no means trivial nor resolved, yet it has waned in recent years, and, concomitantly, interest in population/environment (P/E) relations has declined. Does this mean that population dynamics are no longer relevant in environmental outcomes? Quite the contrary! The debate simply needs to be refocused.

In order to realistically face the P/E challenges of the 21<sup>st</sup> century, two changes would be helpful. First, we need to situate current population growth and environmental trends squarely within the context of ongoing development patterns. Numbers of people are less relevant than how people live, where they live, what they do, and what they consume; today, these questions all depend, to a great extent, on global economic trends and their social impacts. Much discussion of P/E relations has been oversimplified, failing to take sufficient account of mediating factors and how the latter are themselves embedded in broader development efforts and their determinants. Today, populous developing countries are trying to emulate the environmentally-disastrous production and consumption patterns of industrialized countries, within the context of globalized economic competition. Should these efforts be successful, global environmental risks will increase sharply. Should they not succeed, the world will face unparalleled and security-threatening inequality.

Second, we need to take a hard look at a largely-neglected aspect of population/development/environment (PDE) interactions, namely – how, within the context of current development efforts, environmental change is affected by population redistribution. Focusing on the issue of space is vital for sustainability.<sup>1</sup> The interaction between population dynamics, development and environmental change is space- and location-specific. That is, populations can occupy given land areas in ways that have significantly-different environmental implications. Surprisingly, the literature has not dealt effectively with a critical question, namely - what are the advantages of different patterns of population distribution for sustainability? Striving to understand what the options are, and what environmental significance they may have, opens up useful avenues for research and policy formulation on PDE issues. It also contributes to reflections about what modern civilization has to do to achieve sustainability.

Within this concern, the issue of urban growth is particularly relevant in the present historical context. Indeed, it can be posited that the most pressing policy issues of the 21<sup>st</sup> century within the PDE realm will be related to unprecedented urban increase. The locus of both demographic and economic growth today is in towns and cities. These already harbor almost half of the world's total population and will account for all demographic increase during coming years. The manner in which urban growth evolves under globalized economic competition will have an enormous impact on the future of humankind. Most of the critical environmental problems produced by modern civilization originate in the production and consumption patterns centered in urban areas. Yet, cities also present significant potential advantages in terms of conciliating the economic and demographic realities of the 21<sup>st</sup> century scenario with the demands of sustainability. Incredibly, national and global policymakers have yet to seriously consider looming urban issues.

This paper begins with a brief review of ongoing trends in development patterns and population dynamics, with emphasis on the impacts of globalization. This assessment suggests that, in the

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<sup>1</sup> For present purposes, sustainability is defined as the ability of humankind to live within the limitations of the physical environment, now and indefinitely into the future.

foreseeable future, the most pertinent PDE questions will relate to the distribution of population over space and leads to the question - how can we best address the issue of environment and space? The sustainable use of space is posited here as a helpful approach and its usage is exemplified with respect to the main PDE problem of the 21<sup>st</sup> century, namely – urban growth. Finally, the paper addresses the question – what are the environmental implications of unparalleled growth in towns and cities, and what issues need to be addressed in this connection?

### **Shifts in the Development Paradigm**

Much of the literature has attempted to analyze the impact of development on P/E linkages using proxy indicators such as "affluence" or "technology." The intricate political and economic framework for today's development efforts, as well as the increasingly complex relations between economic forces from different countries, requires a more elaborate approach. Globalization, and particularly globalized economic competition, constitutes the concrete politico-economic setting within which different countries are attempting to improve people's lives (Cf. discussion in Bernstein, 2005). This model, spawned in the midst of a world economic crisis in the 1980s, has forced developing countries to redefine their economic organization along a standard blueprint. Widespread and intensive debt negotiations boosted the prominence of international financial institutions and gave enormous political clout to their neo-liberal prescription for structural adjustment. As a result, the adoption of a market economy and the need for openness to the world are central ideas that have been propagated almost universally.

On a world scale, significant boosts in production and consumption can be expected as a result of such reforms. However, such growth will not be equally spread nor environmentally beneficial. The rich countries themselves do not adhere to the rules of an open economy, thus severely limiting the prospects for growth elsewhere. Breaking down trade barriers in developing countries does not generate a level playing field. The overwhelming thrust of the prevalent growth model, based on the "miracle of the market", favors neither equity nor redistribution. In fact, it tends to promote concentration of income and resources, both between and within countries. Historically accumulated advantages - in financial or human resources, entrepreneurial savoir-faire, or technological know-how - not only continue to prevail, but will also tend to increase in the context of globalized competition (ECLAC, 2002). Not to be overlooked is the weight of imperialist economic, political and military might in commanding the use of the world's resources.

For our purposes, the main reflection is that the prospects for environmental outcomes vary by level and type of development. In rich developed countries, environmental degradation can conceivably be controlled in the foreseeable future, **if** their leaders show interest in the environment. There, a combination of factors – such as heightened public environmental awareness, political commitment, technological development, low population growth, changes in the economic base from industry to services, and the power to exploit the resource base and sink capacity of the rest of the world -- can stabilize or even reduce environmental risks of different sorts. The key issue, which will ultimately determine environmental well-being there, is the level and intensity of environmental commitment and the tradeoff with economic growth concerns.

The scenario differs in newly-industrialized countries and others that have realistic perspectives for economic growth in the foreseeable future. There, development could well be associated with escalating degradation, much of which will likely contribute significantly to global/critical environmental problems. Developing countries often prolong the life of obsolete and inefficient equipment. At the same time, increased use of energy and the massification of consumption - of automobiles, appliances and many other environmentally-unfriendly industrialized goods - are essential cogs in the model of growth that is being universally adopted. Moreover, in this group of

countries, environmental concerns tend to pale on an everyday basis, in comparison with the overbearing need for economic growth and poverty reduction. Therein, sacrificing a "little" environmental degradation and resource depletion right now does not appear to be a large price to pay for economic growth that will eventually improve the plight of immense populations. At the same time, the relative lack of competitive technological advances or of other comparative advantages may impel them to exploit natural resources and to pollute more in order to bridge the competitive gap. It is undoubtedly significant that this category includes many countries having large populations but low or rapidly-declining fertility.

Finally, a number of "poor and deprived countries" have a potential role in the global environmental picture that belies their reduced size (despite high fertility) and lack of economic weight. Poor countries with scant prospects for participation in economic competition or growth in the standard mode will be tempted to use their lack of environmental awareness as a proxy for comparative advantages. Environmental considerations and precautions in such countries tend to be perceived as superfluous by comparison to the urgency of survival. Concern with pollution and degradation is largely seen as a prerogative of the rich.

Given the economic interest of firms from industrialized countries to externalize the costs of environmental quality by migrating to other countries or by dumping their solid and toxic wastes there, globalization could constitute a main obstacle to both the development of environmental technology, and to the adoption of effective environmental control on a world-wide scale. Institutional fragility, poor governance, as well as the absence of environmental information and awareness, increases the probability that poor countries will accommodate polluting activities or toxic dumping, and/or overlook the deleterious health effects of certain types of economic activity.

The bottom line is that future environmental outcomes depend fundamentally on the manner in which economic growth is pursued and the extent to which it is attained during coming years. Without question, the overwhelming economic force in the 21<sup>st</sup> century scenario is trade liberalization and globalization of economic activity. It is spreading new forms of economic activity and resource exploitation to the rest of the world. In the process, traditional patterns of production and interaction with the natural atmosphere are being disrupted at an accelerated pace. Whether the intersection between private economic interests and the intense quest for growth by individual countries will somehow result in improved environmental conditions is highly questionable. The increase in critical environmental problems of a global dimension, coupled with the absence of effective global governance, whether in the economic or environmental sphere, is a severe challenge to sustainability. At the same time, the apparent decline of environmental movements is a grave concern.

### **Shifting Population Challenges in the 21<sup>st</sup> Century**

#### **a) Population Growth and Composition**

Since several papers at this Conference deal with world trends in population growth, the topic will not be addressed here. Suffice it to say that, despite continued large absolute increases, experts have no doubt that the population bomb of the 1950s has been defused. The current world TFR is about half the level observed at the time of the first Rome Conference. Almost 60% of all growth is now attributable to inertial factors (i.e. due to population composition stemming from patterns of growth in previous eras, rather than to current fertility and mortality patterns). Even under an optimum scenario (universal empowerment of women, generalized access to family planning and widespread rapid development), it is practically impossible to halt population momentum before the planet reaches at least 7.5 billion people (United Nations, 2005).

Whether the world's population stabilizes at 8 or 11 billion does make a huge difference but, under the current development scenario, sustainability would still be problematic, even if population growth could somehow be halted abruptly. The 50 least developed countries are experiencing the most rapid growth but their impact on global sustainability, despite increasing resource constraints and deterioration of local environmental conditions, is relatively minor; they do not consume, pollute or degrade in the manner or at the rate of the more developed countries. Meanwhile, the fertility transition is well underway in most other developing countries. The main issue to be addressed in both types of countries is access to quality reproductive health services, not population control.

While rates of population growth *per se* recede in overall importance, other demographic changes become more prominent. Concomitant with the rapid changes in patterns of population growth is the dramatic transformation in the world's population composition by age. The combined effects of increases in life expectancy with rapid fertility decline will increase the number of persons aged 60 years or over from 673 million in 2005 to almost 2 billion by 2050 (United Nations, 2005:4-5). By contrast, the size of the world's population aged 0-14 years will change little during that time, so that its share of the total population will drop from 28 to 20%. The population aging transition, as was the case of the mortality and fertility transitions, will be much more rapid in developing countries than that which occurred in the developed world. Many experts now feel that widespread aging is currently more important than growth itself.

So far, the relationship between changes in the age composition and environmental factors has remained largely speculative. Some attention has been called to environmental hazards that threaten the health of older persons, who are particularly at-risk to health problems related to ground-level ozone or to other specific and located environmental hazards. Unquestionably, consumption patterns and health needs differ considerably as populations age, but research has yet to clearly identify the overall significance of such changes. During the next few decades, most developing countries will have a larger proportion of the population in young adult ages and working age groups than ever before; this will favor increased migration and, thus, affect the environmental consequences of population redistribution. The environmental effects of changes in household composition, as well as of divorce patterns, have also been examined in terms of their impact on consumption patterns.

As concerns environmental implications of population composition by sex (biological differences), research has been scant. However, gender (socially determined) implications have spawned an interesting discussion. Much of the literature has centered on the effects of environmental change on women as victims or as resource managers. Generally, it has been argued that the empowerment of women will greatly improve the effectiveness of sustainable development strategies. The bottom line of this literature, as stated by one critic, appears to be that: "If only women and the environment were considered in development practice, the environment crisis would be solved.... Rarely is a connection made between macro-economic and political processes: over-consumption of natural resources by the few in the North and poverty of the many in the South" (Braidotti et al. 1994:96).

This literature has indeed focused largely on the poor and traditional rural context, and failed to address the critical issues that face humankind in the 21<sup>st</sup> century development scenario. Moreover, it has overlooked the fact that both the relation that women have developed with nature, and the attributes that would make them support more sustainable practices, are culturally defined and thus evolve with cultural change. In fact, the roles of resource managers are gender roles that vary from setting to setting and over time within the same setting (Martine and Villarreal, 1997). From the standpoint of sustainability, it is essential to promote both empowerment of women, as well as cultural traits that benefit sustainability among both men and women. Moreover, it is essential not to lose sight of which problems are really compromising the future of the planet. Both men and

women will have to work hard at developing the values and fostering the attitudes and behavior patterns consonant with more sustainable forms of development.

### **b) Spatial Distribution of Population**

As the focus on population growth per se diminishes in importance, spatial distribution, and within that, unprecedented urban growth, assumes increasing significance in the environmental agenda of the 21<sup>st</sup> century. Indeed, it can be argued that, today, the more pertinent PDE relations are space-specific. Where the resident population of a given territorial area actually lives, on what type of land, with what forms of occupation, in what ecological conditions, whether it is concentrated or dispersed, all this makes a great difference in terms of sustainability. Nevertheless, these aspects have received relatively little attention to this moment.

The progressive integration of the world's economies through increased financial and commercial exchange, within the context of an increasingly open and border-free global economy, has had a huge impact on migratory movements; in turn, these will greatly affect sustainability in the foreseeable future. Internal and international migrations have intensified because greatly improved technology in communications and transportation has both reduced physical space and expanded people's cognitive horizons and aspirations. The progressive integration of the world's economies through increased financial and commercial exchange promotes the uprooting of people when it accelerates economic changes that transform communities, stimulates people to abandon traditional occupations and to seek new places, while it also obliges them to confront new customs and ways of thinking (Milanovic, 1999:10-11). In short, in this globalized context, people are on the move and this will inevitably have huge impacts on local and global environmental outcomes.

What is the best way to deal with the environmental implications of population and space? Over time, much attention has been focused on the measurement of "carrying capacity." Cohen (1995) provided a comprehensive review that examined more than 65 estimates of maximal global population, as well as several estimates of local human carrying capacity. His conclusion is predictable: there is no one best estimate since both natural constraints as well as human choices are always involved. Evidently, physical space itself is not the problem. Preston (1994) calculated that if they all stood together, the 5.6 billion humans that populated the earth in 1994 would fit physically within a circle having a radius of less than 8 km! This neatly illustrates the fact that perception of the constraints for a given type of social organization is what really matters in carrying capacity.

The carrying capacity approach has been criticized for not taking adequate account of technological change, people's aspirations for higher standards of living, international trade, and different types of constraints on land use (Marquette and Bilsborrow, 1994:8). Because carrying capacity ultimately depends on specific forms of social organization, and since there are so many different patterns that have significance, the concept appears to be of little practical utility at the global level. It may yield somewhat more useful insights within smaller spatial units; nevertheless, the economies of these smaller units also make demands on resources from a broader area.

The bottom line is that it does not appear to be worthwhile to become involved in painstaking efforts to measure carrying capacity. As Smil puts it: "Carrying capacity is not too difficult to define for deer or gorillas - but without detailing average energy and material flows it is an enormously elastic concept for human societies, and one made even more fuzzy by increasing international trade" (Smil 1993:207). Most demographers seem to be of like mind today and are uncomfortable with aggregated, global-level predictions and relations. Moreover, despite its continued appeal, the question of how many people fit on the earth is not particularly useful. Even if we were able to measure the limits to carrying capacity properly, it is never clear what one could do about them. Presumably, such calculations will prompt the message that we would be better off with fewer people and, consequently, that family planning

or population control programs are in order. Ecologists routinely assert that world population has already outstripped the Earth's capacity. Assuming that this is true, the policy options are murky and/or unthinkable. Family planning and population control do not have retroactive capacity!

An ingenious approach to measuring the relation between population and land area was proposed by Rees (1992), who offered the concept of the "ecological footprint". An offshoot of the carrying capacity literature, this notion refers to the amount of productive land that is needed to sustain a city's population and its consumption levels. Later, the ecological footprint approach was used to demonstrate the differential demands made upon natural resources by societies at different levels of "development" (Wackernagel et al., 1997). An interesting conclusion is that India and China are not considered overpopulated but most Western European countries, as well as the United States, are in that category.

This is evidently a vivid reaffirmation of the notion that patterns of production and consumption, rather than absolute population size *per se*, are critical in environmental outcomes. More generally, although sizing up ecological footprints is not an exact science, it is useful for raising awareness of the linkages between industrial development and the challenges to sustainability. Its main contribution is to generate awareness, both of the demands put by cities upon their hinterland, as well as of the limitations to growth in general. It also provides a strong incentive for improved environmental accounting. However, it does not suggest the future direction to be taken by policy or research. Transforming its central argument into feasible and acceptable proposals is difficult, given the nature of economic and political interests that nurture present economic growth efforts.

In a similar vein, Dutch economists have coined the term "environmental space" to call attention to the amount of environmental pressure that the Earth's ecosystems can handle without irreversible damage. It is based on the idea that the available environmental space sets a ceiling for using and depleting natural resources. The services provided by the Earth's ecosystems, and for which there is a limited space, include both stocks (of renewable, semi-renewable and non-renewable resources) and sinks (i.e. capacities to absorb waste, pollution and encroachment). Most resources are globally tradable while most sinks are regional or local in extent (ozone depletion, persistent toxins and greenhouse gases being major exceptions). The actual use of environmental space is contrasted with permitted use in order to establish input reduction quotas to be achieved by national economies (Hille, 1997; Spangenberg, n.d.).

Following its introduction by Opschoor, the concept of environmental space became the subject of considerable academic and political interest, eventually stimulating a study with a pan-European perspective, "Towards sustainable Europe" (Spangenberg, n.d.). One of its main advances, by comparison to more famous works such as *The Limits To Growth* and the Report of the Brundtland Commission, is its pervasive concern with global equity. That is, it presumes a globally fair distribution of rights to put pressure on the environment. It also has the advantage of linking population size to modern development and its consumption patterns. "It is difficult enough to imagine that one billion people might *sustainably* consume resources at the present European rate, but quite another thing to imagine that 10-12 billion may be doing so in 2050" (Hille, 1997).

Nevertheless, like the "carrying capacity" and "ecological footprints" concepts, "environmental space" does not directly address the issue of whether different patterns of spatial distribution can help or hinder the promotion of sustainability. The suggestion made here is that instead of trying to figure out the theoretical carrying capacity of the Earth, and in addition to calculating how much of our resources we are overspending, we could profitably focus on a more practical issue, namely - how can an existing population make the most sustainable use of a given territory, in light of available

resources, population, economic potential and the current development context?<sup>2</sup> What is the best way that this concrete population can be distributed over its territory, currently and into the future, so that it will cause the least possible environmental damage and best promote sustainability, while also making the best possible use of its comparative advantages (and thus attaining the highest tolerable levels of economic growth and social development)? These are not easy questions to answer, yet they open up an area that holds much promise and that is ripe for policy intervention.

Focusing on the sustainable use of space at the level of concrete political and/or geographical entities favors consideration of the specificities of social and economic organization, ecological conditions and demographic characteristics within that area. When space and population redistribution are analyzed in the context of environmental issues, development appears as the prime determinant of both the spatial allocation of economic activity (and thus of population distribution) and of production and consumption patterns. Sustainability thus requires that development efforts in a given country pay attention both to the spatial allocation of economic activity and population, as well as to production and consumption patterns.

Attempting to understand the relative advantages and disadvantages of different spatial options for environmental outcomes, and helping to promote the more advantageous alternatives, would seem to constitute an effective way in which population-funding agencies and population specialists can contribute to sustainability in coming years. FAO has done considerable work on land-carrying capacity in the rural-agricultural domain, but more recent efforts recognize the need to also consider urban and peri-urban spaces (FAO, 1995). Overall, what is needed is a holistic approach, which simultaneously considers different land uses and ecological factors within a specified limited territory.<sup>3</sup>

### **Influencing the Sustainable Use of Space**

Given space limitations, the argument that the distribution of population over space affects sustainability will be exemplified here with respect to urban concentration. In the short run, it can be argued that the most pertinent PDE issues that can effectively be broached, from the vantage point of population sciences, are those related to the impacts of demographic concentration on environmental outcomes. Focusing on the urban scene is essential because urban areas are increasingly important in the PDE scenario: they are the locus for both demographic growth and development efforts in the future.<sup>4</sup>

#### **a) Urban Growth Trends in the 21<sup>st</sup> Century**

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<sup>2</sup> The following discussion is largely based on Martine (2001).

<sup>3</sup> In an increasingly globalized world, people consume resources from every segment of the globe: this is obviously a complicating factor since we cannot reason exclusively in terms of a given population living on a given territory having a fixed allotment of natural resources. However, the fact that ecological footprints and geographical occupation do not coincide does not prevent us from trying to establish more sustainable forms of occupation of any given spatial area.

<sup>4</sup> The discussion of urban growth is somewhat hampered by definitional problems. Demographers have always criticized the dichotomous split between “urban” and “rural”, however, no satisfactory alternative was forthcoming. In recent years, dissatisfaction with this traditional approach has become more accentuated (Hugo et al, 2002; Montgomery et al, 2003; Cohen, 2004). Researchers continue to agree that “urbanity” has an extremely important effect on the type and quality of the lives that people lead. However, the dichotomous classification does not account for the variety of places in any given country, and much less across countries. Moreover, the urban-rural distinctions are becoming increasingly blurred, especially around individual cities where urban sprawl, new urbanization forms and partially built-up areas are being given various denominations. Finally, definitions vary enormously between countries. Ongoing efforts to differentiate between urban types using a combination of satellite images and census data may provide us with more adequate materials in the foreseeable future (Balk et al, 2005). However, for the time being, we are still forced to use the census data as elaborated by the UN Population Division. The deficiencies of these data are less significant in the analysis of broad trends and prospects of urban growth at the world level, such as that presented here.



The growth of towns and cities constitutes the major demographic phenomenon of the 21<sup>st</sup> century. Several important trends can be identified from the latest UN data on urban growth, summarized in Table 1. First of all, the scale of change, rather than the rate of urban growth, is unprecedented (Montgomery et al, 2003; Cohen, 2004: 27-32). The rate of urban growth is actually declining systematically in all regions, in part due to the mathematical difficulty of maintaining high rates of growth in already-large cities. The biggest challenge will thus come simply from the vast increases in numbers and the sheer size of the urban population in the 21<sup>st</sup> century.

**TABLE 1- URBAN, RURAL AND TOTAL POPULATIONS, BY MAJOR REGIONS, 1950-2030**

Region	Population (in millions)				Avg. Annual Rate of Change (%)		
	1950	1975	2000	2030	1950-75	1975-2000	2000-2030
<b>Urban</b>	733	1516	2857	4945	2,91	2,53	1,83
Africa	33	103	295	748	4,57	4,21	3,1
Asia	232	575	1367	2664	3,63	3,47	2,22
Europe	280	446	529	545	1,86	0,68	0,1
Latin Am. & Carib	70	197	393	602	4,14	2,76	1,42
N. America	110	180	250	354	1,98	1,32	1,16
Oceania	8	15	23	31	2,75	1,51	1,07
<b>Rural</b>	1786	2552	3214	3185	1,43	0,92	-0,03
Africa	188	305	500	650	1,93	1,98	0,87
Asia	1166	1823	2313	2222	1,79	0,95	-0,13
Europe	267	230	199	140	-0,61	-0,57	-1,17
Latin Am. & Carib	97	125	127	109	1	0,08	-0,51
N. America	62	64	66	53	0,11	0,14	-0,7
Oceania	5	6	8	10	0,76	1,31	0,68
<b>Total</b>	2519	4068	6071	8130	1,92	1,6	0,97
Africa	221	408	796	1398	2,45	2,67	1,88
Asia	1398	2398	3680	4887	2,16	1,71	0,95
Europe	547	676	728	685	0,84	0,3	-0,2
Latin Am. & Carib	167	322	520	711	2,62	1,92	1,04
N. America	172	243	316	408	1,4	1,04	0,85
Oceania	13	22	31	41	2,08	1,46	0,97

**Source** - UN Population Division, 2004, Tables I.1, I.4 and II.7

Currently, more than 3 billion people live in towns and cities; this is expected to rise to almost 5 billion by 2030. By comparison, the world's rural population is expected to decline slightly during the same period. This means that, at the aggregate level, **all** population growth occurring in the future will be in towns and cities. The size of Asia's urban population will increase by 1.2 billion by 2030, at which time it will be larger than the world's total population in 1950. Africa's urban population in 2030 will be slightly smaller than the combined urban population of Europe and North America today!

Secondly, large cities are increasing in number and size, as well as in demographic importance. The proportion of the urban population residing in cities of 10 million or more inhabitants in developing regions is expected to rise from 2.7% in 1975 to 8.9% in 2015. The number of such cities is

expected to increase world-wide, from 4 in 1975 to 22 in 2015, when 16 such mega-cities will be located in developing regions. The number of cities having from 5 to 10 million people will also rise from 17 in 1975 to 39 in 2015 (29 of which will be in developing regions), but their proportion of the total urban population will actually decrease slightly. At the other extreme, smaller towns and cities of less than 500,000 inhabitants still account for half of the total urban population, in both the developed and developing world. However, they are proportionately more important in developed countries, where they harbor close to 40% of the total population, than in developing countries where they account for only one-quarter of the total population (United Nations, 2004: Tables I.6, V.1 and V.2).

Thirdly, urban growth and urbanization are no longer necessarily linked to economic growth. As Cohen (2004:33) observes: “Undoubtedly the most profound difference between the experience of the first half of the 20th century and today is that, in the first half of the century, urbanization was predominantly confined to countries that enjoyed the highest levels of per capita income. In the more recent past (and indeed for the foreseeable future), the most visible changes in urbanization have occurred and will continue to occur in middle and low-income countries.” This is particularly notable in Africa, where “. . . cities . . . are not serving as engines of growth and structural transformation. Instead they are part of the cause and a major symptom of the economic and social crisis that have enveloped the continent” (World Bank, quoted in Cohen, 2004: 34).

The path of developing countries to urbanization and urban growth not only differs significantly from the patterns observed in developed countries during the past, but also varies considerably by region. For instance, most large Latin American countries are well advanced in their “urban transition”.<sup>5</sup> That is, three-quarters of these countries’ population already live in urban areas, many of these in large cities; more importantly, the *rate* of city growth has been drastically reduced from being among the fastest in the world to the slowest among developing regions. Rural-urban migrations are much less prominent there because three-quarters of the population already live in towns and cities. Thus, most migration is now urban to urban, and most city growth comes, not from migration, but from natural increase and annexation.

The situation is very different in Asia and Africa, where most large countries only have about one-third of their populations living in urban areas. Several countries therein have an enormous potential for rapid urban growth. This is particularly true of large, populous countries such as China, India, Nigeria, Indonesia, Pakistan and Bangladesh that still have, at this time, a predominantly rural base. Ongoing economic changes are breaking up traditional structures and transforming hundreds of millions of people into potential migrants. In India and China alone, whose combined rural population includes one out of every four persons on earth, we can expect that ongoing economic changes could generate massive urban growth in absolute terms. Rural-urban migrations and annexation will be important in this process, but natural increase within cities will inevitably account for a growing proportion of all urban growth.

From the foregoing analysis, it is clear that massive urbanization and urban growth are inevitable and that these are amongst the most important forces currently at work in the universe in the 21<sup>st</sup> century scenario. Whatever the size of urban problems now, it is even more important to recognize that **most urban growth is still to come**. Close to half of the world’s current 6.5 billion people are now living in towns and cities, a proportion that will increase to 61% by 2030. All the city growth that has occurred in human history to this day stands to be duplicated in little more than a generation. These are mind-boggling facts, with enormous implications, but they apparently haven’t begun to penetrate the public consciousness.

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<sup>5</sup> Expression coined by Skeldon (1990).

### **b) Globalization, Development, Urban growth and Sustainability**

The environmental importance of cities is multiplied by their critical role in the current development framework. Most increments in economic activity presently accrue to urban areas, making them the prime site for population/environment interactions affected by development. Traditionally, cities have possessed enormous economic advantages. However, globalization, as well as the current politico-ideological scenario and, thus, the foreseeable future, favors market mechanisms even more, thereby increasing the propensity to concentrate investments and activities in areas that present the greatest advantages – the cities.

Cities are the driving force in development. They grow because they are more efficient and, over time, productive activities tend to concentrate even further in urban centers. Cities have higher productivity due to their economies of scale and agglomeration; they optimize the use of human and mechanical energy, they allow for fast and cheap transportation, they provide flexible and highly productive labor markets. They facilitate a diffusion of products, ideas, and human resources between different types of spaces. Development in the current scenario necessarily entails raising agricultural productivity through capital investment and increasing labor mobility towards more effective centers of economic growth.

Urbanization is thus a necessary component of the development process such as we know it. Urban growth is now closely related to events in the global economy. Within the framework of ongoing global economic processes, the locus of economic growth will, in the majority of countries, be progressively more urban. Globalization, increasing communications between all parts of the world, modernization and the attractions of consumerism, *per se*, all favor urbanization; moreover, productivity will probably continue to be generally correlated with city size in the process of globalization as international commerce focuses on cities. The current politico-ideological scenario within globalization thus increases the traditional propensity to concentrate investments and activities in urban areas. Since globalization is, paradoxically, tied closely to localization (World Bank, 1999), specific cities and local governments have a greater influence on the attraction of investment than ever before.

Since migration flows accompany changes in the spatial allocation of investments, economic activities and jobs, they generally head towards the more dynamic (and often larger) cities. Productive investments, even by the public sector, tend to be oriented by market mechanisms. Since the foreseeable future favors market mechanisms even more, it can be expected that the propensity to concentrate investments and activities in urban areas will be accentuated.

Does the current urban growth phenomenon constitute a boon or a menace to sustainability? The answer depends primarily on how globalization will affect production and consumption patterns of different countries; this issue obviously extends beyond the limits of this paper since it deals with the very essence of civilization in the 21st century. However, a great deal also depends on the decisions that are made with respect to location and patterns of city growth and to the internal organization of cities. Where this growing urban population will live, in what geographic location, what type of land it will occupy, with what degree of concentration, what density, what energy consumption, what type of housing and transport, what situation with respect to climate, topography, natural boundaries, water supply, or wind currents will - along with its patterns of production and consumption – all have an enormous impact on long-term sustainability. This is clearly a topic that can be broached with the tools of population scientists, in tandem with those of urban planners and many others, as well as international development agencies.

In short, where cities are located, how they grow and how they are organized is decisive for the PDE equation. Much of the global environmental outcome of urban growth depends on decisions taken (or not taken) in the next few years. Doubling the size of all previous urban growth in a few decades' time could have disastrous consequences if the mistakes of the past are repeated. Hence, a concerted effort needs to be made *now* to promote the growth of sustainable cities.

### **Urban Growth and the Sustainable Use of Space**

Environmentalists have traditionally taken a dim view of cities. The modern environmental movement originally centered its concerns on the preservation of nature in rural areas and on the avoidance of urban-based pollution. Within this framework, cities were viewed primarily as a locus and symbol of the environmental problems linked to industrial civilization. Today, the bias might seem even more justified. A large part of the current urban population is poor and lives in health and life-threatening situations. Cities congregate most of the critical environmental problems generated by the production and consumption patterns of modern societies; they consume enormous amounts of energy for industry, transportation, heating, lighting and home appliances. Similarly, they generate prodigious amounts of waste and pollutants.

Nevertheless, in each instance, the question that has to be asked, from the standpoint of the sustainable use of space is - if the population were more dispersed, would the overall social and environmental situation be significantly improved? That is, given the fact that every country has a population of a given size and specific dynamics, and that this population has to be accommodated somewhere on the national territory, is urban concentration really a negative pattern?

In the practicalities of the 21<sup>st</sup> century scenario, the bias against urbanization is exaggerated and near-sighted. There are excellent demographic, socio-economic, and even environmental reasons to assert that urban loci are potentially more sustainable, over the medium and long range. Ultimately, urban concentration and its advantages of scale can turn out to be a more sustainable form of land use. The protection of biodiversity and of natural ecosystems is likely to depend on the absorption of population in non-primary sector activities and densely-populated areas. Urbanization is thus not only inevitable but it can also be advantageous from an environmental standpoint, given the concrete demographic and economic realities that face us at this moment in time.

Most of the negative environmental implications of urbanization are linked more to other factors - such as patterns of development (unsustainable production and consumption), lack of development (poverty), geographical location, patterns of land use (urban sprawl and low-density housing), urban form (e.g. - excessive paving and "de-naturalization"), lack of governance and ineffective urban management, etc., rather than to urbanization, urban growth, density or size *per se*. That is, cities unquestionably have serious negative environmental impacts because they concentrate both population and economic activity; but these effects are associated with a given pattern of civilization and could be mitigated to a large extent.

Several sub-aspects of urban growth's environmental implications could be discussed in this framework. Due to space limitations, we will focus on three of these: the effect of urbanization on population growth, the appropriation of land by cities and the urban consumption of resources.<sup>6</sup>

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<sup>6</sup> Many of the arguments presented below were initially inspired by a seminal contribution made by WRI (The World Resources Institute, 1997).

### **a) Urbanization, Fertility and Population Growth**

Population growth and size - and thus fertility rates – have traditionally been a primary concern of activists and policymakers in the realm of PDE linkages. As explained above, on a global level, **all** future population growth will occur in towns and cities. Natural increase will inevitably become the dominant factor in global urban growth. However, the fact that population growth will accrue to urban areas does not make towns and cities the villains of demographic increase. On the contrary, it is important to observe that urbanization *per se* constitutes a powerful factor in fertility decline. Moreover, migrants to cities end up having fewer children than if they remained in rural areas.

This fact has been demonstrated repeatedly in the literature, and is not difficult to understand; urbanization provides few incentives for large families and numerous disincentives. In practically all developing countries, fertility decline has always occurred first and quickest in cities. Brazil's uncommonly steep fertility decline, in the absence of any concerted family planning program, is attributable, in large part, to rapid urbanization (Martine, 1996). Given rural/urban differentials in fertility levels, a country with higher levels of urbanization will, *ceteris paribus*, have lower overall fertility. Thus, in 1996, if India had the same levels of urbanization as Brazil but maintained its urban and rural fertility differentials, its TFT for the country as a whole would have been around 3.4 instead of 4.0.

In this light, urbanization plays a significant role in reducing the rate of national and global population growth. Paradoxically, urbanization is thus important in eventually diminishing the rate of growth of the urban areas themselves! That is, given the differential nature of the logic of reproduction in urban and rural areas, and the impact of rural-urban migration on migrants' fertility, urbanization (i.e. – an increase in the proportion of the total population residing in urban areas) actually has to **increase** in order to reduce fertility and total population growth.

### **b) Appropriation of Agricultural Lands and Invasion of Ecologically-Fragile Areas**

One of the most common environmental criticisms directed to cities is that they occupy an enormous and critical land area. Current patterns of urban growth are a real cause for concern in this respect. Since many towns and cities were originally located at the heart of some of the more productive land areas in their respective countries, the outward spread of their urban boundaries inevitably tends to destroy prime farmland. For instance, it has been estimated that the expansion of India's cities has overrun 1.5 million hectares of the best agricultural land in a thirty year period (Center for Science and Environment, cited in Roberts, 1994:318). In land-hungry Egypt, more than 10% of the nation's most productive farmlands have been lost to urban sprawl in the last three decades (Hardoy and Satterthwaite 1995:115). At the same time, it is estimated that some 40% of all cities of 500,000 or more inhabitants are located on coastlines, a fact which by itself implies destruction of, or at least a threat to, rich and diverse coastal ecosystems.

Half of the land which will be appropriated for urban uses in the next 40 years is still being used for other purposes at this time. If current urban land-person ratios are maintained, twice the Earth's land area will be occupied by cities, thereby multiplying the encroachment upon ecologically fragile areas and prime agricultural land. It is estimated that cities now occupy 3% of the earth's entire land area (Balk et al, 2005). Simply doubling the amount of land area used for purposes of accommodating city growth, without trying to alter this pattern of land use, would in itself be disastrous. Giving in to the tendency – as many cities are doing - to ever-greater urban sprawl in order to accommodate the automobile would further multiply the negative consequences of urban expansion.

Nevertheless, the total land area which is being appropriated for urban use is not, in itself, the most devastating to sustainability. For instance, the annual acreage given over to urban use is much smaller than the natural lands which are lost every year to agricultural activities, forestry and

grazing. Indeed, it is much smaller than the amount of prime farmland which is lost every year to erosion or salinization. The issue may be more the **type** of land that is being lost to urban growth than the absolute scale (WRI 1997:32).

In particular countries, such as Egypt, the utilization of territorial area for urban purposes may be more acute - leading to proposals to reclaim urban land for agricultural use. Of course, the question then becomes - where would urban dwellers go? Indeed, sending people back to rural areas would end up increasing rather than reducing land scarcity, given the higher per capita land requirements of rural dwellers. In this case, it should also be noted that while agricultural land is being taken over by illegal urban squatters, prime sites within the city remain undeveloped because of land speculation practices (Hardoy and Satterthwaite 1995:115). Indeed, most cities in developing countries, even those with high densities, tend to have large expanses of unused land, due to speculation in real estate. Non-selective urban sprawl, rather than urban growth or urbanization *per se*, is the major culprit of urban appropriation of prime farmlands and ecologically-fragile areas.

From the standpoint of the sustainable occupation of space, the more general question that has to be asked is, again - if the urban population were dispersed, would the amount of land necessary to house it be inferior to that which is now being utilized? Would dispersion contribute to freeing up prime agricultural land? Would it help avoid the invasion of fragile ecosystems?

The answer to these questions is clearly no. The amount of land used for residential purposes is, on a per capita basis, smaller in urban areas than in rural areas (WRI 1997:32). The advantages of urban populations are not restricted to housing - where multi-story dwellings require less space than single-family dwellings - but also to the lesser need of roadways than in low-density areas. Because urban inhabitants use less land on a per capita basis than do rural dwellers, urbanization actually helps to reduce the encroachment upon environmentally rich or agriculturally fertile land areas. This was already shown several decades ago by Dasmann (1971) for the United States, where urbanization indeed increased total land availability and facilitated the preservation of ecosystems - despite encroaching suburbanization.

The fact that, *ceteris paribus*, urban residence is more efficient in terms of land use than rural residence only heightens the need for careful and forward-looking policies. One cannot overplay the implications of using prime land for city growth. Moreover, the utilitarian appropriation of nature in urban areas everywhere has rarely considered the physical environment, topography, hydrology, forest cover or other variables that influence the impact of built-up areas on the environment (Costa and Monte-Mor, 2002). There **are** things that should be done urgently, such as avoiding further urban expansion into coastal areas (because of their important role in reproduction and because they are ecologically fragile), managing prime agricultural land, enhancing the use of public transport, conserving open spaces and protecting sensitive land resources.

Of particular importance in promoting more efficient urban land use is planning for the needs of the poor. Hardoy and Satterthwaite (1989), for instance, reviewed the history of squatter settlements in Latin America. Their research shows that governments in the region have always resisted rural-urban migration and urbanization. As a result, migrants were forced to occupy marginal, ecologically-fragile or dangerous lands such as riverbanks or steep slopes. This has contributed enormously to the squalor and misery of the new urban population. The failure to plan ahead for the accommodation of poor people has also greatly contributed to the ecological degradation of the cities themselves. In the future, such issues are sure to become much worse since many options previously available to low-income urban populations are disappearing.

When local governments finally decide to accept the marginal settlements of the poor as an established reality, and try to provide them with minimal services, or to reduce their negative ecological impacts, the economic costs of doing so become astronomical. The lack of planning, the use of inadequate locations, the lack of access roads and the sheer accumulation of miserable conditions make it practically impossible to provide services or redress the accumulated ecological damage *a posteriori*. The lesson to be learned is obviously that planning ahead, and learning to live with migration and urban growth, instead of constantly trying to catch up after the fact, is cheaper and environmentally more adequate; moreover, its social consequences are far superior. One could say that the anti-urban bias is, in this light, unsustainable!

Consideration of future trends, and preparation for inevitable future growth is thus critical. The implications of doubling the world's urban populations in a short time span cannot be over-estimated. Present use of urban space has to be improved but, even more importantly, the mistakes of the past, that have led to urban sprawl and to the invasion of environmentally- or economically-important areas, have to be avoided. Better land use policies could significantly reduce the negative consequences of inevitable future urban growth. This is one of the most urgent environmental issues that needs to be addressed in a pro-active manner.

In order to avoid the worst consequences of urban growth in terms of land conversion, specific policies need to be urgently implemented. Urban growth first has to be accepted as the inevitable trend it is. The traditional cycle of opposition, acceptance and post-hoc accommodation of rural-urban migration has to be replaced with a pro-active stance. Secondly, urban concentration has to be promoted to the status of an important ally in development and conservation efforts. However, in order to fulfill a positive environmental function, city growth has to be oriented with respect to location, form and organization.

Given ongoing and future city growth, especially in the developing world, we should already be working diligently, in each country, to identify towns and cities that have sustainable growth potential. That is, we should try to spot those locations that present favorable attributes from an economic standpoint as well as favorable physical characteristics, such that their expansion can be expected to have minimal environmental consequences (e.g. - away from coastal areas, wetlands and tropical forests, and favorably located in terms of terrain, topography, water, wind currents, downstream effects, etc.). Such locations should benefit from tax incentives and other fiscal benefits as well as positive public policy campaigns. Meanwhile, the growth of cities in agriculturally-rich or ecologically-fragile areas, or in locations blighted by obviously negative physical characteristics, such as inadequate topography, natural risks, proximity to natural or man-made toxic materials, or lack of access to water, should be discouraged.

By the same token, not all city forms are equally sustainable and certain patterns should be encouraged over others. Thus, vertical growth and higher density cities are, *ceteris paribus*, advantageous from an environmental standpoint. Not only do they help reduce encroachment upon agricultural or ecologically-fragile lands, but they also bring other advantages such as reduced energy consumption and more efficient services.

In the predicted upcoming duplication of city population, reduction of urban sprawl would be a critical element in the sustainable use of space. Planning for effective mass transport is a crucial aspect of reducing energy use. High density areas should be planned to go together with efficient mass transit systems. The Los Angeles pattern of automobile-based dispersion is extremely inefficient; unfortunately, it is being replicated to a greater or lesser extent in a wide variety of places, such as Bangkok, Panama City and Santiago (Chile).

The way in which space is utilized within a city can have huge environmental consequences. What is needed are compact cities that concentrate population, housing and jobs over a minimal land space in order to be energy and resource efficient. This has to be coordinated with transport infrastructure. The American-type suburb is the worst possible scenario from an environmental standpoint, since it promotes congested highways that eradicate vegetation and squander biomass. Its population density is too low for mass transport, but too high to retain wildlife; too much land is paved with unnecessarily wide streets and their complements of driveways and parking lots; enormous resources are used to maintain a vegetative cover of very low biological diversity (Lewis 1997:101; Owen, 2004, *passim*).

In short, city growth and urban concentration can represent important allies in the sustainable use of space. The amount of land area which is appropriated for urban land use is not negligible, nor is the environmental loss it causes. Nevertheless, both aspects can be greatly mitigated by foresight and more appropriate use of the land. Given ongoing urban growth trends, this is a matter of maximum urgency.

### **c) Urban Resource Consumption**

Cities consume enormous amounts of a wide range of resources and raw materials. Urbanites generally don't realize how much, because they have little contact with nature, and thus have lost a direct connection with the source of the myriad products they consume. Evidently, more developed cities consume much more than their poorer counterparts. In this connection, two points can be made. First, it is extremely difficult to differentiate the growing utilization of resources which are attributable to urban growth *per se*, from resources used in the productive process, or from those which are required to improve standards of living. In other words, it is difficult to separate out the environmental effects of changes in residential patterns from economic and social development.

Evidently, more suitable consumption practices in the cities are necessary. Ultimately, it is the level of affluence and the type of lifestyles of given societies, rather than their level or size of population concentration, which determine energy use and efficiency. As Lowry points out: "If large urban concentrations of people use energy inefficiently, it must be so relative to some other spatial arrangements of those people. Suppose that Mexico City's 15 million inhabitants were evenly spread over a 200 kilometer radius surrounding the present center, or locally concentrated in towns of 150,000 inhabitants each. Would the total energy costs of water supply, including catchment, management, purification and distribution really be substantially less? Similarly, suppose the towns of India and Africa sent their residents to live in the countryside. There might be per capita savings in fuel consumption from using firewood instead of charcoal and lower transport costs to supply a dispersed population. But wouldn't the exiles, deprived of urban occupations, have to clear the forest in order to grow crops?" (Lowry, 1991:171-2)

Thus, the use, overuse and wastage of resources is one issue; urban growth is another. Though the two often occur in the same geographical territory, it does not mean that urban growth is the cause of wastage. Indeed, urbanization generally helps to increase use efficiency and reduce some of the waste. The pattern of utilization of resources that improve the quality of life of urban dwellers can be criticized because it is excessive, unsustainable or wasteful, but not simply because it is urban. The same can be said of the utilization of resources for economic production: it may be open to valid criticism, but not because it occurs in urban areas. Actually, the fact that it occurs in urban centers of concentration often helps to minimize waste.

The second point is that, even if they remain in rural areas, people will need access to resources -- such as fuel, energy for transport and production, water and food -- if their lives are to improve on a par with those of urban inhabitants. Implicit in the anti-urbanization bias is the notion that,



somehow, if people remained in rural areas and small towns, their living conditions would improve and their lifestyles would be more pleasant; meanwhile local, regional and global environmental degradation would not be incremented.

Such an assumption is highly debatable, both from a factual and an ideological standpoint. The solution of keeping per capita consumption low (and the stock of world resources high) by policies that keep some people "down on the farm", or "in the woods", where they supposedly consume very little that is not renewable, is technically and morally unacceptable. Ideally, the services, benefits and resources to which urban inhabitants have access should be generalized to the remainder of the population. Extending services to rural areas, however, would require much larger quantities of resources since such services are almost always less efficient and more costly when provided in sparsely-settled regions. Unless we are willing to tolerate continued and/or growing inequalities in use of resources between haves and have-nots, more effective and sustainable solutions have to be found. Altogether, urbanization is a more promising prospect from the standpoint of resource use.

At the same time, resource use in certain domains is clearly made more efficient by urban concentration. This is particularly evident with regard to energy. Mass transport is eminently more efficient and less polluting than private transport; density is essential to an efficient urban transport system. The intrinsic energy efficiency of cities is also evident in other areas, such as: heating, where detached dwellings require much more energy to heat; cogeneration (a process by which industries use what would otherwise be waste heat); transport of goods from business to consumer, which is much less demanding in highly-concentrated areas, and so forth (Lewis 1992:93-4).

Similarly, much could be done to enhance the ability of cities to reduce their demands on the ecosystem and to minimize their ecological footprint. This involves both the recycling of urban wastes for agricultural use as well as increasing the agricultural self-sufficiency of cities. Girardet, for instance, points out that cities often contain an impressive range of plant and animal species, and that urban agriculture could make a significant contribution to feeding the city population. He alludes to the fact that several cities are already fully or partially self-reliant in critical food products. He stresses that this is not merely a developing country phenomenon since the 1990 US Census found that urban metropolitan areas produced 40% of the value of US agricultural production (Girardet 1996). Canada's IDRC invests significantly in the idea that Southern cities can feed themselves through its "Cities Feeding People" program (IDRC 1998).

Again, these advantages do not imply that all problems of resource consumption have been satisfactorily resolved by the magic wand of urbanization. On the contrary, the basic environmental threats posed by our civilization's modes of production and consumption increase dramatically with the impacts of globalization in large and populous countries: urban localities are the sites in which such patterns are most highly concentrated. The main point to be retained from this section is that attributing such problems to urban concentration *per se* is not only incorrect but misleading. Indeed, such erroneous finger-pointing by some environmentalists has generated a few seductive but utterly impracticable back-to-nature proposals. These only serve to hinder and retard effective consideration of genuine issues and their possible solutions.

There are obviously critical problems linked to urban concentration which medium and long-range planning will have to face in the area of energy supply, resource management (especially of water), management of waste disposal and environmental hazards, and management of urban transport externalities. Confronting these several issues represents a serious challenge to human ingenuity. For instance, providing access to sanitation and clean water is considered to be the single most effective means of alleviating human distress in poor and developing countries. Yet, keeping up

with the demand can place severe strain on surface and groundwater supplies. These types of issues require urgent consideration within a future-looking perspective.

#### **d) Overview of the Advantages and Disadvantages of Cities**

The foregoing observations would tend to show that urbanization can be a critical ally of sustainability under the conditions prevailing in the 21<sup>st</sup> century context. With 6.5 billion people and growing, with globalized economic competition as the only path to development, with increasing consumption aspirations and demands for other social amenities everywhere, the arguments in favor of densely-populated centers are convincing. Given the current and foreseeable sizes of the population that will have to be fitted sustainably in the different parts and nooks of the world, higher population densities are strongly advisable – for demographic, economic, social and even environmental reasons.

Indeed, urban concentration, **per se**, can potentially facilitate the resolution of environmental problems. In addition to rationalizing access to services and amenities, urban concentration increases total land availability, permits gains in agricultural productivity and facilitates the preservation of forests and other natural ecosystems. Urban density is favorable to economic growth, to social development and fertility reduction. It also supports greater efficiency in the use of resources. To the extent that proactive and systematic efforts are made to live with what are likely to be inevitable processes of further concentration, innovative and constructive approaches of dealing with urban environmental problems can effectively be developed.

Evidently, such comments should not be taken to mean that there already exist adequate solutions to all urban environmental problems or, that urban areas will automatically become environmentally safe havens. On the contrary, the most critical work remains to be done. Moreover, without development, urban concentration can be simply disastrous. That is, the ability of urban management to deal with the environmental challenges posed by concentration and to provide essential infrastructure and services is ultimately dependent, in large part, on the availability of economic resources. All this inevitably refers us back to the more thorny problem of how to achieve sustainable development in today's economic scenario.

At the same time, the inherent advantages of urban concentration which are being postulated here do not mean that the larger the better. On the whole, it is generally felt that compact cities below the "mega-city" size would be preferable. Nevertheless, the available evidence on this is not incisive. Nor is it clear that policies aimed at promoting intermediate-sized cities have had much success in changing the course of market-based trends. On the other hand, one of the positive aspects of globalization appears to be that the new division of world labor has allowed the growth of industries that are not located in the largest cities (Portes n.d.:20). Moreover, market factors themselves seem to check growth in mega-cities that have become unmanageable. For instance, in Latin America a clear trend towards reduction of primate city growth and mega-city growth has been observed since the beginning of the 1980s.

#### **Final Considerations: The Urgent Need to Address Urban Environmental Issues**

Cities are undeniably the axis of both demographic and economic growth in the 21<sup>st</sup> century scenario. The absolute scale and the sheer number of people involved in the current process of urban growth are unprecedented and extremely significant for local and global environmental outcomes. In the context of ongoing development and demographic trends, there is a pressing need to try to influence the locational decisions affecting the spatial conformation and form of urban growth, as well as the planning of resource use and waste generation, for the sake of sustainability. The environmental implications of this ongoing transformation are staggering yet, unfortunately, the

world has not taken due note of it. The time and opportunity to act is now; delays can only be costly. Some of the necessary actions are summarized in the figure below.

**Figure 1 - Twelve Steps to Sustainable Cities**

- Revalidate medium and long-range planning (in order to counteract the market's haphazard influence and its disregard for environmental consequences), and promote joint planning over spatially-delimited environmental issues (i.e. involve different levels of politico-administrative entities)
- Shift from conventional shelter-oriented architectural visions and urban management strategies to a more holistic planning effort aimed at the sustainable use of space
- Prepare for enormous urban growth, especially in developing countries of Asia and Africa; orient this inevitable urban growth with respect to location, form and organization
- Take a proactive stance: promote future urban growth to the status of important ally in development and conservation efforts
- Avoid further invasion of coastlines, other ecologically fragile areas and rich agricultural lands
- Identify and promote towns and cities that have sustainable growth potential (i.e combining favorable economic attributes and physical characteristics, such that their expansion can be expected to have minimal environmental consequences)
- Plan ahead for the accommodation of great numbers of poor people in urban areas, in terms of their residential land and infrastructure needs
- Promote vertical growth and higher density in cities; reduce urban sprawl and avoid suburbanization
- Plan for effective mass transport, which is eminently more efficient and less polluting than private transport. Curb the use of automobiles.
- Change the conception of cities as biologically sterile environments; promote biological diversity while learning to use the enormous water, energy and nutrient resources that are the by-products of urban drainage, sewage disposal and other functions of city processes
- Increase the agricultural self-sufficiency of cities in order to help alleviate poverty
- Recycle, recycle, recycle, thus reducing the "ecological footprint" of cities

By helping to objectively examine the environmental needs and implications of population distribution over a given territory, the population field can make an important and specific contribution to sustainability. Evidently, the issue of land use is central to any exercise in this domain. What, practically, can be done to further sustainability from the standpoint of urban population studies? The answer is basically to help plan the location and spatial appropriation by cities. The urban growth process is evidently not an unqualified boon. Cities use up valuable land and resources and generate considerable wastes. These negative aspects, however, can be minimized with forethought and pre-emptive action. Advantageous locational and organizational aspects do not germinate by themselves, nor do they derive from the free play of market forces: they have to be planned ahead. Since massive urban growth is inevitable, it would seem crucial to plan for this huge transformation: failure to plan ahead recurrently forces attempts to catch up with what has already happened – at increasingly staggering economic, social and environmental costs.

Planning for future cities and capitalizing on the potential advantages of urban localities - wherein environmental outcomes of modern civilization are sure to be most critical - requires a long-range view. Hence, scenario-building, visualization of the future and long-range planning will have to be reinstated as legitimate ventures. Given the technical knowledge that has already been accumulated, population scientists can make a specific input with respect to the role that cities can actually play in a sustainable world.

In short, though it is true that cities are the locus of the majority of the world's critical environment problems, they also have the potential to enhance sustainability **if** humankind takes significant steps

towards sustainable production and consumption, and **if** it takes a pro-active stance towards inevitable urban growth. A positive and interventionist approach needs to be adopted with regard to urban growth aimed at reducing its negative impacts and maximizing its potential advantages. Environmental concerns in general require both a long-range view as well as management practices that extrapolate the interests and capacity of the market. At the same time, public institutions will inevitably have to be involved in this process, supported, monitored and redressed by widespread public participation.

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