THE SUSTAINABLE USE OF SPACE: ADVANCING THE POPULATION/ENVIRONMENT AGENDA

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ABSTRACT

The population/environment literature has centered mostly on the relation between population growth and environmental change. This discussion is stagnated and provides surprisingly little guidance for policy formulation; at most, it provides legitimacy for what is already being done. Focusing on the largely-neglected area of spatial distribution would open up more useful avenues for policy and action. Past attempts to deal with the relation between sustainability and the use of space issue have centered on "carrying capacity" and "ecological footprints." Though useful for awareness-raising, these approaches do not provide policy orientation and could be superseded by an emphasis on "the sustainable use of space". The critical question is - how can this specific population make the most sustainable use of its territory? Attempting to understand the environmental advantages of different spatial options, within concrete development contexts, seems an effective way for population specialists to contribute to sustainability in coming years. Reviewing regional development and urbanization patterns would appear to be a promising place to start.

INTRODUCTION

This paper attempts to deal with some of the conceptual and practical issues involved in formulating a more meaningful population/environment (P/E) agenda. Essentially, it asks - what can be done about environmental issues from a population perspective, in the framework of the new millenium? How and what can the knowledge, skills and tools of the population sciences effectively contribute to sustainability, via research, policy and action? It assumes that improving the relevance and specificity of the work on P/E linkages begins with a restatement of the problem; concurrently, these linkages have to be viewed more directly within the context of the prevailing development scenario.

The overwhelming majority of the work on population/environment linkages has centered on how population size and rate of growth affect the depletion of natural resources. This debate is largely stagnated and its policy implications are surprisingly restricted. (Smils 1993 and 1998; Martine 1996). Essentially, the suggestion made in this paper is that focusing on the other and largely-neglected area of population dynamics, namely - spatial distribution – would open up more useful avenues for policy and action in the environmental domain. Part of the reason for this is that putting P/E linkages within their spatial context makes it easier to analyze their interfaces with concrete development efforts. In this framework, the concept of "sustainable use of space" is proffered as a tool that facilitates the consideration of population/environment linkages within actual patterns of development and social organization. This, in turn, should favor policies and actions having greater specificity and relevance.

The paper is divided into three parts. The first briefly reviews the policy implications of the dominant perspective on population/environment linkages and suggests a greater focus on spatial dimensions. The second examines different approaches to the relation between space, environment and population within the current development context; it

submits that focusing on “the sustainable use of space” would provide a more productive approach to this nexus. The third section illustrates some of the directions in which this approach can help take us. It suggests that centering on urban environmental issues is particularly promising. Main observations are highlighted in the conclusion.

1. WHY REFOCUS THE AGENDA?

The common denominator of the population/environment literature is concern with how human activity relates to the management of natural resources and to the environmental quality of air, water or soil. Whether working at the micro or macro-level, attention is focused on how people affect, or are affected by, environmental change. Within this broad domain, the topic which has concentrated the bulk of interest in the population/environment literature is the impact of fertility levels, and resulting population growth rates, on environmental change. The main issue is whether or not, and how much, the rate of growth and the size of the human population are detrimental to sustainability.

The dominant view, judging from the number of scholarly pieces written, as well as from its influence on policymakers and on public opinion, is that population growth is a/the major cause of environmental stress. In essence, it argues that modern rates of population growth are putting enormous pressure on the Earth's resources; as a result, the Earth's "carrying capacity" is being, or has already been, overrun.

Despite its ubiquitous and forceful presence, this view has not generated consensus: indeed, the literature has been dominated by extended arguments as to the directness, magnitude, immediacy or relevance of the threat caused by population size and growth rates. We need not go into this well-publicized controversy here since all sides of it are by now well-known.[1] Most researchers and policymakers have come down on the "safe" side, succinctly expressed by Vaclav Smil ("I find it impossible to believe that greater crowding will make for a higher quality of life….(1993:207)... virtually everything that needs doing from a population point of view needs doing anyway” (Ibid:23). Personally, I would be willing to go further in this direction and state, unequivocally, that practically any environmental challenge which one can perceive as facing humankind today, from ozone depletion to waste disposal, is made more difficult by population growth.

[1] For a review and discussion of this controversy, cf. Martine 1996, Section 1.

Nevertheless, four *caveats* need mentioning in this context. First, the nature and extent of the population challenge to sustainability is neither uniform nor linear.[2] It is ultimately determined by the manner in which production and consumption is organized in a given society, at a given moment in time, and by the relative size of the different social groups that engage in particular patterns of production and consumption within that society.[3] Thus, the overriding issue is that, in this end-of-century development scenario, our ecosphere's resources are being most seriously threatened by the manner in which industrial civilization's model of throughput growth is being adopted on a growing scale. Population dynamics are unquestionably important in this scenario. However, they fundamentally affect the dimension and gravity of environmental problems through patterns of development and social organization. Population aggravates the threat to the environment, both through population growth in the developed countries - where higher per capita consumption multiplies the impacts of each incremental person - and through the increase in per capita consumption in developing countries, particularly in those having a large population and/or a high population growth rate.

Secondly, decrying population pressure gives rise to a surprisingly narrow policy agenda. That is, contrary to what seems obvious, this posture does *not* lead to a set of policies that have novelty or specificity. The very real threat posed by the combination of economic growth and population increase should be a matter of great concern to everybody, including policymakers, activists, researchers and common citizens alike. Yet, even if one agrees wholeheartedly with the more radical renditions of the neo-malthusian argument, the only policy implication that it suggests is the need to hasten population stabilization. The current discussion harbors three different paths to fertility reduction: family planning, development, and women's empowerment.

Traditionally, the most influential group has been convinced that fertility declines with family planning programs and, hence, that it is urgent to intensify such programs in high growth countries.[4] Secondly, in the 80s, a growing number of specialists argued that fertility only declines after some form of development sets in; hence, the further reduction of population growth basically depends on speeding up economic development and social transformation.[5] Lastly, in the post-Cairo Conference era, empowering women and meeting individual's needs is being increasingly seen as the more acceptable and effective manner of regulating fertility.[6]

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[2] In some cases, environmental destruction may actually be exacerbated by low population growth and/or densities, while increasing population density may reduce degradation in other instances (National Research Council 1986; Tiffen and Mortimore 1992).

[3] Lutz (1992) provides an effective illustration of this fact with respect to carbon dioxide emissions. He shows that linear projections which consider P as an aggregated homogenous entity are largely meaningless, since the projected level of emissions varies greatly depending on the level of disaggregation of societies into social groups which have eminently differentiated consumption patterns.

[4] In a well-known study, Cleland et al. conclude that: "The evidence for Bangladesh suggests that the relative importance and primacy of the demand and supply side factors should be reversed. The crucial change that has taken place concerns acceptability of and access to birth control and *not* structural change that has driven down the demand for children." (1994:134).

[5] Demeny states that the mechanisms which nudge lower vital rates towards stabilization are rompted by transformations in the socio-economic system which set the framework for individual actions; these, in turn, are prompted by notions of personal gain. (Demeny 1994:16). In other words, fertility declines when many individuals in a given society find it to their advantage to have less children. Elsewhere, he comments that "Fertility policy practiced as

We needn't discuss the specific merits of each school here.[7] All of these efforts could legitimately use additional resources. However, for our purposes, the bottom line is that, whatever posture one assumes with respect to the manner of precipitating fertility decline, none of them leads to originality or specificity in policy formulation for the P/E domain. Concern with population growth for environmental reasons constitutes one more source of legitimacy for the intensification of family planning programs and/or of efforts aimed at promoting macro development and/or the empowerment of women. However, it does not inspire a clear-cut or novel agenda, wherein the approaches and tools of the population sciences, or the resources of population funding agencies, can make a specific *additional* contribution.

In short, despite the inordinate amount of attention which has been placed on the environmental implications of fertility and population growth, and on the apparent clarity and ease of resolution of the main problem, this is actually *not* an area in which specific, original and meaningful policies linking population and environment can be visualized.

Thirdly, the emphasis on *global* population issues, which has dominated the literature, is largely ineffectual, given the continued parochialism of the decision-making processes which affect the P/E area. Despite all the hype about globalization, the short-term political and economic interests of nation-states continue to dwarf global concerns. In this context, global population figures are, in practice, not decisive from a policy standpoint: population pressure is felt at the national or, at best, the regional level. Demeny, for instance, shows that the USA has, for some time, promoted world population stabilization but is little concerned with it at home. This is "logical" because no immediate threats from population growth are perceived within the country by the majority, and because the sum of fertility choices of the country's individuals is not seen as likely to cause a problem within the country; when and if it does, appropriate measures will presumably be taken. (Demeny 1994: 15-16)

It can be surmised that the USA has felt no need to stabilize its own population partly because: a) a moderately growing population tends to stimulate continued economic growth; b) it is expedient to ignore that the absence of a population pressure inside its borders depends on exploiting the resource base of the entire world. Obviously, the USA is not alone in this: most other countries, industrialized and non-industrialized, also pursue analogous shortsighted and self-serving policies. The global implications of such stances vary; in some cases, the population agenda of individual nations may conform to global needs, but that is mere coincidence. Clearly, one would ideally want a more universalistic and altruistic frame of mind and both population specialists and environmentalists should increase their efforts to make such attitudinal changes effective. But, in the real world, global population concerns do not move the agenda of individual countries.

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virtually synonymous with family planning programs is clearly in sharp conflict with the dominant analytic understanding of the factors underlying fertility change as well as the sense of the policy directives in standing international declarations" (Demeny 1992:323).

[6] "... improving the status of women also enhances their decision-making capacity at all levels in all spheres of life, especially in the area of sexuality and reproduction. This, in turn, is essential for the long-term success of population programmes." (United Nations 1995:17). Cf. Also Sen, Germain and Chen (eds.) 1994.

[7] For a discussion of these views, cf. Presser (1997), Hodgson and Watkins (1996), Cleland (1996).

Finally, and perhaps most importantly, the relative limitations of population stabilization efforts themselves are insufficiently considered. 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. More realistically, the latest UN projection is for stabilization at around 9 billion by the year 2050 (United Nations 1999). The same source indicates that global population growth has slowed significantly, from 2.04% a.a. during 1965-70, to 1.33% a.a. during 1995-2000. Of current growth, more than half (59%) is 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).

This basically means that, henceforth, halting population growth will not be easy or quick. Some countries and regions can still make rapid progress in fertility decline but this is unlikely to have a major impact on global trends. If everything coalesced to speed up fertility reduction at a maximal rate, world population would stabilize at 7.5 billion; if current trends prevail, it will stabilize at 9.0 billion. Evidently, *the total discrepancy between best and probable scenario of future population growth (1.5 billion people) is important, but less so than the population/environment challenges involving the other 7.5 billion*. In other words, sustainability would still be problematic, even if population growth could somehow be halted abruptly today.

From the above, it is clear that, although global population figures are critical to sustainability, continuing to focus the scientific debate of population/environment linkages on global issues of size and rate of growth does little to advance the policy agenda. How then can population specialists address population/environment linkages in a more meaningful way?

The practical suggestion made here is to focus on population dynamics within the context of concrete spatial areas that have political and economic relevance. Population/environment issues are, in practice, meaningful only within the boundaries of individual countries (or, more recently, of integrated regions); hence, work on population/environment linkages would be more fruitful if it focused on sustainability issues within them.

Within national territories, issues of population size and rate of growth may be variably critical. In practically all cases, initiatives to deal with population growth are already being taken; these may or may not need urgent reinforcement. In addition to such initiatives, however, greater concern should be placed on the relation between sustainability and the use of space within the national territory. Sustainability, at the country level, will be determined to a significant extent by where the population will in fact live, and what it will do for a living. Striving to understand what the options are for the sustainable use of space, and what environmental significance they may have, has the added advantage of contributing to reflections on what modern civilization has to do to achieve sustainability. Indeed, it is impossible to consider spatial utilization without reference to economic decisions; these, in

turn, call into consideration a much broader range of political and social questions stemming from the current development framework.

2. THE SUSTAINABLE USE OF SPACE

a) Carrying capacity

The concept of "carrying capacity" has had a long and heterogeneous trajectory. Intuitively, the concept appears to be forthright and useful: since every human being imposes some sort of demand on environmental resources, there ought to be some way we can calculate how many people that environment can support altogether. Despite the fact that the results of numerous attempts to measure "carrying capacity" have been less than satisfactory and, despite reiterated criticisms, many analysts continue to refer to it in one way or another. Indeed, judging from the number and variety of efforts to measure it over the years, the notion seems to be indestructible.

Cohen (1995) provided a state-of-the-art review that precludes the need for extended discussion of carrying capacity here. He examined more than 65 estimates of maximal global population, as well as several estimates of local human carrying capacity that have been made over the last 300 years. This thorough review of carrying capacity and how it has been approached will remain an obligatory starting point for future discussions (and dismissal) of this topic. Cohen's even-minded conclusion is predictable: there is no one best estimate. "Estimating how many people the Earth can support requires more than demographic arithmetic... it involves both natural constraints that humans cannot change and do not fully understand, and human choices that are yet to be made by this and by future generations. Therefore the question "How many people can the Earth support?" has no single numerical answer, now or ever...estimates of human carrying capacity cannot aspire to be more than *conditional* and *probable* estimates: *if* future choices are thus-and-so, *then* the human carrying capacity *is likely to be* so-and-so (262-3).

In his review, Cohen also puts his finger on a sore point: the ideological underpinnings of most discussions concerning human carrying capacity. "Notwithstanding their cloak of qualifications, many of the published estimates of human carrying capacity are probably less dispassionate analyses than they are political instruments, intended to influence action one way or another" (233). Finally, he correctly situates the exact value of such efforts: "I conclude that estimates of human carrying capacity may usefully serve as dynamic indicators of humans' ever-changing relations to the Earth. At any given time, a *current* but changing human carrying capacity is defined by the *current* states of technology; of the physical, chemical and biological environment, of social, political and economic institutions; of levels and styles of living; and of values, preferences and moral judgments."(17)

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 1994:8). Because carrying capacity ultimately depends on specific forms of social organization, and since there are so many

different patterns which 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 because this permits making less-aggregated and more meaningful assumptions about social organization in those areas (Hogan 1992 and 1993). Nevertheless, the economies of smaller spatial units also make demands on resources from a broader area. Carrying capacity might make sense only in the context of concrete historical and political entities.

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.

Perhaps more to the point, the question of how many people fit on the earth is not particularly useful, even if we were able to measure it adequately. Preston (1994) calculated that if they all stood together, the 5.6 billion humans which populated the earth in 1994 would fit physically within a circle having a radius of less than 8 km. Evidently, physical space is not the problem. What matters is what one perceives to be the constraints for what type of social organization.

Even if one could measure them properly, it is never clear what one could do about the limits to carrying capacity. Presumably, such calculations will prompt the message that we would be better off with fewer people, and that, consequently, family planning or population control programs are in order. Ecologists routinely assert that world population has already outstripped the Earth's capacity. Assuming that the limit has already been attained, the policy options are murky and/or unthinkable. Family planning and population control do not have retroactive capacity!

At the level of countries, out-migration could be posited as a way of dealing with excessive population, but that option has two problems: first, migration is, in practice, severely restricted by national and international laws; secondly, out-migration could foist carrying capacity problems on other areas. Within a given country, this approach might be helpful in selecting areas for future development and thus for orienting migration flows within it. In other words, it could support efforts aimed at identifying and promoting the sustainable use of space.

b) The Ecological Footprint

In recent years, William Reese (1992) has proposed an ingenious approach to the relation between population and land area through the concept of the "ecological footprint". The notion, applied initially to cities by Rees, is an offshoot of the carrying capacity literature. Essentially, it refers to the amount of productive land that is needed to sustain a city's population and its consumption levels. The original objective of this device was to quantify how voracious of natural resources cities had become, particularly those in the developed world. Utilizing simple calculations of the requirements for basic living, the adepts of this

approach calculate how much land each inhabitant of a given city requires to sustain her/his current pattern of living.

Several different approaches to the calculation of ecological footprints have been proposed. The conclusion is inevitably that cities constitute ecological black holes that deplete the material resources and productivity of a vast hinterland. Typically, the total land area required to sustain an urban region is calculated to be at least an order of magnitude greater than that contained within its built-up area. According to the Earth Council, for instance, a biologically productive area of 1.7 ha is available per capita for basic living. This would mean that the population of Tokyo (26.6 million) would need a land area of 45.2 million ha, or 1.2 times the entire land area of Japan (Wackernagel et al 1997). According to One World, the area required for food production is 0.2 ha per person, the forest area for wood products is 0.109 ha per person and the land area required for carbon sequestration is 1.5 ha per person; adding up these three requirements would mean that Tokyo's population actually requires a land area 2.14 times that of Japan.[8] Other measurements would arrive at different numbers if we were to take into consideration waste disposal, energy needs or other environmental requirements.

The ecological footprint approach has been used more recently to demonstrate the differential demands made upon natural resources by societies at different levels of "development". Wackernagel et al. (1997) have analyzed data comparing the biologically productive space and ecological footprints of 52 countries. Countries with an ecological impact smaller than their capacity are considered to be sustainable within their own bounds; however, if they occupy more than the standard 1.7 hectares per capita available at the global level, they are seen as subtracting from global sustainability. A surprising 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. As could be expected, Hong Kong and Singapore have the greatest ecological deficit per capita. Only nine land rich countries, including Iceland, New Zealand, Peru, Australia, Brazil, currently have surpluses. At the global level, a serious deficit already exists.

Taking this reasoning a step further would show the connection between the environmental problems of North and South and the appropriation of extra-territorial carrying capacity through trade.

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[8] Data obtained from the Urban Environmental Management website < www.soc.titech.ac.jp/uem/tokyo-fprint.html >

How useful is the ecological footprint approach? This has to be answered at two levels. First, although sizing up ecological footprints is not an exact science, it is unquestionably useful for raising awareness of the linkages between industrial development and the challenges to sustainability. In this light, it provides a strong incentive for rethinking economics and advocating for improved environmental accounting. The figures generated by this approach inevitably highlights the responsibilities of the dominant culture in our industrial civilization, based on throughput growth and increasing consumption. In this sense, this instrument corroborates, documents and quantifies the main argument espoused by many environmentalists in recent years, namely that humankind's aspiration for increasing throughput growth is unsustainable. [9]

Transforming this argument into feasible and acceptable proposals, however, is much more difficult, given the nature of economic and political interests that nurture present economic growth efforts. The critical question continues to be – how can modern civilization's path be altered in more sustainable directions? In short, estimating ecological footprints, or providing better environmental accounting, is essential for awareness-raising, but does not necessarily provide clear policy directions.

Second, as concerns the specific relation between population and environment, the main contribution of the ecological footprint exercises evidently is again to generate awareness, both of the demands put by cities upon their hinterland, as well as of the limitations to growth in general. However, it does not suggest new policy or research directions. Actually, the original exercise, centered on cities, may actually be somewhat misleading. Rural populations, if they had access to the same goods, services and amenities as their urban counterparts, would also consume natural resources in the same – or even larger - order of magnitude on a per capita basis. Finding a solution to the problems posed by the ecological footprint of cities would seem to invite resurrection of the notion of autarkies, wherein each population nucleus would be capable of surviving by drawing on resources from its own bioregion. Obviously, something will have to be done about patterns of city structure, public transportation, urban sprawl, energy use and so forth. Nevertheless, the notion of self-contained and self-sufficient regions does not fit into the current historical scenario of universal trade intensification. The more recent studies, focused on the ecological footprint of nations, show that the problem is not necessarily one of density but rather of the consumption patterns of given populations (Wackernagel et alii, 1999).

c) The Sustainable Use of Space

The above discussion suggests that the more pertinent population/environment relations at the start of the new millenium are space-specific. Every spatial area in the world has a population of a given size, growing at a certain rate, which distributes itself in some way over the available territory. Population/environment linkages are thus relevant within (relatively) autonomous spatial units, wherein resource use is affected by concrete decisions

[9] For instance, Ehrlich and Ehrlich pointed out many years ago that the Netherlands can support a dense population because it appropriates most of its resources from a much larger area (Ehrlich and Ehrlich, 1972:257)

in the economic, demographic, social and environmental sphere. The suggestion made here is that instead of trying to figure out the theoretical carrying capacity of the Earth, or some segment of it, or of calculating how much of our resources we are overspending, we could profitably shift our focus to a more practical issue, namely - how can an existing population make the most sustainable use of a given territory?

This is not an easy question to answer, yet it opens up an area which holds promise and which is ripe for policy intervention. That is, rather than estimating ethereal limits to growth, or of calculating how distant we are from the ideal, we should try to look at how specific population groups can make the most sustainable use of concrete land areas, in light of available resources, population, economic potential and the real development context.

The basic question we have to ask, in order to help promote the sustainable occupation of space is - *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)*?

There is, of course, no hard and fast answer to this question. Nevertheless, it is highly profitable to search for complementary approximations to the answer. Where the resident population of a given territorial area - which is bounded by restrictions on migration (such as national boundaries or insurmountable physical barriers) - actually lives on that territory, 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.

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. Despite the influence of globalization, which has evidently reduced the sphere of national decision, the most relevant unit for analysis and action on the sustainable use of space is still the Nation-State. On the one hand, global environmental outcomes will depend fundamentally on the sum total of development efforts undertaken by specific countries; hence, population/environment issues have to be framed within the context of the concrete development paths and possibilities of different countries and regions. On the other, the borders of the Nation-State represent, in most cases, the ultimate limits within which the sustainable use of space by a given population will have to be resolved.

Given that large-scale international migration does not constitute a realistic alternative in the current world scenario,[10] the bottom-line issue really becomes: what forms of occupation of this national territory by this concrete population are most sustainable in the long run? There are different ways in which that population can economically and demographically occupy that given land area. Each of these has different environmental implications. Sustainability will depend on making better choices with respect to the use of land.

[10] Although international migration is increasing, it is still selective and in very few instances does it represent an effective safety valve for overcrowding.

Centering on the utilization of space, and on how human beings distribute themselves over it, also favors the consideration of population/environment issues within the context of concrete development efforts in a country or region. Sustainability requires that patterns of development in a given country pay attention both to the spatial allocation of economic activity (and thus of population distribution), as well as to production and consumption patterns.

Hence, the recommendation being made here is that a more useful approach to population/environment linkages begins with the question: *what is the most sustainable way to apportion people and resources within a given spatial area?* Attempting to understand the relative advantages and disadvantages of different 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.

This idea is evidently not original. Geographers have long insisted on the need to consider locational and spatial variations in human phenomena. Economists have recently been discussing the use of "environmental space". Population specialists need to learn to work with them as well as with other scientists, but bringing their own tools and insights. What is needed is a more holistic approach, which simultaneously considers different land uses and ecological factors within a specified limited territory.

True, 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. The mobility of people beyond nation-state boundaries is still relatively limited by immigration laws, but other factors of production, including natural resources, flow almost freely throughout the world. 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. The next section addresses this issue directly.

3. INFLUENCING THE SUSTAINABLE USE OF SPACE

The manner in which the population of a given country or region apportions itself over its territory is dictated primarily by the way in which economic investment and activities distribute themselves over that space. Other factors such as natural beauty, topography, climate and access to services and amenities also influence individual residential choice, especially among affluential people not in the labor force; however, at the aggregate level, people basically occupy space according to the flow of economic opportunities. They go where they feel they have the best chance of obtaining a better job and better income. Hence, people ultimately redistribute themselves according to the spatial re-allocation of investments and jobs.

In this light, the most important determinant of whether or not a given territorial area is utilized sustainably is the way economic activity conditions the occupation of that space. Location of economic activity is itself conditioned by a combination of historical factors and market forces. In this light, the central policy question seems to be - how can the locus of economic activities be shaped or altered to benefit sustainability?

In an ideal world, one might aspire to mapping out the natural resources of a country in order to draw up a blueprint for occupation which would orient investments (and therefore population settlements) in directions and ways in which their environmental impacts would be most beneficial.

In practice, such an aspiration borders on the fanciful. No country constitutes a *tabula rasa* on which to draw ecological blueprints; no technocracy has the knowledge and skills to visualize a harmonious integration of activities, resources and people over a given space; no self-respecting assemblage of entrepreneurs would willingly espouse a rigid and pre-ordained location for their investments and, thus, few politicians would support efforts in this direction. In the current context of market-based globalized competition, the imposition of such rigid schemas for environmental purposes is particularly incongruous.

Nevertheless, sustainability in the long run will require a more environmentally-adequate use of space; it hinges on our ability to identify patterns of spatial organization of both economic activities and population that best combine environmental with economic and social benefits. This demands that considerable thought be given to short, medium and long-range planning that can conciliate environmental concerns with economic and social needs. Such a concern obviously goes far beyond environmental impact analysis of individual investment projects. The question that arises is – do we have a coherent game plan for the use of space, based on considerations of sustainability? Overcoming political and economic obstacles will require rational arguments and sound proposals. In what directions would we ideally want to promote growth? What do we know about the "ideal map", that could help us take a proactive stance aimed at promoting sustainability? What can the tools of the population sciences contribute to formulating this ideal map?

Without purporting to answer this question in any conclusive fashion at this time, it appears, *a priori,* that regional development and urban concentration are the two most critical questions that can be broached with respect to the sustainable occupation of space. The two aspects are evidently linked and both are highly correlated with the location of investment and economic activity. A brief discussion of their potentialities follows.

a) Regional Development and the Sustainable Use of Space

Planning regional development sustainably is at once essential and difficult. It defies the formulation of widely-applicable formulas, for two reasons. First, problems and solutions have to be tailored to the specificities of resource management in each country and region; there may be few universal blueprints for environmental policymaking. Secondly, regional development planning can easily run afoul of the market ethos and rationale, requiring

careful balancing of economic and environmental factors: it may also require the mobilization of political support for environmnental objectives. Despite such difficulties, sustainability depends on making a systematic effort to visualize different scenarios of territorial use which would provide the basis for orientations aimed at maximizing economic and environmental advantages in the medium and long run.

There are at least three basic directions that can be taken immediately in promoting the sustainable use of space, and in which population specialists can help. First, we need to identify populations at risk – both to sporadic catastrophes such as hurricanes and earthquakes, as well as to recurrent events such as droughts and floods -- and to other problems such as landslides which may be brought on by natural disasters, by human interventions, or by both. Once the populations at risk have been identified, the demographic occupation of such areas must be limited, prevented or regulated. The utilization of information provided by GIS systems, together with historical registers, permits the identification, at satisfactory levels of accuracy, of those areas which are subject to flooding, seismic movements, droughts, landslides and even the recurrence of hurricanes. It also permits evaluation of the degree of risk involved and, consequently, of the relative urgency of population relocation.

Secondly, a more common type of initiative involves the identification of ecosystems which need to be preserved from the invasion of human populations and the enforcement of measures to reduce population growth in that area. This type of preventive activity is undertaken, with greater or lesser success, by the majority of environmental agencies, both private and public, in most countries. It is aimed at the protection of fragile ecosystems as well as areas rich in biodiversity or in nature's services such as tropical forests, wetlands, coastal areas, watersheds and so forth. The main task here is to identify, at the national and local level, which areas should *not* be invaded by demographic expansion because they are particularly critical to sustainability in the long run.

Thirdly and more importantly, in order for efforts aimed at relocating populations at risk or protecting fundamental ecosystems to work, viable alternatives for demographic/economic expansion have to be offered. This means we need to identify, in a progressive and continuous manner, areas that *can* absorb the population contingents that would otherwise seek to reside in vulnerable areas or in protected ecosystems. This inevitably involves economic as well as socio-environmental and demographic considerations. If population distribution is consequent upon the spatial location of economic activity, the reduction of vulnerability and the protection of the environment requires an integrated approach to development and to the use of space. In the current economic context, this will require working together with the private sector, in order to exploit a country's economic advantages without enhancing vulnerability and degradation. The State's role is to orient economic advantages using fiscal mechanisms and other incentives. In order for such mechanisms to work, they must be preceded by comprehensive analyses which identify prospects and possibilities for more sustainable occupation of space by the present and future population of a given country. That is, efforts must be made to find patterns of spatial organization which best combine environmental with economic and social benefits.

The ongoing process of economic globalization, which can rapidly alter the type and nature of comparative advantages as well as the locus of economic activity - and thus the distribution of population over space - evidently makes such long-term planning more difficult than ever. Yet it is essential for sustainability to recognize that market forces do not have, for the most part, an ecological perspective. Markets are fundamentally oriented to making the largest profit, in the least amount of time, in whatever geographical area or ecological system is most advantageous. Because the value of many critical ecological goods is largely intangible, price structures are unlikely to regulate them effectively. In addition, markets have no way of anticipating, and therefore reflecting, the value that future generations will assign to the resources we deplete. Thus, despite the problems, there is a clear need for some entity to take a broad view of the ecological systems in a given territory and to try to orient the spatial location and resource utilization of economic activities (and thus population distribution) therein in more sustainable ways than ordained by the vagaries of market forces.

Unquestionably, such an enterprise is extremely complex from a technical standpoint. There are no shortcuts here. Making an impact implies looking simultaneously at economic, demographic, environmental, social and political issues. Populations apportion themselves over the territory in accordance with the way economic investment and activities distribute themselves over space. In turn, distribution of economic activity involves a network of decisions made primarily by the private sector. It is the public sector's responsibility to try to orient such decisions in environmentally and socially sustainable ways through guidelines, zoning, infrastructure provision, taxation and other mechanisms of land use planning.

The only entity capable of initiating such a broad and forward-looking stance would be the State. True, economic globalization and structural adjustment measures have promoted minimalism and questioned the political legitimacy of the State to undertake such ambitious steps. Nevertheless, in more recent times, even the financial institutions responsible for worldwide structural adjustment, trade liberalization and the consequent decline of the State's role, have reviewed their position in this connection. (World Bank 1997:1)

Within a broad-based effort aimed at providing an integrated economic, geographic, environmental and demographic visualization of future needs and actions, population scientists can and should make an important contribution. They can make specific inputs into scenario building, into the analysis of the demographic implications of given investments, and also into the projection of requirements in such areas as energy, water and infrastructure. They can make a distinctive contribution to the analysis of future land use needs and possibilities, particularly with the use of GIS technology.

b) Urbanization and the Sustainable Use of Space[11]

In the short run, it can be argued that the most pertinent P/E issues which can effectively be broached, from the vantage point of population sciences, are those related to the impacts of

[11] This section is based on Martine 1999. The latter was stimulated by a seminal contribution made by The World Resources Institute which, in its 1996-1997 Annual Report, focused on the urban environment. (World Resources Institute 1997).

demographic concentration and urbanization on environmental outcomes. Focusing on the urban scene is essential because urban areas are increasingly important in the population/environment scenario: they are the locus for both demographic growth and development efforts in the future.

Environmentalists generally take a dim view of urbanization and city growth. From the inception of the modern environmental movement, concern has been centered on the preservation of nature in rural areas and on the avoidance of urban-based pollution. Within this framework, cities have been viewed primarily as a locus and symbol of environmental problems linked to industrial civilization.

Cities indeed congregate most of the critical environmental problems generated by the production and consumption patterns of modern societies; moreover, a large part of the current urban population lives in health and life-threatening situations. Yet cities – in addition to being the centers of cultural advancement and technological change - are undeniably the axis of both demographic and economic growth in the end-of-century scenario. The absolute scale and the sheer number of people involved in the current process of urbanization is unprecedented and makes it one of the most significant transformations of the human habitat ever witnessed. Recent economic trends stemming from the globalization of the market are speeding up this process.

Given the correlation between urbanization and critical environmental problems, the environmental significance of cities is obviously multiplied by their importance in the current development framework. Most increments in economic activity presently accrue to cities, making them the prime site for P/E interactions affected by development. Thus, environmental outcomes will be increasingly dependent on the trajectory of economic and demographic growth in the cities.

Ultimately, where cities are located and how they are organized is decisive for the population/environment equation. Cities already harbor almost half of the world's total population and are expected to absorb some nine-tenths of all demographic growth in coming decades. In absolute terms, we will witness a doubling of the world's 1990 urban population by 2025 (United Nations 1997). This also means that in the next 25 years or so, cities will convert another one percent of the earth's land surface to their own needs. Cities already occupy one percent of the Earth's land surface; *ceteris paribus,* doubling their population will mean doubling their expansion onto agricultural land and fragile ecosystems during this short period. (World Resources Institute 1997: chapter 3). The location of future urban growth, with respect to land use, climate, topography, natural boundaries, water supply, effluents or wind currents will have a major impact on global sustainability. The number, size, form, density and organization of cities, as well as the efficacy of urban environmental management, will have a determining effect on resource use, waste generation and disposal, as well as on the prospects for conservation of natural ecosystems. At the same time, cities will continue to be influential in the fertility transition; they will also concentrate an increasing proportion of economic activity and thus be pivotal in the improvement of social well-being.

These observations suggest that there is a pressing need to try to influence the locational decisions affecting the spatial conformation of urban growth, as well as the planning of resource use and waste generation, for the sake of sustainability.

What can be done to further sustainability from the standpoint of urban population studies? The answer is basically: helping to plan location and use of spatial appropriation by cities. The urbanization 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 necessarily 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. Working with urban environments, where environmental outcomes will be most critical, inevitably requires a long-range view. 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.

At the same time, population scientists can help demystify and clarify the agenda. Environmentalists often deplore the various manners in which cities use up natural resources and degrade the environment. For instance, frequent reference is made to the fact that cities use up valuable agricultural land and encroach upon rich ecosystems. Cities also consume enormous amounts of energy for industry, transportation, heating, lighting and home appliances. Similarly, they generate prodigious amounts of waste and pollutants. Rees' notion of "ecological footprints", when applied to cities, makes them appear to be particularly gluttonous in terms of resource use (Rees 1992). Because cities are more efficient, they not only concentrate more people but also more rich people, who consume and pollute more. Hence, urbanization is easily associated with unsustainable consumption. However, does the problem stem from concentration or from consumption?

The central question which 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 a certain country has a population of a given size, which has to be accommodated somewhere on the national territory, is urban concentration really a negative pattern? Or is density a potential ally in the preservation of fragile areas? What type of density? In what conditions? These are the types of issue that population scientists can help clear up with respect to such questions as the impact of different concentration/dispersion patterns on appropriation of land, on resource utilization, on pollution and on waste management.

A priori, it could actually be argued that most of the negative environmental implications of urbanization are linked more to other factors - such as patterns of development (unsustainable patterns of production and consumption), geographical location, lack of development (poverty), patterns of land use (urban sprawl and low-density housing), urban form (e.g. - excessive paving and "de-naturalization"), 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. Ultimately, urban concentration could actually end up being a more sustainable form of land use, largely due to advantages of scale.

In short, it is true that cities are the locus of the majority of the world's critical environment problems. Yet, cities 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 what inevitable urban growth instead of simply denouncing it. We need to take a positive and interventionist approach 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 which extrapolate the interests and capacity of the market. 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. At the same time, public institutions will inevitably have to be involved in this process, supported, monitored and redressed by widespread participation. These are all enterprises that could profitably be promoted and investigated by population specialists.

Finally, focusing on cities is also beneficial from the standpoint of policy formulation and implementation. Urban environmental concerns are evidently not independent of market decisions but cities can only function in economic and social terms if they are well administered. This makes them more amenable to intervention - i.e. research, evaluation, planning and regulation - than regional or national spaces. It is also advantageous to center on urbanization from the standpoint of cost/benefits and generalizability of research; all cities share a common set of concerns and, hence, there are quasi-universal lessons that can effectively be applied to a number of different situations.

CONCLUDING REMARKS

The main argument proposed in this paper is that the central focus of population/environment linkages could profitably be switched from concern with size and rate of growth of the world population to the sustainable use of space in concrete territories. This contention evidently does not deny that population growth has a negative impact on the Earth's source and sink capacity, nor that it poses increasingly-greater challenges in all environmental areas. The point is that the policy implications of such a stance are narrow and, *grosso modo,* are already being carried out; the only orientation which it provides is intensification of what is already being done in order to further accelerate the decline of fertility.

By contrast, centering more attention on the sustainable use of space would encourage us to analyze concrete possibilities for maximizing sustainable resource use in actual segments of

the global territory under real development conditions. It would force us to concentrate on which forms of territorial occupation will have the more favorable environmental impacts.

What has all this to do with the population field? Firstly, focusing on the sustainable use of space jolts the population/environment agenda out of the neo-malthusian rut in which it has been stuck for the last two decades. Secondly, it gives population specialists an opportunity to contribute something more tangible and useful than merely trying to figure out when and how the limits to carrying capacity are being stretched and overrun.

Population specialists have comparative advantages in terms of contributing to the clarification of the sustainable space issue. The population perspective helps introduce a dynamic dimension to the rather static Green and Brown Agendas. The potential contribution of population specialists within a focus on space has various dimensions. Their skills are particularly useful in any attempt to analyze future scenarios and formulate future-looking policies. At the core of their proposed contribution is the ability to quantify and characterize broad trends in population dynamics and, on this basis, to help define necessary directions on such issues as land use, patterns of growth and models of occupation.

Population specialists are particularly well-placed to look at the larger picture and to put things into perspective; they are good at predicting trends in growth size and distribution, as well as at examining the probable impacts of different policies and outcomes. Given the inertia inherent in demographic processes, predictability tends to be considerably higher in the population field than in most other segments of the social sciences. Consequently, the analysis of population dynamics constitutes an excellent basis for scenario-building. Such expertise, if properly used, and in collaboration with inputs from other disciplines, can make a significant difference in long-term sustainability at local, regional and global levels. It can help deflate inadequate policies and point to more appropriate directions for expansion or redistribution.

Evidently, as argued forcibly by the World Resources Institute, the issue of land use is central to any exercise in this domain.[12]To this purpose, the tools of the Geographic Information Systems (GIS) will have to be utilized more extensively. GIS can profitably combine demographic information with ecological information through map overlaying to produce spatially-based data that can be used for planning and policy purposes.[13] At a minimum, clear information can be provided on which types of areas should not be invaded by any type of use. It is also critical in identifying populations at risk, as recommended by UNCED. Moreover, it is absolutely essential to demarcate clearly, and if possible alienate and preserve, the land areas into which lower-income migrants can move without jeopardizing their own health or contributing to ecological disasters in the city.

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[12] "Underlying virtually all urban environment problems is the issue of land use... Indeed, urban form and land use patterns within a city are critical determinants of environmental quality." (World Resources Institute 1997, chapter 5 page 1)

[13] For an excellent example of the application of GIS technology to environmentally-oriented policy-formulation for land use, cf. Torres 1997.

Progressively, more sophisticated orientations, which can serve as a basis for discussion and negotiation concerning the feasibility and desirability of different types of land uses on a larger scale, can be produced. Thus, more ambitious orientation schemes for land use, within a more regional and national perspective, can eventually be elaborated. Of course, these materials should not serve as a springboard for the return of technocratic planning; their principal goal should be to contribute to awareness-raising, negotiation and decision-making - among a variety of social actors – leading to more adequate environmental outcomes through a more sustainable use of space.

Improving sustainability in the use of space will not, of course, provide clear solutions to the problems of increases in *per capita* energy and material consumption compounded by population growth. In other words, working on questions related to the sustainable occupation of space will not generate breakthroughs capable of redirecting 21st century patterns of production and consumption. No matter how well distributed a given population over its national or regional territory, it will still have to find more sustainable ways of using and preserving natural resources. Striving to achieve a more sustainable use of space in concrete areas will, however, help push the agenda in the right direction.

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