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UNITED NATIONS EXPERT GROUP MEETING ON POPULATION DISTRIBUTION, URBANIZATION, INTERNAL MIGRATION AND DEVELOPMENT

New York, 21 – 23 January 2008

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Department of Economic and Social Affairs
Population Division

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DESA

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PREFACE

In 2008, the world is reaching an important milestone: for the first time in history, half of the world population will be living in urban areas. Urbanization has significant social and economic implications: Historically, it has been an integral part of the process of economic development and an important determinant of the decline in fertility and mortality rates. Many important economic, social and demographic transformations have taken place in cities. The urban expansion, due in part to migration from rural to urban areas, varies significantly across regions and countries. The distribution and morphology of cities, the dynamics of urban growth, the linkages between urban and rural areas and the living conditions of the rural and urban population also vary quite substantially across countries and over time. In general, urbanization represents a positive development, but it also poses challenges. The scale of such challenges is particularly significant in less developed regions, where most of the urban growth will take place in the coming decades.

To discuss trends in population distribution and urbanization and their implications, the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat organized an Expert Group Meeting on Population Distribution, Urbanization, Internal Migration and Development. The meeting, which took place from 21 to 23 January at the United Nations Headquarters in New York, brought together experts from different regions of the world to present and discuss recent research on urbanization, the policy dimensions of urban growth and internal migration, the linkages and disparities between urban and rural development, aspects of urban infrastructure and urban planning, and the challenges of climate change for the spatial distribution of the population.

This volume presents the proceedings of the meeting. Part One includes the report of the meeting, which presents the main conclusions of each session of the meeting as well as a summary of the papers presented and the discussions held in each session. The papers contributed by participants are presented in Part Two.

Comments and suggestions on this report are welcome and may be addressed to Ms. Hania Zlotnik, Director, Population Division, Department of Economic and Social Affairs, United Nations, New York, NY 10017, USA, tel. (212) 963-3179 or fax: (212) 963-2147. This publication may also be accessed on the website of the Population Division at *www.unpopulation.org*.

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Symbols of the United Nations documents are composed of capital letters combined with figures.

The following symbols have been used in tables throughout this report:

Two dots (..) indicate that data are not available or are not separately reported.
An em dash (—) indicates that the amount is nil or negligible.
A hypen (-) indicates that the item is not applicable.
A minus sign (-) before a figure indicates a decrease.
A point (.) is used to indicate decimals.
A slash (/) indicates a crop year or financial year, for example, 1994/95.

Use of a hypen (-) between dates representing years, for example, 1990-1995, signifies the full period involved, including the beginning and end years.

Details and percentages in tables do not necessarily add to totals because of rounding.

Reference to "dollars" ($) indicates United States dollars, unless otherwise stated.

The term "billion" signifies a thousand million.

The following abbreviations have been used in the present document:

APHRC	African Population and Health Research Center
ASEAN	Association of South-East Asian Nations
CELADE	Latin American and Caribbean Demographic Center
CIESIN	Center for International Earth Science Information Network
CORINE	Coordination of Information on the Environment
CSP	Comprehensive Strategic Planning
CVIs	Craft and Industrial Villages
DALYs	Disability-Adjusted Life Years
DCLG	Department of Communities and Local Development (United Kingdom)
DEFRA	Department for Environment, Food and Rural Affairs (United Kingdom)
DEPUALC	Spatial Distribution of the Population and Urbanization in Latin America and the Caribbean (database)
DES	Demographic and environmental stress
DHS	Demographic and Health Survey
DIT	Dhaka Improvement Trust
DMA	Dhaka Municipal Authority
DOTS	Directly Observed Short Course
EAs	Enumeration Areas
ECLAC	Economic Commission for Latin America and the Caribbean
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign direct investment
GDP	Gross Domestic Product
GIS	Geographic Information System
GRUMP	Global Rural Urban Mapping Project
HDI	Human Development Index

IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
ILPES	Economic and Social Planning Institute of Latin America and the Caribbean
IPCC	International Panel on Climate Change
ISRIC	International Soil Reference and Information Centre
IUSSP	International Union for the Scientific Study of Population
LECZ	Low Elevation Coastal Zones
LUZ	Larger Urban Zones
MDG	Millennium Development Goal
MIALC	Internal Migration in Latin America and the Caribbean (database)
MICS	Multiple Indicator Cluster Surveys
MIT	Massachusetts Institute of Technology
MMDA	Metro Manila Development Authority
NAPA	National Adaptation Programme of Action
NBS	National Bureau of Statistics
NCSS	Nairobi Cross-sectional Slum Survey
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
PPP	Purchasing power parity
PRD	Pearl River Delta
PRIO	Peace Research Institute, Oslo
PRSP	Poverty Reduction Strategy Paper
SESs	Socio-ecological systems
SRTM	Shuttle Radar Topography Mission
TVEs	Township and Village Enterprises
UNCHS	United Nations Centre for Human Settlments -Habitat
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USP	Urban system planning
WHO	World Health Organization

PART ONE

REPORT OF THE MEETING AND INFORMATION PAPERS

REPORT OF THE MEETING

The Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat organized a meeting of experts from 21 to 23 January 2008 to evaluate the implications of the historic and unprecedented transformation of the world's population becoming predominantly urban in 2008. Since the beginning of agriculture, millennia ago, and especially since the industrialization process started some two centuries ago, the proportion of the population of the world living in urban areas has increased, especially during the twentieth century. In 2008, for the first time in history, the urban population will equal the rural population of the world. In the decades to come, the number of people living in urban areas is expected to continue to expand and to represent an increasing fraction of the world population. This changing spatial distribution, due in part to the movement of people from rural to urban areas, has been an integral part of the process of long-term economic development, and constitutes one of the two main demographic trends associated with that development, along with the reductions in mortality and fertility rates over time. It is therefore an opportune time to assess the recent experience and future prospects of urbanization and its relationship to development, especially in the developing countries.

To this effect, the United Nations brought together specialists working on various aspects of the urbanization process to present and discuss the patterns, the causes and implications of the changing spatial distribution of the population in different parts of the world. This report presents the main topics covered in each session of the meeting as well as a summary of the papers presented and the discussions held in each session.

A. URBANIZATION: A GLOBAL PERSPECTIVE

1. Main topics

The meeting was opened by Ms. Hania Zlotnik, Director of the Population Division, who noted that the urban and rural data presented by the Population Division during the meeting referred to the latest United Nations estimates and projections from the 2007 revision of the *World Urbanization Prospects.*[1] It was noted that these estimates were the best available on a global scale. However, they were based on data that were not fully comparable across countries or in some cases over time within countries and which still need improvement. The results of the meeting would be presented to the United Nations Commission on Population and Development in April 2008 for use in developing policy recommendations.

During 2008, the population of the world will become, for the first time in human history, primarily urban, and is likely to continue to urbanize substantially over the coming decades. The shift of population from relatively low-productivity rural areas to higher productivity urban areas has been a major aspect if not a driver of economic progress. Urbanization is a dynamic process that can contribute to a better and more sustainable use of space, provided that the right policies are in place. Policies aimed at limiting migration to cities have, in most cases, proved to be expensive and ineffective; instead, governments have much more to gain by developing forward-looking plans and policies to better accommodate the growth of their urban populations.

Some misconceptions were clarified by the information provided by the Population Division and existing research. First, it was noted that in a majority of developing countries, urban growth is due mostly to natural increase in urban areas rather than primarily to rural-urban migration. Second, the most substantial migration flow is not that from rural to urban areas but those from urban to urban areas and from rural to rural areas. Third, most of the urban population

growth is accounted for the population in small cities (under 500,000), rather than that in large and mega-cities. Indeed, most of the large cities are growing at a relatively slow pace now, and are likely to grow even more slowly in the future. Fourth, poverty is much more prevalent in *rural* areas than the urban areas of developing countries, although the number of poor people is increasing faster in the urban areas as the population as a whole is becoming more urbanized. Fifth, the redistribution of the world's population towards urban areas can have both positive and negative implications for the environment, social welfare and the economy depending on how it is managed. In this regard, a basic fact sometimes overlooked is that cities concentrate a large part of the population on a very small fraction of the earth's surface (see sessions B and F). Sixth, almost all of the world population growth to 2050 is projected to occur in the urban areas of developing countries, with 80 per cent of it in Asia and Africa. The growth of the rural population has slowed considerably and is expected to turn *negative* by 2018. In 2007, 50 per cent of all rural dwellers in the world lived in Asia, primarily in China, India and Indonesia.

The Population Division continues to search for better and more comparable measures and estimates of the urban population, making adjustments to the original data, interpolations and extrapolations to produce time-series data comparable over time and space. A relatively new development is that data based on satellite imagery are becoming more widely available. Although until now they only exist in relatively few developing countries, they might well become more common as the cost of acquiring images falls sharply and the availability of technicians who can work with the data rises globally.

Virtually all censuses classify the population according to rural or urban residence. While many countries also include a question in their census on the place of previous residence at some fixed date in the past (such as five years prior to the census), few countries classify the latter by rural or urban residence. The number of countries with data available to categorize internal migrants according to four types—urban-urban, rural-urban, rural-rural, and urban rural—was actually smaller for the inter-censal period of the 1990s than for the 1980s. It would therefore be useful if the United Nations Statistics Division recommended that countries include a question in the next round of censuses on whether the place of previous residence was urban or rural. This would provide a basis for measuring and comparing the different types of internal migration movements, and ascertaining their changes over time.

The fact that urban areas are growing mostly due to natural increase in most developing countries has a clear policy implication for Governments concerned about high urban growth: improve the provision of and access to family planning in urban areas, especially for the urban poor who lack access. This, rather than efforts to limit migration to cities, will become an increasingly important policy tool as the proportion urban continues to rise.

2. Presentations

The four presentations in this session provided a global overview of urbanization trends. The methodology used by the United Nations Population Division for carrying out the projections was briefly described, with problems noted with respect to gaps and limitations in the basic data for many countries, including differences and changes over time in the definition of urban and rural in some countries, including China, and other complications resulting from changes in urban boundaries and reclassification of rural areas as urban.

Mr. Gerhard Heilig, Chief of the Estimates and Projections Section of the Population Division, presented some highlights of the 2007 revision of the estimates and projections of the urban and rural population in the world, including data for all the urban agglomerations with

750,000 inhabitants or more in 2007 and of all capital cities in the world in 2007. Mr. Heilig explained that the projections were carried out and published for all 229 countries and areas of the world as well as for all major areas and regions. The world urban population in 2007 was estimated to be 3.3 billion, compared to only 0.7 billion in 1950 and 1.5 billion in 1975. The urban population was projected to continue to grow, reaching 4.6 billion in 2025 and 6.4 billion in 2050, with growth rates slowing as fertility rates continued to decline. In 2008, the urban population of the world was going to surpass the rural population for the first time in history.

At the same time, the world's current rural population of 3.4 billion would continue to grow slowly for another decade to 3.5 billion before declining gradually to 2.8 billion by 2050, at which time it would constitute only 30 per cent of the total world population. At the regional level, the rural population would continue to grow after 2025 in Africa and Oceania only. Nevertheless, a map of Europe's *surface area* based on population density showed that the overwhelming majority of land was still rural: Even in Western Europe over 80 per cent of the administrative areas were mainly rural.

Mr. Heilig showed that trends at the global level masked very different trends in countries in the more developed regions and the less developed regions, as well as across regions within the developed and developing countries. The percentage of the population living in urban areas in the developed countries was 74 per cent in 2007, projected to reach 86 per cent in 2050, while for developing countries as a whole, the urban share of 44 per cent was anticipated to increase to 67 per cent. Among developing countries, the proportion urban in 2007 was highest in Latin America at 78 per cent, a proportion higher than that in Europe (72 per cent in 2007). In contrast, the share of the population living in urban areas was still low in Asia (41 per cent) and Africa (39 per cent). It was only in the latter two regions where the annual growth rates of urban populations would still be high in the future. Indeed, 80 per cent of all future population growth would be in urban areas of Asia and Africa.

The Population Division prepared estimates of population size for all urban areas with over 750,000 persons in 2007. The number of mega-cities, those with over 10 million persons in their urban agglomerations, had risen from three in 1975 to 19 in 2007, and was expected to reach 27 in 2025. The world's largest city was Tokyo, with 36 million in its extended urban agglomeration, followed by four cities with about 19 million each: New York, Newark, Mexico City and Mumbai (Bombay). In developing countries, the number of large cities, defined as those with over five million inhabitants, were only 10 in 1975 but increased to 37 in 2005 and was projected to rise to 58 by 2025. In 1975, only four per cent of the world's population lived in large and mega-cities, in contrast to nine per cent (in 2007) and a projected 10 per cent in 2025. Nevertheless, despite the focus in the media on the growth of large and mega-cities, medium-sized and small cities (with less than 500,000 residents) were growing more rapidly, and that trend was expected to continue in both developed and developing countries.

Mr. Jorge Bravo, Chief of the Population and Development Section of the Population Division, discussed patters of internal migration in different regions and countries in the world, the sources of urban and rural population growth, and the relationship between urbanization, the changing age structure of the population (ageing) and economic development. He started by pointing out that rural-urban migration was not the main cause of urban population growth in the majority of developing countries, but that natural increase (the excess of births over deaths) in cities had been in fact the main factor of urban growth in about two-thirds of the developing countries. Natural increase was the dominant component of urban growth, especially in Latin America, where the relative size of the rural population and the source of rural-urban migrants were small and shrinking. Notable exceptions to this included China and India, where internal

migration and reclassification accounted for the majority of recent urban population growth during the last two decades. He also noted that rural to urban migration represented a relatively small part of the internal migration flows, as in a majority of countries the movements *within* the urban or the rural areas are the predominant flows.

Mr. Bravo noted that the participation of women in the internal migration flows varies somewhat across countries and regions, but that they have come to represent a very important group of migrants, especially in the rural-rural movements. As regards the socio-economic characteristics, he noted that migrants are generally positively selected by education and skills, and that evidence indicated that migration was more often than not beneficial for the migrants themselves, their families and for the overall economy, inasmuch as it entails a redistribution of labour towards higher productivity occupations. Because of the high concentration of young adults in the rural to urban migration flows and the generally lower fertility and mortality rates in urban areas, the demographic dependency ratios in urban areas were shown to be lower than in rural areas in all regions of the world, except for the old-age dependency ratio in Oceania, which is higher in the urban areas.

He also indicated that per capita Gross Domestic Product was often positively correlated with the level of urbanization, and the two variables also tended to move together over time as countries developed and urbanized, but that the degree of correlation was not always very high and that causality could go in both directions. A more systematic relationship was observed between the temporal changes in urbanization and employment and production in the non-agricultural sector in all the regions of the world. The latest World Bank estimates of poverty levels in rural and urban areas of developing countries (for the period 1993 to 2002) indicated that the prevalence of poverty in urban areas remained less than half that of rural areas, and that a substantial majority (about three-fourths) of the world's poor lived in rural areas. However, as the proportion of the population shifted to being more urban, a greater proportion of the poor will be living in urban areas. Urban poverty was thus a significant and growing problem.

Mr. George Martine presented a paper concerned with the sustainability of the urbanization process, considering that virtually all of the population growth in the world over the coming decades will take place in the cities of developing countries. In this context, he stressed the importance of meeting the needs of the urban poor and discussed the significance of the urban land use. He indicated that the poor constituted about half of the urban population in developing countries, but tended to be neglected in urban plans for the provision of services, which mainly benefited the middle and upper classes. This was especially evident in housing policies, which forced migrants to invade and settle ("squat") on marginal lands, such as under bridges, on floodplains or on steep slopes. This contributed to their environmental vulnerability, made the planning of urban services more difficult, and discouraged private investment. Among the policy implications of his analysis, Mr. Martine noted that policies to limit in-migration to urban places have not worked in the past and that in general, there is little justification for them. In order to improve the social and environmental sustainability of the urban space, Governments should rather adopt a more positive approach towards rural-urban migrants by easing up on land use restrictions for migrants, seeking to improve the access of the urban and rural poor to basic services, and incorporating migrants in urban planning and management.

Mr. Martine also noted how environmentalists used to criticize urbanization for the ecological footprints that cities produced locally (for example, from depletion of fresh water and deforestation of watersheds as dwellings expanded up steep slopes) and globally, as they constituted centres of high levels of energy consumption, production of waste and pollution. Indeed, much of the ongoing urban expansion had been in coastal areas, wetlands or fragile

watersheds, which has produced a considerable ecological impact. However, many were coming to realize the advantages of urbanization for environmental sustainability, as the urban areas occupied only 0.4 per cent to 2.8 per cent of the earth's land area, and that annual increases in the urban area were less than the areas lost to either soil erosion or salinisation.

He also explained that in some regions the urban area was increasing faster than the urban population, as households became smaller in terms of number of persons and as the demand of space per person rises. This was embodied in new projections for 2000-2030, showing urban land use rising to 2.7 times the current area while the urban population grew only 1.5 times. A key issue for the future was whether the anticipated urban growth in Asia and Africa would follow the suburban sprawl model of the United States or a more compact urbanization model as in Europe. He noted that the physical area of Shanghai recently increased by 150 per cent in fewer than ten years. Mr. Martine then further considered the issue of urban sprawl, noting that transportation infrastructure was a key driver of urban expansion. The number of cars in the world rose from 200 million in 1970 to 850 million in 2006, with significant growth in China and likely imminent growth in India, due to rapidly growing household incomes and the new inexpensive ($2,500) car. The huge expansion of roads and parking lots for cars in and around cities in developing countries illustrated the bias in Government infrastructure provision towards the elite rather than public transportation for all, including the poor. What was needed was a *vision* of the urban future that incorporated social and environmental values for a more sustainable use of space, taking into account projections of a growing population with more in-migrants, and which sought to make land, housing and other infrastructure available to the urban poor and not just the well-off. Curitiba (Brazil) and Bogota were mentioned as examples of cities which had implemented policies that improved the use of urban space. Small cities were particularly in need of better planning, but lacked access to population data or knowledge about how to use them.

The final presentation in the session was by Ms. Axumite Gebre-Egziabher, based on a paper prepared by Ms. Nefise Bazoglu. The paper analyzed the situation of the urban poor, especially slum dwellers. She provided evidence from a study of the relationships between urban population growth, the level of human development in the country, and changes in the provision (coverage) of basic services, observing that cities at higher levels of human development were better able to cope with high urban population growth. She noted that the fact that services such as schooling and health care were readily available in urban areas did not ensure that the urban poor really had access to and use of them. The value of pro-poor Government policies was illustrated by the increased investment in deprived areas that occurred in São Paulo, Tunis, and cities in both Egypt and Turkey. In particular, she stated, there was a need for more decentralization and participation of the poor in decision-making—a bottom-up approach to city planning. Performance monitoring (as in China and Vietnam) and citizen participation was also important, especially when it was proactive, as in Curitiba, in contrast to reactive, as in Cairo. Improved coordination was also needed between lower and higher levels of Government in decentralized systems, along with environmental planning.

3. Discussion

An active discussion followed, touching on many topics, including measurement and data issues, patterns of urbanization, and policy implications. First, the question was raised as to whether the traditional dichotomy of urban and rural was meaningful as populations sprawled out of cities into rural areas, leaving open green areas in their trail, as some rural populations spent most of their working hours in cities via commuting, and as some rural populations acquired the conveniences of urban life, such as electricity, piped water, televisions, computers and cell

phones. Thus, population distribution changed significantly, even during the course of a day, with large-scale commuting to work in cities from suburbs and surrounding rural areas as far as two hours or more away one way (as in Mexico City). One participant said that telephone companies could identify where cell phone calls were placed from, which, given the enormous increase in people using cell phones in urban areas of even the poorest developing countries, would provide a reasonably accurate indication of where people were at any given time in an urban area. The discussion led to a recommendation that the United Nations Statistics Division urge countries to collect data on commuting time to work in the next round of censuses.

Questions were also raised about the measurement of poverty, including whether the figures for urban and rural areas were really comparable, and whether the World Bank's use of $1/day and $2/day as the poverty line cut-offs were reasonable. Urban-rural income differences could also be exaggerated in developing countries if income figures did not take into account the size of remittances sent by migrants and others from urban to rural households.

In response to the questions raised, it was noted that while a strict urban-rural dichotomy may not be quite as relevant as in the past, it was still useful to show differences in the location, density and living conditions of populations over space, in spite of the different national definitions used to specify urban populations. Regarding poverty estimates, it was pointed out that although not always measured accurately, household income and consumption surveys were supposed to include all types of transfers to households, including government transfers as well as remittances. Based on this information, the urban and rural poverty lines were adjusted by the differences in the price of food and other expenditures to better reflect the purchasing power of income and thus to make the poverty estimates more comparable between areas of residence. Still, the measurement of poverty in urban and rural areas could be improved by explicitly considering the greater expenditures that urban dwellers make in transportation, water, and other services, which would probably result in a smaller difference in urban vs. rural poverty rates.

It was noted that as the process of urbanization was driven by transportation infrastructure, suburbs sprawled out from cities along roads, and train stations and airports also affected population clustering. It was especially striking to see patterns of lights recorded in satellite images of the earth at night strung out along major roads, such as in Siberia and the Amazon basin. This indicated that population distribution could be better analyzed in the future using spatial methods including satellite imagery.

The alternative future scenarios of suburban sprawl vs. compact cities led to a lively debate. The horizontal expansion of cities was leading to increased transport costs, other infrastructure costs, air pollution and land damage, in contrast to the advantages of compact cities in facilitating public transportation and economies of scale. Nevertheless, a participant noted that sprawl was likely to be dominant in the cities of developing countries in the future, since people expressed a demand for larger housing space per person as well as for cars as a form of individual transportation and freedom. The demand for space was highly income-elastic. Another participant said that if the United States model of urban sprawl and use of cars was to be replicated all over the planet, it would not be environmentally sustainable.

As "urbanization is driven partly by profit-seeking enterprises concentrating in space," as stated by a participant, the need to harness the private sector to achieve better urban planning was discussed. Institutional mechanisms were needed to stimulate the right kinds of private investment. Learning from success stories such as Curitiba, Bogota and Shanghai (public transport-centred) vs. Beijing (auto-focused) was encouraged, and examples of successes in smaller cities needed to be found and publicized. In addition, with the dramatic recent advances

in technology, notably computers and the internet, and the omnipresence of cell phones (for instance, in Bamako, Mali), the question was raised as to how to use technology to better connect people to jobs so as to reduce the need for roads, cars and time wasted in commuting and traffic jams.

Questions also arose with respect to policy issues pertaining to the presentations of Mr. Martine and Ms. Gebre-Egziabher. Decentralized planning was noted as desirable since it facilitated citizen participation. Ms. Gebre-Egziabher stated that it was a dominant tendency reported in over a hundred responses to a recent UN-Habitat questionnaire sent to Governments. However, many had not yet implemented such plans due to lack of human and financial resources at the local level; for example, environmental impacts were not well understood by local planners. In general, local governments needed more capacity-building. International financial institutions like The World Bank generally made loans to central governments rather than to cities or local governments, though it was said that this policy was changing.

Finally, it was asked what data local governments need for planning. Had demographers and National Statistics Offices done enough to make key local-level demographic data available and easily usable, such as from population censuses? It was also observed that, to the extent Governments in developing countries were worried about urban population growth, they should focus on reducing fertility (for example, through improving family planning programs) rather than trying to restrict migration to cities.

B. URBAN GROWTH AND INTERNAL MIGRATION: POLICY DIMENSIONS

1. Main topics

One theme of the session was the continuation of rural-urban migration—its contribution to the redistribution of population and growth of cities, and its importance for improving living conditions of the population and overall development. The papers on China and Latin America brought together a wealth of data on internal migration, reflecting the continuing importance of migration from rural to urban areas, especially in Asia. However, this migration is generally not leading to reduced spatial disparities in income or living conditions between regions, provinces, or urban and rural areas. In urban areas, the poor have little access to urban facilities and services, whether migrants or not, so there is not a systematic discrimination against migrants in Latin American cities. That is not the case in China, where there are two classes of migrants to cities, those with *hukou* (a legal residence permit) and the majority without, the latter holding generally lower paying jobs and greater difficulty to obtain urban services.

Another important theme of the session was the role of the Government (if any) in shaping internal migration and urban growth through policy, drawing mostly on the examples of Brazil, China and other Asian cities. It was clear that it had proven virtually impossible to restrict migrants from moving to cities: They will find a way to move if they think it will improve their lives. Thus, Governments should instead turn their efforts to providing migrants and the urban poor in general with basic services.

It was noted in both the presentations and discussion that urban agglomerations have grown well beyond the traditional city boundaries into semi-urban/rural areas. Efforts to manage such politically-fragmented areas effectively, including their services and transportation networks, have generally not been successful. In order to cope with projected increases in population, only higher level provincial or national governments can call for metropolitan-wide management, at

least of key services, as well as long-term planning. One example of a successful conversion to region-wide planning is Vancouver.

An intriguing topic for research would be to obtain data from a household survey in which data are collected for individuals on the places they customarily go for work, shopping, health care, school attendance, and their most common forms of recreation, such as movie theatres, restaurants, etc. Although no concrete experiences in this regard were cited, such data could be used to map the overlapping but distinct activity spaces, which would be very useful for urban planning.

2. Presentations

The session included four papers, the first two on housing and urban government planning the last two on internal migration. Mr. Vernon Henderson opened the session by asking what caused the creation and expansion of slums, in particular the role of deliberate policies to exclude access to services to poor people, including migrants. He then examined the case of Brazil. The theoretical underpinning for his approach was the Tiebout hypothesis, which stated that consumers tend to sort themselves to live around others with the same demands for public services, resulting in clustering of people with similar demands and socio-economic characteristics. He noted a major difference between developed and developing countries in that in the former, restrictions for the expansion of housing to meet the needs of in-migrants led to rising house prices (for instance, San Francisco, USA) and to potential migrants choosing other destinations, whereas in low-income countries it has led to more informal settlements.

Regarding Brazil, Mr. Henderson analyzed data from policy changes and censuses from 1970 to 2000. He noted that a 1979 law required all urban land plots to have a minimum of 125 m^2 and that it was illegal to provide services to informal settlements, which intended to discourage in-migrants. This changed with democratization of the country in 1988, and the provision of services such as water to low-income urban populations rose rapidly between 1991 and 2000. According to the 1991 census, the population with full services (electricity, water and sewer connection) was 62 per cent in urban areas, but only 34 per cent for those with houses on occupied land. The latter included the populations living in two types of informal urban settlements, which represent eight per cent of all urban housing in Brazil: *favelas* (land invasions) and *loteamientos* (organized but illegal development). These settlements comprised both the migrant and non-migrant poor, there being no evidence of migrants being worse off than others. An analysis of data from 123 urban areas comprising 447 localities showed that the urban population growth rates were about the same in small and in large urban areas over recent decades, except that the central cities grew more slowly, reflecting suburbanization. The larger cities were richer and becoming even more so compared to others over time in terms of GDP per capita. Econometric models were used to explore the relationships between urban growth and the per cent of houses equipped with full services. The model related urban population growth in 1991-2000 to the provision of services in 1991 and other variables, finding some positive effect of service provision on subsequent urban population growth. However, this did not necessarily link services to attracting migrants as urban population growth in Brazil was mainly due to natural increase.

The second paper, by Mr. Aprodicio Laquian, addressed issues of planning and governance for Asia's mega-cities. He asked, "How do we plan for the future, given that urbanization and mega-cities in particular have become so important?" First, he noted that existing methods of identifying mega-cities – used by, for instance, the United Nations, may underestimate their true size and significance. He proposed that planners should consider whole

urban corridors and mega-city regions. Examples of the latter were places like the Bangkok region and Metro Manila, while the former referred to even larger urban regions such as the Pearl River Delta around Guangzhou, China, comprising 36 million people; the Beijing-Tianjin corridor, with 35 million people, compared to 11.7 million in the urban agglomeration of Beijing alone; the Shanghai region; and Mumbai-Pune. Mega-urban regions and corridors were "vital command centres and global investment hubs," linked in a global system. Mr. Laquian indicated that urban planning should aim to direct growth to other (non-mega) areas rather than just let the market reign, which would lead to even more growth around mega-cities. He reviewed types of planning in Asian cities over the course of history, from classical approaches based on religious principles for laying out cities in China and India, to colonial plans based on grid street layouts, post-war socialist plans, and contemporary comprehensive strategic plans. He noted the success of "special economic zones" in China, where there were only five (all in the Southeast), in contrast to India, where too many (756) had been created, diluting their impact.

Three current approaches existed for planning in mega-city regions in Asia: (1) autonomous local governments; (2) mixed regional governments; and (3) unified regional governments, as in the managed socialist economy of Vietnam. He noted that autonomous local governments constituted the most common situation, resulting in great fragmentation of decision-making, and added that local government authorities rarely agreed to collaborate unless it was *imposed* upon them by higher level provincial or national authorities. The lack of effective coordination across local governments in the Pearl River Delta, for example, had led to disordered development. Three key policy issues for mega-city development were: a) inner city redevelopment to deal with crumbling houses and infrastructure, narrow streets and crime; b) controlling city sprawl; and c) controlling pollution, waste disposal, and preservation of green areas. He concluded by noting the need for unified development with strategies to achieve economic, social and environmental sustainability, involving significant citizen participation.

The last two papers in the session focused on internal migration. Mr. Kam Wing Chan began by noting that the extraordinary economic growth in China, which had become the "world's factory," resulted from both cheap labour and mobile labour, which were closely linked. Thus, internal migration had played a major role in economic growth. Manufacturing relied heavily on cheap migrant labour in many cities; for example, 46 per cent of the employed workers in Wuhan and up to 90 per cent in Shenzhen were migrants. The majority of the migrants were non-*hukou* or unauthorized migrants. Mr. Chan provided a brief history of the *hukou* system, noting that it began in 1958 as a system of population control to keep the majority of the population in rural areas, with only the urban population receiving various guaranteed free or subsidized benefits, including housing, schooling, health care, food, and jobs. Children of non-*hukou* migrants could not even attend public schools. The *hukou* system thus divided the national population into two groups, one eligible for benefits, the other not; one accepted as a local population, the other considered as outsider. The police and local governments enforced the system throughout the country. *Non-hukou* migrants also had lower economic status and lower wage jobs than *hukou* migrants or urban natives; they were employed in large numbers as sales, service and farm workers.

Mr. Chan then addressed the various estimates of the urban population and migration movements found in both official statistics and the research literature for the period from 1982 to 2006 arising from recent census and other data sources in China, and he presented his best estimates. He estimated the urban population of China to have been 27 per cent of the total in 1990, rising rapidly to 36 per cent in 2000 and 43 per cent in 2006. He expected it to cross the 50 per cent threshold in 2010 and to reach 65 per cent in 2020, at which time the total urban population would reach 950 million. This meant that the urban population would rise by 400

million persons in 15 years, about 80 per cent of which would be accounted for by rural to urban migration and reclassification, and the remaining 20 per cent by urban natural increase. The observed rural-urban migration rate had been at about two per cent per year, with rural-urban migration being the largest flow, followed by urban-urban migration. Mr. Chan estimated the total accumulated stock of *non-hukou* migrants, also referred to as the "floating population," as 140 million persons in 2003.

Mr. Chan also examined regional and inter-provincial migration flows, noting the major changes over time. Before 1980, China had a policy of settling people and promoting industrialization in the Western provinces, as well as restricting migration to urban areas. After 1980, with the opening to the market economy and foreign trade, the pent-up demand to migrate and the rapidly growing employment opportunities in the export sector combined led to a huge increase in all forms of internal migration, mainly towards the Eastern coastal provinces and especially their cities. In the 1990s, the main sending province was Szechuan, and the main receiving province was Guangdong (containing Guangzhou). The one per cent national survey of 2005 showed that during 2000-2005 the same two provinces had the largest flows, but the major origins and destinations had become more diversified. In part due to internal migration, regional inequalities increased during 1990-1995, declined somewhat during 1995-2000, and since 2000 they had remained wide but stable.

The final paper in the session, by Mr. Jorge Rodríguez, presented a comprehensive review of internal migration trends in Latin America, drawing on data and studies of CELADE since 2003, including the extensive (DEPUALC) database. He noted that two-thirds of the region's total population lived in cities of 20,000 or more inhabitants. As the proportion of the population living in urban areas had increased, the pace of urbanization had declined. The average percentage increase of the urban proportion had peaked in 1950-1960 at 1.58 per cent per year, and had declined steadily to reach 0.48 per cent per year in 2000-2010. While cities continued to grow, the largest ones were growing slower, so urban primacy (the ratio of the population of the largest city over the population of the three next largest cities combined) had been declining throughout the region except for Panama and Ecuador. Since 1980, cities of 50,000 inhabitants to one million had been growing more rapidly in the region than mega-cities or towns under 20,000 residents. Most of the major cities in the region continued to experience net migration, but the two largest (Mexico City and São Paulo) were experiencing net out-migration.

Latin America continued to experience a decline in the rural population and the contribution of net migration to urban growth continued to gradually fall as the proportion urban rose. The intensity of internal migration, measured by the rate at which people moved across internal borders to change their residence each year, was much lower in Latin American countries than in the United States: The percentage of the population changing their place of residence (across large administrative divisions) in five years was 8.7 in the region as a whole, compared to 18.6 in the United States. Despite large intra-national disparities in living conditions, internal migration rates had been declining in almost all countries. While migration continued to originate mainly in the poorer regions (for example, the Northeast of Brazil, the *Altiplano* of Bolivia, the northern deserts of Chile and the rural highlands of Ecuador) and flow to better-off provinces, it had not reduced regional disparities. Mr. Rodriguez supported his observations with detailed estimates from the MIALC database (based on census micro data) on the main provinces of origin and destination of internal migrants for 18 countries of the Latin American region.

3. Discussion

Several participants asked whether it would be better to define and measure "urban" based on economic criteria rather than demographic or administrative (area) criteria. Another possible line of research is using data on the location of people during their daily activities, in particular, where they worked and daily commuting patterns.

It was pointed out that despite its booming economy, China should not necessarily be seen as a model of urban planning for other countries, since there was little coordinated planning among localities. For example, national policies urging local officials to address environmental issues had not been effective since local governments did not implement these policies. Also, *non-hukou* migrants were disadvantaged with respect to *hukou* migrants and city natives, as they had limited or no access to urban services, so a key policy issue was whether Governments would provide services, and what level of government would be responsible for it. Although the national Government had indicated that local governments should provide services to *non-hukou* migrants (and even that the *hukou* system should be eliminated), it did not provide local governments with the needed resources. The difficulty was exemplified with the case of Shenzhen, where the capacity to supply services was based on the legal population of 1.7 million rather than on the *de facto* population -including *non-hukou* migrants- of 7 million.

Another problem was that regional per capita income figures were sometimes distorted in China when the aggregate income figures were divided by the population excluding *non-hukou* migrants, in effect inflating urban per capita income and exaggerating the urban-rural income differences. Nevertheless, the urban-rural gap was real. This combined with the large surplus labour force in rural China implied that there would continue to be considerable rural-urban migration for years to come in China. It was already observed that in recent decades, once the economy opened up, large numbers of migrants left the countryside for the cities, even though they would not have the benefits of a *hukou*. It was noted that, in general, migration would occur if there where sufficient incentives to move. One participant exemplified this idea with the expression "if you build it, they will come," referring to the creation of Shenzhen as a special economic zone with new infrastructure, which quickly attracted millions more migrants than originally planned.

With regard to Latin America, in response to the question was raised as to whether regional disparities in incomes were declining, Mr. Rodriguez said they were more likely to be increasing, partly because of the clustering of poor indigenous populations in regions from which the more educated population had emigrated, depleting those regions of human capital.

Several participants stated that attempts to restrict urban growth had rarely been successful. For example, the military Government in Brazil in the 1960s and 1970s had even set up roadblocks on major roads into São Paulo, but that people found other means of entry. Over time, the move towards democratic Governments in Latin America had led to more tolerance of informal settlements, including for regularizing squatter settlements and providing them with services. However, informal land markets still appeared to be more lucrative than the formal sector, which operated with more controls over land use and transactions. Informal sector transactions tended to be more common in the outskirts of cities, where controls were weak or non-existent.

Vancouver, Canada, was mentioned as an example of successful metropolitan area planning. A metropolitan area-wide government authority was created that reduced the bureaucracy by 30 per cent and led to a big increase in citizen voting: The emphasis on local-area

issues in the past, on which less than a quarter of the population had voted, had given way to mostly metropolitan-wide issues, which stimulated a greater voter turnout. In developing countries, a general problem was that it was very difficult for any level of Government to purchase land and to provide services in informal or illegal settlements. In Brazil, this problem was lessened by the fact the *national* Government was responsible for providing water, which reduced jurisdictional problems and conflicts across multiple local governments. Finally, one participant noted that modern technology could play a larger role in improving local government management: For example, cell phones were being used by residents of Suzhou, China, and Surabaya, Indonesia, to contact local officials to complain on the spot about local government failures.

C. RURAL AND URBAN DEVELOPMENT: LINKAGES AND DISPARITIES

1. Main topics

The issue of defining urban versus rural arose again in this session. It was recalled that each country uses a set of criteria to classify the population as urban or rural to distinguish these areas and corresponding population groups over time and space. Such a dichotomy is simple and the data thus generated is widely used by Government entities, researchers, and international organizations. However, improvements should always be sought, including exploring possibilities for using new technologies for measuring urban, such as satellite imagery and the location of cell phone calls. Traditional sources of data can perhaps be used in new ways as well, such as the use of linked census records or data from longitudinal surveys to identify migration movements over time, and hence to classify people according to their urban and rural places of residence by type and size of community over the life course. This would lead to new research paradigms for the study of migration.

An interesting point was raised in the session regarding population ageing. In the United Kingdom and elsewhere in Europe, rural areas were ageing faster than urban areas as a result of middle-aged persons and elderly migrating away from central cities to nearby small towns and rural areas. Meanwhile, young adults remained in the cities, which were also receiving working-age immigrants from abroad. Similarly, in developing countries ageing was generally occurring faster in rural than in urban areas, but this was due to the *opposite* type of population movement: young adults migrating away from rural areas to the cities, leaving their parents and the elderly behind.

A major theme of the session was the relationship between internal migration and economic development, addressed by three of the presentations. Dual economy explanations of economic development have dominated the literature on development from the time of the classical economists, Adam Smith and David Ricardo to Lewis (1954), who put forth a dual-economy model further elaborated by Fei and Ranis. The presentations and discussion in this session on rural-urban relationships were especially useful in identifying links between migration and income gaps, the roles of remittances from urban to rural households in reducing those gaps, and the links between production and consumption and economic feedbacks between urban and rural areas. The fact that African households use migration of a household member to the city, for example, to diversify sources of income is fully consistent with the extensive literature relating to the peasant household survival strategies in Latin America. But the economic linkages between urban and rural areas are complex and multidimensional, requiring for correspondingly elaborate analyses of urban and rural production, consumption, investment, and remittances in a model of regional development.

2. Presentations

Four papers were presented in the session, dealing with diverse aspects of urban dynamics and its relationship to rural areas. Mr. Anthony Champion opened the session reviewing changes in urbanization patterns in Europe, with a focus on the United Kingdom. He first noted, based on the 2005 United Nations urban population estimates and projections, that the total population of Europe (47 countries) in 2000 was 728 million, 72 per cent of which was classified as urban. Since 1970, the population had grown only by 11 per cent, with the urban population increasing by 27 per cent and the rural population declining by 16 per cent. The total population was projected to decline by 4 per cent by 2030, or to 699 million people. In virtually all countries there was evidence of counter-urbanization, with faster growth in small towns than in large cities. This was the case in the United Kingdom with the exception of London, which was also growing rapidly. If a 2,000 population size cut-off was used, the percentage urban in 2001 was 88 per cent. Many small places close to metropolitan areas, which would be absorbed into growing cities in other countries over time, survived in the United Kingdom as distinct towns due to the preservation of historical administrative jurisdictions. Another way in which the urban-rural distinction was becoming blurred over time in the United Kingdom (and throughout Europe) was that most rural households were close to cities and had all the services of urban households. Nevertheless, the dichotomy was still useful: In the United Kingdom, when all local areas were classified as urban, rural or mixed, during 2001-2006 only rural areas gained significant populations from net internal migration (urban areas gained from *international* migration and natural increase). Those rural districts were also experiencing the most rapid ageing of populations due to migration of the middle aged and elderly from cities to rural areas. By 2030, rural districts were projected to have a third of the population to be over age 60.

He said that, on the wider European scene, fewer cities had been experiencing positive population growth in 1995-2005 than ever before. Indeed, the number of cities with positive growth was for the first time *smaller* than the number of cities with negative growth. Urban sprawl was evident in most countries, including the case of France, which during the period 1968-1999 experienced more than a five-fold increase in the surface area of cities, and only a small increase in the number of urban places. More generally, the patterns of urban growth and sprawl had been well documented by data coming from ESPON (the European Spatial Planning Observation Network). This project had developed an urban-rural typology based on a three-fold classification of human intervention (high/medium/low) and a two-way classification of urban influence measured by population density (high/low) at the district level for all of Europe. Mr. Champion concluded that using settlement size was useful for classifying large urban areas, but that for small ones it would be more useful to differentiate them three ways: by urban influence, access to urban-type services and settlement size.

The second presentation, by Ms. Roopa Purushothaman, focused on whether urban growth was good for rural India. She began by noting that India had eight mega-cities with over five million inhabitants each, and that they were experiencing rapid economic growth. The media focused on this, contributing to three myths about India: that urban areas were growing too fast; that rural areas continued to depend on agriculture; and that the gap between rural and urban areas was widening. In fact, urban areas were *not* growing fast overall, and rural-urban migration was relatively low (rural-urban migrants as a share of the rural population were only 2.8 per cent in the 2001 census versus 6.5 per cent in 1981), and natural increase was also modest due to fertility decline. Contrary to a commonly held view, faster urban growth would probably benefit rural areas, since the population there was increasingly dependent on non-agricultural production, which accounted for half of the rural household incomes. Furthermore, the rural-urban income gap was not widening but starting to decline.

In elaborating, she explained that the rural non-farm sector was growing faster than the urban economy overall, resulting in rural per capita income growing somewhat faster than urban per capita income over the past two decades (seven per cent versus 6.5 per cent). Thus the urban-rural income gap was narrowing (from a ratio of 3.3 in the early 1990s to 2.8 at the time), in contrast to trends in China, and reflecting diversification of the rural economy, especially into small scale manufacturing and services. The Gini coefficients, however, pointed to increasing inequality *within* both urban and rural areas in recent years, especially in the urban areas.

Ms. Purushothaman then examined the effects of rising urban consumption on rural household incomes by means of cross-sectional and time-series regression analyses over a 25 year period. The results suggested that a 100 rupee increase in urban consumption could lead to about 39 rupee increase in real rural household incomes, and that some 6.3 million non-farm jobs could be added over the next decade due to increases in urban consumption. The analysis thus indicated that urban consumption could indeed be an important engine of the growth of non-farm employment in rural India, a finding largely ignored in the corporate and policymaking sectors of society.

The next paper, presented by Ms. Cecilia Tacoli, showed some links between urban and rural development in Africa and Asia. She began by examining patterns of urbanization in the two regions, which were similar at the aggregate level but not at the sub-regional level. Thus, between 1950 and 2000, the percentage of the population living in urban areas rose from 15 per cent to 36 per cent in Africa and from 17 per cent to 37 per cent in Asia. She noted, though, that the ability to make strong generalizations was limited by the lack of reliable data (especially in Africa) and differences in definitions (for example, in China). In Africa, countries continued to urbanize while there was little economic growth in recent decades; the economy had even slowed in some countries (for instance in Uganda) during the 1980s and 1990s. The narrowing of the urban-rural income gap had led in some cases to *reverse* migration, from urban to rural communities while the urban areas of Africa continued to grow due to high fertility and hence high natural increase

The economic and urbanization trends were very different in Asia, where export-led industrialization (especially in China and Vietnam) concentrated in coastal areas and in peri-urban regions. This had led to widening rural-urban income gaps, notably in China, and hence to increased commuting to work and circular migration. In Asia, rural industrialization by small enterprises had become important in countries like China, India and others such as Vietnam, where more than 40 per cent of GDP was generated by rural industry.

Ms. Tacoli noted that the dominant policy view in developing countries, including Africa and Asia, continued to be that rural-urban migration caused problems, such as increasing the costs of urban services and raising poverty in both urban and rural areas. An *increasing* percentage of countries globally still said they wanted to reduce rural-urban migration and urban population growth: the percentage of Governments who stated their aim to reduce or prevent rural-urban migration increased from 51 per cent in 1996 to 73 per cent in 2005. This view did not take into account the fact that migration was driven by economic factors and generally improved the lives of migrants. Moreover, such policies to restrict migration had not proven effective.

Temporary forms of migration, including circulation and seasonal migration, were increasing as they served to maintain links to the rural asset base, including land rights. Political and economic insecurity in the urban areas of Africa also motivated migrants to maintain those ties. She said that remittances were another way by which rural and urban populations were linked, and that remittances accounted for growing proportions of household income in Africa

and Asia, even becoming larger than farm income in parts of rural China. Another link between rural and urban populations noted by Ms. Tacoli was that the non-farm incomes earned by rural households were utilized to intensify and diversity agriculture. Local traders, often viewed as exploitative of farmers, played an important role in linking village economies to markets in towns and cities, assisting rural development. Finally, the expansion of urban consumption stimulated domestic food production far more than did the expansion of exports, as seen in West Africa and Vietnam.

Overall, the reciprocal links between rural and urban areas were considered to be important for millions of families in Asia and Africa. As noted before, internal migration could lead to greater social inequality and produce some negative environmental effects, but mobility also increased access to resources, and contributed to economic welfare and development. Unfortunately, policy-makers in most developing countries did not fully appreciate this, nor apparently did some multilateral financial organizations, which according to Ms. Tacoli, did not considered adequately the crucial role of urban centres (for example, in the 2007 World Development Report, which focused on agricultural development). She concluded by noting the inconsistency between the fact that local governments in Asia were supposed to play an important role in development but had extremely limited technical and financial capacities, received little help and were not accountable to national Governments.

The final paper in the session, on peri-urban (suburban sprawl) growth in mega-cities in Latin America, was presented by Mr. Haroldo da Gama Torres. He first explained that a slum, according to UN-Habitat, was identified according to five criteria: non-durable dwellings, little floor space per person, lack of access of the dwelling to piped water and sanitation, and insecure land tenure. Based on this definition, 30 per cent of the urban population in Latin America lived in slums. The usual source of data was the census of population and housing, but this did not distinguish shantytowns (*favelas* in Rio) or slums from illegal settlements. The former occupied all the space available and were unplanned, while the latter usually involved an organized use of space, such as with a grid road system, space for recreation, etc. In Latin America, both tended to be on the outskirts of cities, between the central city and rural areas.

Peri-urban areas tended to have lower density and younger populations than city neighbourhoods, higher population growth, little infrastructure or zoning regulations, and fragmented local government jurisdictions. Their expansion usually involved occupation of agricultural lands, deforestation and damage to watersheds, and environmental degradation from pollution of waterways and lack of solid waste collection. The lack of jobs in these areas led to long distance commuting to city centres. According to Mr. da Gama Torres, there was need to develop housing policies to cope with the growing population, and regularize land tenure (as had been done in Santiago, Chile). Peri-urban areas were extremely important since virtually all future population growth in Latin America was expected to be in these areas (yet the only good data on peri-urban areas were from São Paulo, Mexico City and Santiago). Nevertheless, they were of little interest to urban governments and planners, being essentially *invisible*, as land use was not registered and there was usually no data on peri-urban populations except at the time of decennial censuses. They were also located on land in many different political jurisdictions. For these two reasons, the State did not know about them and was incapable of acting. Mr. da Gama Torres concluded by recommending the creation of early warning systems based on satellite observations, so urban and local managers could identify areas of new expansion in the peri-urban region.

3. Discussion

The definition of urban, raised among others by Mr. Champion, was discussed further—should density be the basis for defining urban areas, what was the spatial dimension of distinguishing urban and rural, and what were the underpinnings of defining urban on economic bases, such as the location of their places of work. One participant said that by some criteria, Ethiopia should be considered 40 per cent urban instead of 15 per cent urban, as per official estimates. Another participant noted that in most of Latin America, peri-urban areas were considered urban, in the traditional dichotomous classification. Regarding India, several participants questioned how there could be so much manufacturing in rural areas and wondered whether this was not taking place in towns very close to cities.

In commenting on the use of satellite images to monitor changes in population and land use, participants noted that this would not be the same as on-the-ground observation, so Governments in Latin America should also explore other new forms of data collection, including specialized local surveys. On the other hand, participatory budgets were being tested more now—asking for the opinion of the public about, for instance, what services should be improved, where public funds should be invested, an exercise were the poor were usually not involved.

In responding to some questions, Mr. Champion said that the appropriate definition of urban depended on the purpose of the study, and related to historical usage, lifestyle differences, even the extent of communications between neighbours, as described by Louis Wirth in 1938, who noted that people rarely talked to neighbours in urban areas, in contrast to rural settlements. He also indicated that small-scale manufacturing was an important economic activity in small towns in the United Kingdom, as well as in India. Regarding India, a participant said that up to 110 million people could be classified as either urban or rural depending on what population cut-off was used: India would be 48 per cent urban using a 5,000 population cut-off and about 60 per cent using a 2,000 population cut-off. Most rural manufacturing took place indeed in large villages, which in other countries were classified as towns or small urban centres.

One participant pointed out that the econometric results presented by Ms. Purushothaman had to be interpreted in the light that they were based on a simple one-equation model, and that individual regression coefficients did not meet the usual 5 per cent criterion level for statistical significance. It was also pointed out that the urban-rural linkages analysed were indeed complex at both the macro and the micro or household level, and that more detailed research was needed to ascertain the significance of the various linkages. In response, Ms. Purushothaman indicated that the purpose of the statistical analysis in her paper was to show that urban-rural linkages are important, and that the evidence in general pointed in this direction. She also noted that in India, peri-urban areas were growing faster than central cities, which constituted some clear evidence of urban sprawl.

Part of the discussion referred to different types of population movements, from long-term migration to daily commuting. Some people moved from one type of community to another over one or more times during their lives, and it would be useful to have data on the proportion of time spent by people in different types of localities. This would also permit classifying people at any time by urban-rural residence, and would allow researchers to study the life-course dimension of migration which, it was noted, had already been done for the United Kingdom based on linking census records. A study by the Massachusetts Institute of Technology (MIT) had used records from telephone companies in the U.S. on the locations where cell phone calls were placed, which reflected the approximate distribution of the population, especially during daytime hours.

In relation to peri-urban areas, it was noted that the process of urban sprawl beyond city boundaries was well under way in Asia as well as Latin America, though usually there were strong local governments operating in the peri-urban belts in Asia. Some participants reiterated that it was important that local government managers could have access to local data on which to base their decisions, though capacities for using the data were often limited.

Other aspects of the urban-rural linkages referred to the role of circular and temporary migration flows. For example, in Africa, some migrants to cities usually decided to move back to their rural homes once they ceased working, and many wanted to be buried there. Migration was also a way for households to diversify against risk in many African countries.

D. URBAN INFRASTRUCTURE, HEALTH AND POVERTY

1. Main topics

This session of the meeting examined levels and trends in health and mortality in developing countries, mainly based on Demographic and Health Survey (DHS) data and focusing on Sub-Saharan Africa. It was evident that child mortality has continued to decline significantly in most developing countries, but had stalled or increased in sub-Saharan Africa in the past decade or so. In countries with DHS data, health conditions, such as nutrition and child mortality, were much worse in slums than in other parts of the cities, and were closer to those prevailing in rural areas. This indicated a serious failure of policies to address the health needs of the urban poor.

The presenters noted that a key problem was the limited data available. DHS surveys provided very useful information on child health and mortality, but the samples were not always sufficient to disentangle the effects of the proximate determinants of child health, such as water, quantity and regularity of access to services, and child vaccination separately for urban and rural areas. DHS surveys were said to be too small to provide health indicators for individual cities, but now that the sample size had increased to 20,000-30,000 households in some countries, this was becoming less of a limitation. An examination of these data would serve as a basis to assess the levels and trends in health conditions within countries, of the urban slum, non-slum and rural populations. Still, sample sizes would often be too small for reliable direct estimates of infant/child mortality for cities. Data sources on adult mortality were much weaker, even non-existent in many countries.

2. Presentations

This session included two presentations, one by Mr. Mark Montgomery, on an overview of health and poverty in urban areas of developing countries, the other by Ms. Nyovani Madise, on child mortality in sub-Saharan Africa. Mr. Montgomery noted that health in urban areas of developing countries varied enormously across countries, and that data were often not comparable, complicating the analysis. First, he reviewed global trends in poverty, observing that the latest World Bank estimates for the developing world showed a decline of 180 million poor people in rural areas over the period 1992-2003, and an increase of 50 million in the urban poor, with much of these changes related to population redistribution from rural to urban areas. While poverty was indeed still much more prevalent in rural areas, it had declined from 36 per cent to 30 per cent (based on the $1/person/day cut-off), while its prevalence in urban areas had increased, from 14 to 16 per cent. These figures included China, and could be underestimating urban poverty since large numbers of *non-hukou* migrants (many of them poor) were not included in estimates of poverty in Chinese cities. Mr. Montgomery also questioned whether the prices

used to determine poverty were really those faced by the poor—did they include key non-food items such as rent and transportation, did they take into account that the poor often had to pay higher prices for food by buying in small shops close to their homes (which offered credit) rather than at supermarkets which were not as close? Considering all this, in his opinion the urban poverty line should be at least 1.2 times the rural line to realistically compare them.

Regarding health conditions, the urban poor often did not have access to health facilities in the cities in spite of them being available there, for various reasons: they either did not know about preventative health care, could not afford treatment for illnesses and injuries, or could access only poor services, and thus faced health risks more akin to those of the rural population. For the most part, the urban poor lived in polluted environments and in crowded living conditions, facilitating the spread of contagious diseases. Mr. Montgomery noted that most of what we knew about health conditions across developing countries came from DHS surveys and recently from UNICEF's Multiple Indicator Cluster Surveys (MICS), which provided much better data on children than on adults. Recent extensions to collect biomarker data and data on violence and accidents was improving the data base, but DHS samples were generally too small to provide reliable measures of health status for individual cities, and it was difficult to link households to slums. Moreover, these surveys did not collect information on income or consumption expenditures, so relating health to economic status required the use of housing quality or household assets as proxy indicators of the latter. Despite these caveats, DHS data allowed for many comparisons of population groups across and within countries, and showed that in general the urban poor were more like the rural population than the urban non-poor population in health status. This was the case, for example, for child malnutrition in India, quality of prenatal care (in the Philippines), medical attendance at birth, and for violence against women. His estimates of infant mortality rates for developing countries, based on DHS surveys, were 86 infant deaths per 1,000 live births for rural populations versus 75 infant deaths per 1,000 live births for urban populations and 56 infant deaths per 1,000 live births for the urban non-poor.

The next presenter in the session, Ms. Nyovani Madise, noted that 9.7 million child deaths occurred in 2006 in the world, almost five million of which were in sub-Saharan Africa. Six million of the world's child deaths would have been preventable. Among the regions of the world, sub-Saharan Africa had by far the highest under-five mortality rate of 160 per 1,000 live births, followed by South Asia at 83 per 1,000 live births. It was very unlikely that the Millennium Development Goal of cutting child mortality to half (from 187 per 1,000 live births in 1990 to 93 per 1,000 by 2015) would be met. A review of DHS survey results for 22 countries in the region from the 1990s showed a decline in under-five mortality in only five countries, with increases in 17 other countries. Countries with faster urban population growth experienced higher growth in informal settlements, a deterioration in urban health conditions including declines in safe drinking water, in vaccination coverage of children, and even some increases in child mortality. She then discussed two case studies, on Kenya and Zambia. In Kenya, data from three DHS surveys in 1993, 1998, and 2003 plus a survey of 4,564 households in Nairobi in 2000 showed that access to water and child vaccination prevalence declined for the rural population, the slum and the non-slum urban populations. Infant mortality in slums was closer to rural levels than to the urban non-slum levels. In recent years, there had been a general deterioration in sanitation and health in Kenya, with vaccination coverage and access to piped water declining. In Zambia, data from three DHS surveys over the period 1992 to 2002 showed slight improvements in infant mortality, though vaccination coverage was stagnant and access to piped water worsened slightly. Again, mortality in slums was closer to rural levels than to those of non-slum urban dwellers there. Both case studies provided results generally consistent with those shown by Mr. Montgomery.

3. Discussion

In the discussion, it was pointed out that DHS surveys provided very useful information but that did not provide the depth needed to study some important aspects of mortality. For example, beyond access to safe water, how continuous was that access and what quantity of water was available? Mediocre quality water in adequate quantity could be better than good water in very limited quantity—for example, for washing and sanitation/flushing. Could DHS surveys ask additional questions to get at this dimension? This required that the data specified the location of households to permit going back to those of interest to collect additional detail. A question was also raised about the spatial dimension of the data collected, if it could be geo-coded. Aspects of the samples in DHS surveys were then considered, noting that sampling variability and quality differences over time affected the estimates. For example, it was found that surveys with overlapping reference periods the levels of and trends in fertility and mortality were not always consistent, and that that the estimates of child mortality from these survey data seemed often to be too low. One participant pointed out that the role of HIV/AIDS in child mortality should merited attention, while another emphasized the importance of achieving democracy to improve public health services for the urban poor.

In response, Ms. Madise explained that the DHS surveys did not have ideal questions on water access, sanitation, use of the health care system, or malnutrition. On the other hand, in Malawi and Zambia, the geographical distribution of illness in the survey was indeed determined by geo-coding the location of households using GPS, and indicated that articles on the relationship of illnesses to road access were forthcoming in the American Journal of Public Health. One participant pointed out that data on HIV/AIDS was collected in some DHS surveys, but that privacy concerns led to introduce a random 1-5 km distance variable to the household location in the mid-cluster GPS identifier, which reduced the ability to link community variables to household behaviour, including child mortality.

While it would be useful to have more detailed information on factors related to malnutrition and child mortality in DHS surveys, it was pointed out that the questionnaires were already over 50 pages long, so a very strong case would need to be made to add any more. Any addition would have to consider the need to maintain the scope and quality of the core data that the survey had to cover.

E. URBAN PLANNING AND ECONOMIC GROWTH

1. Main topics

The accelerated development of the Pearl River Delta around Guangzhou in southeast China is a microcosm of rapid economic expansion and export growth in China, with massive flows of migrants (non-*hukou* migrants, or floating population) to cities, with consequent environmental impacts. The dual-population system, where the *non-hukou* migrants are subject to low wages, poor working conditions, job instability, poverty, and lack of access to normal urban services, contrast with the better conditions of the small number of *hukou* migrants and urban natives. This constitutes a source of social inequity as well as a threat to long-run development and political stability. This situation, along with the severe deterioration of the environment, needs to be confronted with much stronger regional plans involving coordinated local government policies, provision of services to the floating population, and strict environmental controls. The area could then serve as a model for sustainable development for the rest of China. Current trends are clearly not sustainable.

The comparative historical perspective provided by Mr. Peter Marcotullio showed the variety of paths taken over time by both currently developed countries and developing countries in the Asia-Pacific region as regards energy consumption, transportation, and caloric food consumption. Historical comparisons of the beginning of the urban transitions and the use of coal as the major source of energy in China and the United States needed to take into account that the world was quite different in terms of technologies and energy sources available when the United States began its urban transition a half century ago. On the other hand, the variety of paths taken by different countries suggested that the type of determinism embodied in the "environmental Kuznets curve" is not very useful because countries can choose and indeed have been choosing different development and energy use paths. The specific route taken depends on national policies, including legislation, direct controls, and the use of tax incentives and subsidies. In order to deal with rising global environmental threats, Governments in both developed and developing countries needed to develop and implement policies to reduce environmental degradation, restore degraded systems, and develop clean sources of energy. This required policies to price natural resources correctly, stimulate technological change, and conserve remaining high-value ecosystems.

2. Presentations

This session included three presentations, by Mr. Eduardo Lopez-Moreno (via video-conference), Mr. Peter Marcotullio, and Ms. Mee Kam Ng. Mr. Moreno presented global urban growth patterns using data from the United Nations Demographic Yearbook. He then examined a sample of 250 cities in developing countries to investigate the drivers of growth. He noted that over 193 thousand urban dwellers were added to the world population each day but that trends were very different in the developed and developing countries, with 40 per cent of the cities of the North having lost population in 1995-2005. In contrast, urban populations were declining in only 10 per cent of cities in developing countries, but the pace of urbanization was slowing, from four per cent per year in the 1950s to two per cent at the time. He reviewed patterns of urban population growth by region, noting the dominant role played by cities in Asia in city growth at the global level (66 of the 100 fastest growing cities are in Asia). Africa was at the early stages of the urban transition, so urban growth was very high, was highly influenced by conflict, disasters and, in the case of Southern Africa, the burden of HIV/AIDS. He then examined the reasons for urban population decline, which included suburbanization (loss of central city population to surrounding towns), structural economic changes, local conflicts, and reclassification. Mr. Moreno also examined patterns of growth in cities, and found that the main contributing factors were economic factors (investment in transportation and communication infrastructure, designation of Special Economic Zones), improvements in the quality of life, and change in the city's political status.

The presentation by Mr. Marcotullio highlighted globalization and urban development in the Asia-Pacific region. He examined the question of whether developing countries were following or were likely to follow the path of the "developed world" (taken to be that of the United States) as their economies and populations grow. Using a human/social-ecological system framework, he noted over the past 150 years, the size of the human/social sphere had risen greatly in intensity and the scale of economic activities, which had been accompanied by increasing interaction with the ecological sphere. Mr. Marcotullio saw this as a process of globalization which embodied the widening, deepening and speeding up of worldwide interconnectedness. Widening referred to the *expansion* or *broadening* of human impacts on ecological systems, with cities spreading and growing like biological organisms, with increasing ecological footprints. Deepening referred to the *speeding up* of the pace of change, of capital accumulation in large urban metropolitan areas, which resulted in higher consumption of ecosystem services and hence

in major environmental impacts. Interconnectedness stood for the dramatic increase in contacts between people and cities in world city systems increasingly better connected as a result of advances in telecommunication (internet, cell phones) and transportation systems, which allowed much faster travel and communications.

Mr. Marcotullio applied these concepts to analyze the effects of globalization in the Asia and Pacific region and to compare them to the United States. Regarding widening, he noted that changes in socio-ecological systems were occurring at much lower levels of per capita income in contemporary Asia than they did historically in the United States, for example, for urbanization, technology (use of cell phones), carbon dioxide emissions from transportation and shifts in energy use. For example, Asian countries were more highly urbanized than the United States was at the same level of GDP per capita, and had higher levels of emissions. Nonetheless, shifts in energy sources were also occurring at lower levels of per capita income. For instance, China was reducing the proportion of its energy from coal at a lower level of income than the United States did in the past. Asian countries had much lower emission levels per road mile of transport than the United States had at the same level of per capita income. In fact, only Australia was close to the United States' high emissions level, with the Netherlands being the lowest among a sample of developed countries. The fact that there was considerable variation across Asia, with low emissions per road mile relative to GDP per capita in Japan and Singapore versus high levels in Thailand and Malaysia, suggested that higher efficiency was indeed possible.

In contrast to emissions efficiency, consumption of food calories per capita was higher in Asian countries than it was in the United States at the same level of GDP per capita, so the serious problem of obesity in the United States may well be replicated in the Asian countries. The World Bank predicted that, by 2030, there would be 600 million more people in the middle class in developing countries, bringing the total to one billion, most of them aspiring to have the consumption levels of the United States. This was likely to lead to many more urban people suffering from environmental problems, whether "brown" (lack of safe water and sanitation), "grey" (pollution) or "green." The three ongoing historical global processes described above combined to dramatically alter time-space dynamics of population-urbanization-environmental interrelations. Public policy and technological changes had contributed to some reduction in CO_2 emissions from transportation and energy use per capita, but stronger policies were needed.

The last presentation/paper in the session was by Ms. Mee Kam Ng, referred to urban planning in China, focusing on the Pearl River Delta (PRD), an area experiencing great changes over the last few decades. The PRD region comprised Guangzhou, Zhuhai/Macau, Shenzhen, and also Hong Kong. The total population of the region was 19 million in 1980 and increased to 45 million in 2006. Meanwhile GDP grew 180 times and the value of exports rose 507 times. After Hong Kong became part of China, 90 per cent of manufacturing companies in Hong Kong had facilities on the mainland in the PRD region.

With 0.4 per cent of the land area and 3.4 per cent of the population of China, the PRD accounted for 10 per cent of GDP and 30 per cent of the exports of the country. The "open door" policy of export-oriented market economy began in 1978. But the continuation of the *hukou* system which granted benefits for the minority native urban population that were not available to the large majority of the population of rural origin, had perpetuated a "dual-population system" in the country, including the PRD region. Other problems were substantial sub-regional disparities, environmental degradation and poor labour conditions. The Eastern part of the PRD which includes Hong Kong had much higher per capita incomes than the Western part, and the ratio of per capita urban to rural income in the region rose from 2.7 to 3.2 during 1978-2006. Environmental degradation was rampant, including widespread water and air pollution (for

instance, only 43 per cent of urban residential waste was treated) and acid rain existed throughout the region. Finally, there were about 12.6 million migrant workers, especially women, working in factories at low wages and without any health or educational benefits.

Ms. Ng said that the political administration of the region was complex and did not have proper coordination, involving one province (Guangdong), two special administrative regions, two special economic zones (of the five in all of China), eight cities and dozens of local governments. It had multiple highways, railroads and five international airports. In an attempt to confront this and also develop a long-run plan, two regional plans had been developed. The first in 1994-1995 had specific development goals, including the idea of the region as a "dragon head" of development for Southern China. It had a top-down approach, centralized, with no involvement of the private sector or civil society. It had also projected a population of 34 million in 2010, including a floating population of 5 million persons, in contrast to the actual population of 45 million people in 2006, including 20 million floating persons. A second attempt to develop a region-wide plan was made in 2005, still a top-down plan but including Hong Kong and based on discussions with experts. However, it had been largely imposed on local governments. The goal was to achieve sustainable development for a population projected to be 65 million in 2020 by slowing down the rate of increase of the land area in use from five per cent per annum to three per cent, reducing the surface area per person from 160 m^2 to 140m^2, and permanently preserving 22 per cent of the land area. While the new plan involved a monitoring and evaluation plan with government inspectors, there was still no involvement of the private sector, and the physical area was still seen as a place for development rather than a life space for sustainability.

3. Discussion

Most of the discussion focused on changes in China, noting that there were two other major urban growth corridors, Shanghai to Wuhan and Beijing to Tianjin. Two participants noted that what one saw in China was different from what was really happening, that the impressive economic growth in the PRD region masked serious problems of millions of underpaid workers with no *hukou* and hence no benefits, many of them living in shantytowns, with no piped water nor sanitation. The question was raised what would happen in the PRD to the 78 per cent of the land not subject to conservation control, would it continue to suffer serious environmental problems? A participant said that it was desirable for local governments to be able to collect their own revenues, such as from user fees, although this again required proper control, as these mechanisms had been abused elsewhere in China, leading to protests in rural areas.

In response, Ms. Ng confirmed that water and sanitation services were provided only to the legal migrants in Shenzhen. Also, in its high growth period in the late 1990s, Shenzhen attracted not just unskilled workers from rural areas but also a large number of highly-skilled workers of which it had a serious shortage at the time and which were needed to sustain the increases in industrial productivity.

A question was raised whether it was useful to compare the proportion of energy consumption from coal by level of GDP per capita for China to corresponding historical values in the United States. Especially, since the technologies available differed very much between the times (decades earlier in the United States than for China) at which the two countries had reached a given level of GDP. Many contemporary developing countries were benefiting from the advantage of coming later and adopting more efficient technology. But Japan provided a different example, of a country which laid out its basic public transportation system before automobiles were common, which had allowed it to have one the most efficient transportation system in the world.

Questions on Mr. Moreno's paper focused on the methodology and data used. One participant asked about the statistical methods used to analyze the determinants of urban growth. Another participant wondered whether focusing in shrinking cities could detract attention from the most important and pressing issue, which was still urban growth. Mr. Moreno said that the identification of the determinants of growth had been based on factorial analysis. An analysis of five Latin American cities showed that the main reasons for urban decline were negative rates of natural increase, even though emigration also played a role. Mr. Moreno also pointed out that, although the implications of urban growth were important, future urban growth would not be as fast as current growth, and it was likely that more cities would be shrinking. He noted that those emigrating from cities were often young skilled adults, so cities that lost population were loosing an important asset.

F. SPATIAL DISTRIBUTION OF THE POPULATION AND CLIMATE CHANGE

1. Main topics

Issues of global and local climate change are dominating the news, and have stimulated major research efforts in multiple disciplines in recent years. This session focused on the effects of global climate changes for urban populations and their policy implications, and also looked at demographic effects on violent conflicts. The evidence reviewed by Mr. Henrik Urdal showed that there is little empirical support for the hypothesis that population growth or pressures on the land lead to armed conflicts or political violence in developing countries. Some evidence was found for provinces in India, although that study did not use the preferred measure of demographic pressure, the population density on agricultural land. It was noted that most of the evidence on countries or states involves macro-level variables which are interrelated in various causal ways and can be affected by important missing variables, making it difficult to draw firm conclusions. As Mr. Urdal stated, the relationships would be better examined at the local level.

Future climate change will add considerably to the problems of urban areas already associated to population growth, inadequate infrastructure, and marginalization of much of the population (the urban poor) in developing countries. Addressing this will require, in both developed and developing countries, long-run plans in infrastructure and to relocate population, ports and other economic activities, and short-run policies to confront the anticipated increase in extreme weather events in coastal areas. For the latter, comprehensive data need to be collected by coastal cities to inventory where problems occurred in the past, how were they dealt with, and how could they have been dealt with better. This would permit better responses in the future. Still, the underlying major sources of climate change must urgently be addressed. This would involve changing resource use practices driven by the more developed countries, reducing greenhouse gas emissions from energy production, industry, and transportation, and tropical deforestation, which is in turn driven by global demands for tropical hardwoods as well as by the expansion of the agricultural frontier in developing countries to meet local needs linked to growing populations and economies.

2. Presentations

The three presentations in the session dealt with different aspects of the linkages between the spatial distribution of the population and the environment. Mr. David Satterthwaite examined the implications of climate change on urban populations in low-income countries; Ms. Deborah Balk reviewed evidence from night lights on the spatial distribution of coastal populations and hence their exposure to sea-level rise and other aspects of climate change; and Mr. Henrik Urdal

provided evidence on whether demographic factors are causally related to armed conflict. Mr. Satterthwaite initiated the session by first noting that the major consequences of global climate change had important effects on urban populations, including effects on health. Climate change was associated to increasing air pollution, higher precipitation in some areas, drought in others, more extreme climate events at local levels such as floods and hurricanes, and the overall rise in the sea level. These effects were felt mainly in developing countries, which registered 95 per cent of the deaths and a majority of the injured from natural disasters in the past 25 years. The number of such disasters rose over the period 1950-2007, with 2007 being the worst year ever. Mr. Satterthwaite said that a focus on climate effects on the urban populations in developing countries was desirable since they accounted for a third of the planet's population and virtually all future population growth, which would be concentrated in coastal areas. Rising sea levels will be disastrous for many cities like Dar es Salaam and Montevideo, which were major centres of their country's culture as well as of its population and economy.

How could cities in low-income countries respond? First, any mitigation of their contributions to global climate problems would only have little effect compared to the enormous levels of greenhouse gases emitted by developed countries. So mitigation had to begin in the latter. Second, adapting infrastructure to rising sea levels was often not an option since there was little infrastructure to adapt, as much of the urban population was poor and did not have even piped water or basic sanitation facilities. In contrast, the higher income urban populations could always migrate, which was more difficult for the poor to afford. Thus local governments needed to adapt with pro-poor policies and by running competent, accountable governments. As one example of successful adaptation, Thailand supported local communities to improve their drainage systems. Durban (South Africa) was cited as the main success story, with 25 thousand homes built for the poor. The capacity to plan for minimizing environmental disasters and coping with increasing environmental hazards had to be created in thousands of localities in the developing world, requiring support from international aid and drawing on local knowledge and experience. Even small, inexpensive activities could help, such as establishing and enforcing building codes, budgeting for rapid response teams, squatter settlement upgrading, micro-credit loans for women running businesses in slums, and establishing coordination mechanisms with higher levels of Government.

Ms. Deborah Balk followed with a presentation on the effects of global climate change and sea level rise on coastal populations, especially urban ones. The rise in sea level was expected to be one-fifth to three-fifths of a meter by the end of the twenty-first century. She used new data from the Global Rural-Urban Mapping Project (GRUMP) on the distribution of global rural and urban populations, and from the Shuttle radar topographic mission (SRTM). The data was used to map populations exposed to rising sea levels in low-elevation coastal zones, those at less than 10 meters above sea level She pointed out that people were more concentrated in coastal areas than other ecosystems, that urban population density was higher, and that future population growth would be almost totally urban growth in developing countries, much of it in coastal areas. These areas were subjected to not only sea level rise but also increasing extreme weather events, including heavy rains causing erosion and mudslides.

The fourth Assessment of the International Panel on Climate Change on Global Climate Change confirmed that much of the ongoing change was anthropogenic, that is to say, caused by humans and their activities: population growth, waste products from energy production, transportation and industry, and deforestation. The impact of climate change on floods in low-lying areas could account for 5 to 10 per cent of GDP in Africa by the end of the twenty-first century, and would be especially large in the mega-city delta regions of Asia such as Dhaka and

Shanghai, and in Africa (Alexandria). It compounded the effects of population growth, urbanization and development on resources.

Ms. Balk explained that existing maps with population distributed by political jurisdiction were too crude to show the concentration of the population in urban places in vulnerable low-lying coastal regions. Risk-assessment required looking globally at the population living at less than 5 meters above sea level, since that would be the most affected population (5 meters was also used by the New York City Office of Emergency Management), but global-scale satellite imagery only provided data at a resolution of 10 meters minimum altitude at a reasonable cost. Ten per cent of the total world population and 13 per cent of the urban population was living at locations under 10 meters above sea level, especially in Asia. Vietnam (Ho Chi Minh City especially), Bangladesh, and Egypt are the largest countries among the 10 with the highest percentage of their population living in places under 10 meters above sea level. Uncontrolled development in coastal areas, including cutting down mangroves, was adding to the risks. Policy implications included raising public awareness, mitigation of greenhouse gas emissions (especially in developed countries), improving access to family planning to reduce urban and rural population growth, and planning for redistribution of population and industry to higher altitude areas.

In the last presentation, Mr. Henrik Urdal addressed the question of whether demographic changes caused conflict. The topic had attracted considerable attention in the media as well as in the research community, led by Homer-Dixon. Widely-publicized figures indicated that the number of "environmental refugees" in the world, resulting from mostly future land degradation, would reach 200-250 million persons by 2030, a figure traced to the ecologist Norman Myers in 1995. However, it was noted that the International Panel on Climate Change had not endorsed any figure in this regard. This figure contrasted with an estimate of the current stock of "climate refugees" at 20-25 million, which had been stable for some years and was generally accepted by the scientific community. Mr. Urdal said that while the 20-25 million figure was significant, it was only a tenth of the estimated total number of rural to urban migrants and people reclassified as urban, projected to be in the order of 250-310 million in the period 2005-2015. The literature on climate change and conflict considered physical changes such as resource depletion from soil and wind erosion, as well as global warming and its implications for sea level rise and increasing frequency of extreme weather events. These changes, as well as growing population pressures on resources, may lead to conflicts over resources and migration away from resource-scarce areas.

Mr. Urdal noted that there were four schools of theory to address the topic. First, the neo-Malthusian school which saw increasing population pressures on the land creating resource scarcity, leading to competition for resources and either State exploitation or State failure and conflict. The second was the counter-argument of technological optimism linked to Ester Boserup, which instead asserted that rising population pressures may actually *stimulate* technological change, which would restore per capita output and thereby help to avoid conflict. The third was political ecology, which saw resource scarcity as being due mainly to the extreme inequality in the distribution of resources and political power, so that resource conflicts were due to those inequalities. The fourth approach was that of the institutionalists who claimed that resource scarcity was more likely to lead to cooperation over resource use.

He tested the relationships between armed conflict and demographic factors using logistic regression, with the dependent variable taken from the extensive PRIO-Uppsala dataset on armed conflicts (within or between countries) in the world for the period 1946-2006 involving at least one Government, armed forces action, and a minimum of 25 deaths in the year. Such conflicts numbered around 30 per year around 1970, rising to a peak of 53 conflicts in 1992-1993, then

falling to about 30 in the new millennium. In the cross-country statistical model, Mr. Urdal found no evidence of Malthusian effects, not for total population growth, density or urban population growth. No effect of resource scarcity on conflict was found either. However, a study based on geo-coded data compiled for all conflict points in the world (the area within a radius of 300 km) over the period 1990-2004 found evidence in support of the neo-Malthusian position, that is, that population density was statistically positively linked to armed conflicts. In this study, population growth interacted with density and water scarcity. However, according to the author, the results were "extremely sensitive" to which countries were included in the regression, and the population growth interaction effects disappeared when the study was restricted to the developing countries, precisely where the relationships were hypothesized to be strongest. The third data set Mr. Urdal examined was for 27 provinces from six censuses of India from 1951 to 2001, which found modest support for population effects on political violence: more violence was observed in provinces with higher population density and growth, and also where agricultural yields were declining. He concluded that "while overall demographic pressures and resource scarcity do not seem to make a state conflict-prone, the internal resource distribution…[helps to] explain the geographic distribution of political violence (in India)."

3. Discussion

An active discussion followed. One participant asked whether estimates of the total global population were likely to be negatively impacted by climate change. Another inquired whether there was any evidence of success stories in urban planning, or of the poor getting access to disaster insurance. Another participant recommended that the United Nations Statistics Division included a spatial dimension in the world population data they collected. Climate change and the rise in the sea level, it was pointed out, were not the same around the world, with the extent of the latter due to changes in salinization. Some large areas of the globe would likely benefit from climate change: Russia would become warmer and more apt for agricultural activity, there would be less drought in Northern China, etc.

Several participants asked whether there was any evidence on best practices in the responses of Governments in developing countries to natural disasters, or in advance planning to cope with disasters. Studies were needed on the implications of coastal sea rise on migration, on creating new coastal areas and ports, and on the impacts of climate change on dry lands and hence on migration into and out of those lands. Sea level rise would affect not only internal migration in countries but could spill over into international migration as well.The 20-40 year time horizon for the coastal sea rise should provide enough time to adapt.

Finally, several participants noted that most of the negative effects of climate change were expected to be on the developing countries, especially on the poor, while developed countries were most responsible for such change. They should play a major role in providing technical assistance and providing resources for solutions to be implemented in the developing countries.

In response, it was noted that the main environmental problem in the next 10-20 years would be an increase in extreme events (climatic) and that sea level increase would not be significant until after that. Data were thus urgently needed to identify and measure local level vulnerability to natural disasters for both urban and rural areas, thus enabling to inventorying past events, their demographic and economic consequences, and the results of any mitigation responses. Some work had already been carried out in Latin America through a network called "La Red" recording data on natural events and their impacts in various countries, permitting

mapping areas according to risk. Presently, creating such vulnerability and response maps was important for all regions.

Regarding the implications for Government policy, the World Bank and other bilateral and international agencies had provided loans and technical assistance mostly to national-level Governments rather than local ones, though the latter were most in need of capacity building or strengthening. As for best practices, Mr. Satterthwaite recalled that Durban was the only city to develop a plan for confronting climate change and extreme weather events, but even there the Minister of Environment and the Minister of Housing did not coordinate with each other. In India, there were examples of successful adaptation at the local community level, stimulated by "bottom up" pressures from below.

One presenter said that it was desirable to explore how to integrate spatial data with demographic data, including efforts to define and measure urban areas and to study the effects natural disaster and climate change on the population. The effects of climate change were indeed not uniformly negative in developing countries. Concerning areas with low rainfall, semi-arid areas in West Africa were projected to become less dry, though the Sahel would likely become even drier. Ms. Balk noted that identifying populations at risk, especially urban ones, was limited by the fact that the global maps were based on one-degree pixels, which was far too broad to identify cities (for which at least one-kilometre pixels resolution was needed). Finally, it was agreed that it was far less costly to mitigate environmental impacts than to have to respond to their consequences.

NOTE

[1] United Nations, Department of Economic and Social Affairs, Population Division (2008). *World Urbanization Prospect: The 2007 Revision. CD-ROM Edition - Data in digital form* (POP/DB/WUP/Rev.2007).

INFORMATION PAPERS

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ENGLISH

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Population Division
Department of Economic and Social Affairs
United Nations Secretariat
New York
21-23 January 2008

ORGANIZATION OF WORK

MONDAY, 21 JANUARY 2008

9:00 –9:30 Registration

Morning session (9:30–13:00)

9:30–9:45 I. Opening session

Opening statement (Hania Zlotnik, Director, Population Division, United Nations)

9:45–11:00 II. Urbanization: a global perspective

Gerhard Heilig (Population Division, United Nations). *New urbanization estimates and trends: the World Urbanization Prospects, Revision 2007*

Jorge Bravo (Population Division, United Nations). *An overview of urbanization, internal migration, population distribution and development in the world*

11:00–11:30 Break

11:30–13:00 II. Urbanization: a global perspective (*continued*)

George Martine (Núcleo de Estudos Urbanos/Universidade de Brasília, Brazil). *Preparing for sustainable urban growth in developing areas*

Axumite Gebre-Egziabher (UN-Habitat, New York). *Urban growth, slums and policy*

13:00–14:30 Lunch break

Afternoon session (14:30–18:00)

14:30–16:00 III. Urban growth and internal migration: policy dimensions

J. Vernon Henderson (Brown University, USA). *The effects of exclusionary housing policies on urban development: evidence from Brazil*

Aprodicio A. Laquian (University of British Columbia, Canada). *The planning and governance of Asia's mega-urban regions*

16:00–16:30 Break

16:30–18:00 III. Urban growth and internal migration: policy dimensions (*continued*)

Kam Wing Chan (University of Washington, USA). *Internal labour migration in China: trends, geographical distribution and policies*

Jorge Rodriguez (Economic Commission for Latin America and the Caribbean/CELADE, Chile). *Spatial distribution of the population, internal migration and development in Latin America and the Caribbean*

TUESDAY, 22 JANUARY 2008

Morning session (9:30–13:00)

9:30–11:00 IV. Rural and urban development: linkages and disparities

Anthony Champion (Newcastle University, UK). *The changing nature of urban and rural areas in the UK and other European countries*

Roopa Purushothaman (Future Capital Research, India). *Is urban growth good for rural India?*

11:00–11:30 Break

11:30–13:00 IV. Rural and urban development: linkages and disparities (*continued*)

Cecilia Tacoli (International Institute for Environment and Development, UK). *Links between rural and urban development in Africa and Asia*

Haroldo da Gama Torres (Centro Brasileiro de Análise e Planejamento, Brazil). *Social and environmental aspects of peri-urban growth in Latin American megacities*

13:00–14:30 Lunch break

Afternoon session (14:30–18:00)

14:30–16:00 V. Urban infrastructure, health and poverty

Mark R. Montgomery (Population Council and State University of New York at Stony Brook, USA). *The health of urban populations in developing countries*

Nyovani Madise (University of Southampton, UK). *Progress towards the child mortality millennium development goal in urban sub-Saharan Africa*

16:00–16:15 Break

16:15–18:00 VI. Urban planning and economic growth

Eduardo López-Moreno (UN-Habitat, Kenya). *Urban growth patterns and socioeconomic inequalities in the world*

Peter J. Marcotullio (UN University, USA). *Globalisation and urban development in the Asia Pacific region*

Mee Kam Ng (University of Hong Kong, Hong Kong). *Urban system planning in China: the case of the Pearl River Delta*

WEDNESDAY, 23 JANUARY 2008

Morning session (9:30–13:00)

9:30–11:15 VII. Spatial distribution of the population and climate change

David Satterthwaite (International Institute for Environment and Development, UK). *Climate change and urbanization: effects and implications for urban governance*

Deborah L. Balk (Baruch College/City University of New York and CIESIN, USA). *Urban population distribution and the rising risks of climate change*

Henrik Urdal (International Peace Research Institute, Norway). *Demographic aspects of climate change, environmental degradation and armed conflict*

11:15–11:30 Break

11:30–12:00 VIII. Summary and conclusions

Chair:	Hania Zlotnik (Population Division, United Nations)
Rapporteur:	Richard Bilsborrow (University of North Carolina at Chapel Hill, USA)

12:00–12:15 Closing

LIST OF PARTICIPANTS

Invited Speakers

Ms. Deborah BALK
Associate Professor
Baruch College, City University of New York
School of Public Affairs
One Bernard Baruch Way, Box D-0901
New York, NY 10010
United States of America
Tel.: 646-660-6762
Fax: 646-660-6701
E-mail: deborah_balk@baruch.cuny.edu

Mr. Richard E. BILSBORROW
Professor
Carolina Population Center
123 W. Franklin St., CB #8120
Chapel Hill, North Carolina 27516-3997
United States of America
Tel.: 919-966-1738
Fax: 919-966-6638
E-mail: richard_bilsborrow@unc.edu
http://www.cpc.unc.edu

Mr. Anthony CHAMPION
Professor
University of Newcastle
School of Geography, Politics & Sociology
Claremont Tower, Room 432
Newcastle-Upon-Tyne NE1 7RU
United Kingdom
Tel.: 44-1912226437
Fax: 44-1912329259
E-mail: tony.champion@newcastle.ac.uk

Mr. Kam Wing CHAN
Professor
University of Washington
Department of Geography
Box 353550
Seattle, WA 98195-3550
United States of America
Tel.: 206-543-3313
Fax: 206-543-6994
E-mail: kwchan@u.washington.edu

Ms. Axumite GEBRE-EGZIABHER
Director
United Nations Human Settlements Programme
(UN-Habitat), New York Office
2 United Nations Plaza, Rm. DC2-943
New York, NY 10017
Tel.: 212-963-8725
Fax: 212 963-8721
E-mail: axumiteg@un.org

Mr. John Vernon HENDERSON
Professor
Brown University
Department of Economics
Box B
Providence, RI 02912
United States of America
Tel.: 401-863-2886
Fax: 401-863-1970
E-mail: vernon_henderson@brown.edu

Mr. Aprodicio LAQUIAN
Professor
University of British Columbia
401-5760 Hampton Place
Vancouver, British Columbia
Canada V6T 2G1
Tel.: 604-222-2148
E-mail: alaquian@shaw.ca

Ms. Nyovani MADISE
Professor
University of Southampton
Division of Social Statistics
School of Social Sciences, Bldg. 58
Highfield, Southampton SO17 1BJ
United Kingdom
Tel.: 44-23-8059-2534
Fax: 44-2380-593846
E-mail: n.j.madise@soton.ac.uk

Mr. Peter J. MARCOTULLIO
Professor
UN University
2 UN Plaza, DC2-2060
New York, NY 10017
United States of America
Tel.: 212-303-7936
Fax: 212-326-7989
E-mail: pjmarco@ias.unu.edu,
pjm12@columbia.edu

Mr. George MARTINE
Professor
Universidade Estudual de Campinas
Associação Brasileira de Estudos Populacionais
6166 Campinas
Campinas-SP
Brazil
Tel.: 55-61-3662805
Fax: 55-61-3662805
E-mail: georgermartine@yahoo.com

Mr. Mark MONTGOMERY
Professor
Population Council
One Dag Hammarskjold Plaza
New York, NY 10017
United States of America
Tel.: 212-339-0673
Fax: 212-755-6052
E-mail: mmontgomery@popcouncil.org

Mr. Eduardo MORENO
Chief
UN-Habitat
Global Urban Observatory
Monitoring and Research Division
Nairobi, Kenya 30030
Tel.: 254-20-762-3149
Fax: 254-20-762-3080
E-mail: eduardo.moreno@unhabitat.org

Ms. Mee Kam NG
Professor
University of Hong Kong
CUPEM
Pokfulam Road
Hong Kong
Tel.: 852-28592276
Fax: 852-28592276
E-mail: meekng@hku.hk

Ms. Roopa PURUSHOTHAMAN
Economist
FCH House, 2nd Fl., Peninsula Corporate Park,
Ganpatrao Kadam Marg, Lower Parel
Mumbai, India 400013
E-mail: roopa@fch.in

Mr. Jorge RODRIGUEZ
Research Assistant
ECLAC
CELADE - Divisíon de Población
Avda Dag Hammarskjold 3477, Vitacura
Santiago, Chile
Tel.: 56-2-2102096
Fax: 56-2-2080196
E-mail: jorge.rodriguez@cepal.org

Mr. David SATTERTHWAITE
Senior Fellow
International Institute for Environment and Development
Human Settlements Group
3 Endsleigh St.
London, England WC1H ODD
United Kingdom
Tel.: 44-20-73882117
Fax: 44-20-73882826
E-mail: david@iied.org

Ms. Cecilia TACOLI
Senior Research Associate
International Institute for Environment and Development
Human Settlements Group
3 Endsleigh St.
London, England WC1H ODD
United Kingdom
Tel.: 44-20-73882117
Fax: 44-20-73882826
E-mail: cecilia.tacoli@iied.org

Mr. Haroldo da Gama TORRES
Knowledge Transfer Coordinator
Center for Metropolitan Studies - CEBRAP
Rua Itacolomi 380-42
São Paulo SP 01239-020
Brazil
Tel: 55-11-32552147
E-mail: hgtorres@uol.com.br

Mr. Henrik URDAL
Senior Researcher
International Peace Research Institute
Centre for the Study of Civil War
Hausmanns Gate 7
Oslo 0186
Norway
Tel.: 47-22547720
Fax: 47-225-47701
E-mail: henriku@prio.no

United Nations Programmes and Funds

United Nations Environment Programme (UNEP)

Ms. Juanita Castano
Director
New York Liaison Office
2 UN Plaza Room DC2-803
New York, NY 10017
United States of America
Tel.: 212-963-2111
Fax: 212-963-7341
E-mail: castano@un.org

United Nations Human Settlements Programme (UN-Habitat)

Ms. Sabine Kleinsesser
Intern
UN-Habitat
2 United Nations Plaza, DC2
New York, NY 10017
E-mail: sabine.kleinsesser@univie.ac.ot

United Nations Population Fund (UNFPA)

Mr. Rogelio Fernandez-Castilla
Director
Technical Support Division
220 East 42nd St.
New York, NY 10017
United States of America
Tel.: 212-297-5211
E-mail: castilla@unfpa.org

Mr. Jose Miguel Guzman
Chief
Population and Development Branch
220 East 42nd St.
New York, NY 10017
United States of America
Tel.: 212-297-5266
E-mail: joguzman@unfpa.org

Ms. Ann Pawliczko
Technical Specialist
Population and Development Branch
220 East 42nd St., Rm. 1752
New York, NY 10017
United States of America
Tel.: 212-297-5283
E-mail: pawliczko@unfpa.org

United Nations Specialized Programs

International Fund for Agricultural Development (IFAD)

Ms. Rosemary Vargas-Lundis
Policy Coordinator
I107 Via del Serafico
Rome, Italy 00142
Tel.: 39-065-4592606
Fax: 339-06-54597606
E-mail: r.vargaslundius@ifad.org

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Mr. Masami Egawe
Social and Human Sciences
2 United Nations Plaza, Room DC2-900
New York, NY 10017
Tel.: 212-963-2007

Mr. Martin Fernández-Ordóñez
2 United Nations Plaza, Room DC2-900
New York, NY 10017
Tel.: 917-275-0312

Other United Nations Entities

United Nations Regional Commissions Office

Mr. Amr Nour
Officer-in-Charge
United Nations, Room S-3127C
New York, NY 10017
Tel.: 212-963-5561
Fax: 212-963-1500
E-mail: nour@un.org

Ms. Daniela Simioni
Social Affairs Officer
United Nations, Room S-3127D
New York, NY 10017
Tel.: 917-367-2003
E-mail: simioni@un.org

United Nations Secretariat

Department of Economic and Social Affairs
(DESA)

Population Division

Ms. Hania Zlotnik
Director
2 United Nations Plaza, Room DC2-1950
New York, NY 10017
United States of America
Tel.: 212-963-3179
Fax: 212-963-2638
E-mail: zlotnik@un.org

Mr. Thomas Buettner
Deputy Director
2 United Nations Plaza, Room DC2-1952
New York, NY 10017
United States of America
Tel.: 212-963-3209
Fax: 212-963-2638
E-mail: buettner@un.org

Mr. Jorge Bravo
Chief
Population and Development Section
2 United Nations Plaza, Room DC2-1920
New York, NY 10017
United States of America
Tel.: 917-367-2323
Fax: 212-963-2147
E-mail: bravo1@un.org

Ms. Sabine Henning
Population Affairs Officer
Population and Development Section
2 United Nations Plaza, Room DC2-1922
New York, NY 10017
United States of America
Tel.: 212-963-3781
Fax: 212-963-2147
E-mail: hennings@un.org

Ms. Marta Roig
Population Affairs Officer
Population and Development Section
2 United Nations Plaza, Room DC2-1926
New York, NY 10017
United States of America
Tel.: 212-963-3198
Fax: 212-963-2147
E-mail: roig@un.org

Ms. Mary Beth Weinberger
Population Affairs Officer
Population and Development Section
2 United Nations Plaza, Room DC2-1960
New York, NY 10017
Tel.: 212-963-3199
Fax: 212-963-2638
E-mail: weinberger@un.org

Mr. Giacomo Sbrana
Associate Expert
Population and Development Section
2 United Nations Plaza, Room DC2-1924
New York, NY 10017
United States of America
Tel.: 917-367-2210
Fax: 212-963-2147
E-mail: sbrana@un.org

Mr. Gerhard Heilig
Chief
Population Estimates and Projections Section
2 United Nations Plaza, Room DC2-1918
New York, NY 10017
United States of America
Tel.: 212-963-4531
Fax: 212-963-2147
E-mail: heilig@un.org

Mr. Taeke Gjaltema
Population Affairs Officer
Population Policy Section
2 United Nations Plaza, Room DC2-1910
New York, NY 10017
United States of America
Tel.: 917-367-9192
Fax: 212-963-2147
E-mail: gjaltema@un.org

Mr. Victor Gaige-Togbe
Population Affairs Officer
Population Policy Section
2 United Nations Plaza, Room DC2-1936
New York, NY 10017
Tel.: 212-963-9900
Fax: 212-963-2147
E-mail: gaigbe-togbe@un.org

Ms. Clare Menozzi
Population Affairs Officer
Population Policy Section
2 United Nations Plaza, Room DC2-1938
New York, NY 10017
United States of America
Tel.: 212-963-4985
Fax: 212-963-2147
E-mail: menozzi@un.org

Mr. Francois Pelletier
Chief
Mortality Section
2 United Nations Plaza, Room DC2-1988
New York, NY 10017
United States of America
Tel.: 212-963-3213
Fax: 212-963-2147
E-mail: pelletierf@un.org

Division for the Advancement of Women (DAW)

Ms. Sharon Taylor
2 United Nations Plaza, Room DC2-1250
New York, NY 10017
United States of America
E-mail: taylors@un.org

Statistics Division

Mr. Jean-Michel Durr
Chief
Demographic Statistics Section
UN Statistics Division
2 United Nations Plaza, DC2-1556
New York, NY 10017
Tel.: 917-367-9165
Fax: 212-963-1940
E-mail: durr@un.org

Ms. Erlinda Go
Statistician
Social and Housing Statistics Section
2 United Nations Plaza, Room DC2-1550
New York, NY 10017
United States of America
Tel.: 212-963 4507
Fax: 212-963-1940
E-mail: go@un.org

Other Organizations

Columbia University

Ms. Sally Findley
Professor
Columbia University Population Center
Mailman School of Public Health
60 Haven Ave., B-2
New York, NY 10032
United States of America
Tel.: 212-304-5790
E-mail: sef5@columbia.edu

CUNY Institute for Demographic Research

Mr. Neil Bennett
Professor
National Bureau of Economic Research
Box D-901, One Bernard Baruch Way
New York, NY 10010
United States of America
Tel.: 646-660-6779
Fax: 646-660-6784
E-mail: neil_bennett@baruch.cuny.edu

International Organization for Migration (IOM)

Ms. Briana Gilmore
Advisor
120 East 42nd Street, Ste. 1610
New York, NY 10168
Tel.: 860-466-0747

Media Global

Ms. Sarah Long
30 Park Avenue, No. 146
New York, NY 10016
Tel.: 617-955-0995
E-mail: selong@mac.com

The Rockefeller Foundation

Ms. Anna Brown
Research Associate
420 Fifth Avenue
New York, NY 10018
United States of America

Ms. Claudia Juech
Managing Director for Research
420 Fifth Avenue
New York, NY 10018
United States of America
Tel.: 212-852-8313
E-mail: cjuech@rockfound.org

Ms. Cristina Rumbaitis del Rio
Senior Research Associate
Climate Change Team
420 Fifth Avenue
New York, NY 10018
United States of America
Tel.: 212-852-8459
E-mail: crumbaitisdelrio@rockfound.org

Social Science Research Council

Mr. Josh DeWind
Program Director
Migration Program
810 Seventh Avenue
New York, NY 10019
United States of America
Tel.: 212-377-2700
Fax: 212-377-2727
E-mail: dewind@ssrc.org

United States Census Bureau

Mr. Peter O. Way
Chief
International Programs Center
Rm. HQ 5H087
Washington, DC 20233
United States of America
Tel.: 301-763-1390
E-mail: pway@census.gov

William J. Clinton Foundation

Mr. David McCann
Clinton Climate Initiative
220 East 42nd St.
New York, NY 10017
United States of America
Tel.: 212-348-8882
Fax: 212-348-5147
E-mail: dmccann@clintonfoundation.org

Government Representatives

Permanent Observer Mission of the Holy See to the United Nations

Ms. Lisa Harper
Expert
25 East 39th Street
New York, NY 10016
E-mail: lisa.p.harper@gmail.com

Permanent Mission of the Republic of Indonesia to the United Nations

Ms. Kartika Handaruningrum
3rd Secretary
325 East 38th Street
New York, NY 10017
Tel.: 917-295-0306

The Permanent Mission of Japan to the United Nations

Mr. Kenju Murakami
First Secretary
866 United Nations Plaza, 2nd Floor
New York, NY 10017
Tel.: 212-223-4300
E-mail: kenju-murakami@un-japan.org

PART TWO

CONTRIBUTED PAPERS

PREPARING FOR SUSTAINABLE URBAN GROWTH IN DEVELOPING AREAS

George Martine, Núcleo de Estudos Urbanos/Universidade de Brasília, Brazil

A. INTRODUCTION

The social and environmental significance of upcoming urban growth still receives insufficient attention. All urban growth that has occurred since the founding of the first towns in Mesopotamia can be expected to double in the next 40 to 50 years. Practically all of this growth will take place in countries that concentrate most of the world's poverty. These are also countries that are striving to compete in the globalised economy by emulating the economic processes of the industrialised nations, with worrying social and environmental consequences. Africa and Asia alone will experience four-fifths of all urban growth in the world between 2000 and 2030; as a result, their combined urban population will double from 1.7 to 3.4 billion in the interim (United Nations, 2006a).

The social and environmental contours of future urban growth will be critical in humankind's future. The ongoing urban transition provides important opportunities for reducing poverty and enhancing sustainability. Within this framework, one specific issue that will have an important impact on sustainability, and that is very much in need of explicit orientation, is the urban use of territorial space. This paper, after briefly summarising the historical context within which the second-half urbanization is taking place, will focus on two sets of aspects that affect the sustainable use of urban space: the importance for sustainability of meeting the land and housing needs of the poor; and, the process of converting "rural" land to "urban" uses. A concluding section will discuss some of the policy implications of these different facets of the sustainable use of urban space.

B. TELESCOPING TIME AND THE CHALLENGES FOR SUSTAINABILITY

Historical time is being compressed in several dimensions, with enormous consequences for development and sustainability in developing countries. Social processes that took centuries in the now industrialised countries are not only being condensed into a few decades in developing countries, but are interacting among themselves in novel ways. Moreover, the gradual socio-economic changes that underlay or trigger those processes in developed countries are being bypassed in developing regions through technological innovations and other factors.

Several contrasting approaches have been developed by economists to describe the environmental transitions undergone by cities. The Environmental Kuznets Curve popularized by the World Bank (1992) and by Lomborg (2001), among others, suggested that environmental problems first got worse, and then improved as incomes rose. Major urban environmental problems, in this framework, would be best resolved by further industrialisation and economic growth, according to the win-win argument famously emphasised by the World Bank (1992).

The urban environmental transition theory (McGranahan et al., 2001) questioned this optimistic view and indicated that distinct environmental challenges arise at different stages of development, and that some of these challenges do not follow the Kuznets curve. It suggested that, as cities become wealthier, their environmental impacts shift in nature from localized and immediate health issues to globalised and delayed threats to ecosystems. Marcotullio (2005) built on this model and introduced the notion of "time-space telescoping" in order to help distinguish differences in urban environmental conditions and their transitional phases between now developed and developing cities. Over time, the urban environmental priorities of developed countries have gone from brown issues (waste disposal and

water quality) to gray issues (air and chemical pollutants) and on to green issues (sustainability). However, under the influence of globalization, many developing countries are experiencing this whole set of environmental issues simultaneously (McGranahan et al., 2001; Marcotullio, 2005; Solecki, Feng and Yu, 2005, p. 4).

In the population field, the best-known example of a major social transformation being telescoped in time is that of the so-called "demographic transition," whereby people live longer and families become smaller as countries move from high to low fertility and mortality rates. The time that this process took is measured in centuries in developed countries, but in decades in many developing countries. The case of Iran, which recently experienced a decline of 64 per cent in its Total Fertility Rate in little more than a decade (Vahidnia, 2007) is an extreme but meaningful illustration. Yet, while developing countries now worry about decreasing population growth, demographic inertia ensures that Asia and Africa will end up with population dimensions that are unimaginable for developed regions.

Less well known, but perhaps even more significant, is the urban transition, wherein countries move from being primarily rural and agricultural to primarily urban. Again, this transition is being achieved in developing countries over a much shorter period of time, despite involving much greater population volumes than was the case in the industrialized countries. Many Latin American countries accomplished this transition in a few decades, even while experiencing their fastest population growth ever.

It is critical that these three processes – environmental change, population growth and urbanization – are being compressed in developing countries within a historical context that is being simultaneously and differentially moulded by the forces of globalization and decentralization. The simultaneity of these historical changes constitutes what could be characterized as the foremost sustainability nexus of the 21st century.

Within the current globalised development scenario, many rapidly growing poor and developing countries are trying desperately to move out of poverty and, ultimately, to imitate the production and consumption patterns of the industrialized world, while also undergoing rapid urbanization. The expansion of private automobile use in some countries, for instance, is also telescoping, into a few years, the absolute rise in car use that took almost a century in developed countries. More generally, given their much larger population sizes, even the modest achievement of developing countries' economic goals, under today's development/environment tensions, could have unforeseen and possibly disastrous consequences.

At the same time, dramatic increases in municipal authority, derived from political and fiscal decentralization, have had two simultaneous effects. First, they have helped to greatly reduce the influence of central governments in deciding where and how economic and demographic growth should occur. Secondly, in combination with globalization, decentralization has provided cities, particularly smaller cities, with exciting new opportunities to manage their own economic destiny. It is not entirely clear how this will affect the trajectory of environmental responsibility, but it is certainly pertinent that smaller cities still constitute more than half of the world's urban population (UNFPA, 2007).

Environmentalists have generally taken a dim view of urbanization and city growth. At its inception, the modern environmental movement focused its attention on the preservation of nature and, consequently, on rural areas. Thus, it was logical that cities be viewed primarily as the locus of the critical environmental problems generated by the production and consumption patterns of modern civilisation. Although this link between cities and their ecological footprint has undoubtedly been magnified over time, it is increasingly obvious that this is not because cities concentrate population, but because they are

the sites in which "modern civilisation" is evolving – for good and for bad – and because they concentrate most affluent consumers.

More importantly, recent years have witnessed a turnaround in environmental thinking, based on the recognition of the potential advantages that cities possess in terms of addressing critical environmental issues, as well as in reducing population growth in developing countries – in addition to their increasingly obvious advantages in promoting economic development. More and more, cities are seen as a potential solution, rather than as a problem, IF a more proactive stance is taken toward urban growth (UNFPA, 2007). As stated by the World Bank when announcing a new pro-urban strategy: "Urban development can have both positive and negative implications for the environment, just as for social welfare and the economy. The balance depends on how it is managed" (World Bank, 2000, p. 39).

Cities can indeed be considered as the site in which the main economic, demographic, social and environmental issues of the future will play out. The way these different dimensions are interacting in today's cities has, deservedly, been receiving increased attention.[1] However, what has not received nearly enough attention is the magnitude of *future* urban growth and its probable ecological implications. World attention is focused primarily on ongoing processes in existing towns and cities. But these represent only the better known half of the equation in the trajectory of urban sustainability. Indeed, dealing with current issues may be relatively simple, compared to the challenges still to come in the context of globalised development expectations and consumption aspirations, given the dimensions and characteristics of upcoming urban growth.

Current projections would indicate that all the urban growth that occurred in the history of humankind until the beginning of the 21st century will double in some 40 to 50 years. The environmental consequences of this upsurge are critical since most of this expected growth will occur in the world's poorest countries. For instance, 80 per cent of urban growth between 2000 and 2030 is expected to occur in Africa and Asia alone. Current approaches and policies often overlook the innate differences of varying development trajectories for urban environmental management. For instance, discussions of the linkages between urbanization and climate change are wont to lump cities into a single package when discussing mitigation and adaptation challenges, overlooking the enormous implications of massive urban growth in the context of poverty.

This paper focuses on one of the critical environmental problems linked to population growth in urban areas of the developing world – the sustainable use of urban space. The main intention here is to try to get a better handle on the significance of different urban growth patterns for sustainability and, on this basis, to examine policy options for countries undergoing massive urban growth. This leads us to focus on two main questions: the environmental implications of dealing effectively or ineffectively with the land and housing needs of the poor, and the magnitude and significance of "rural" land conversion to urban use. This second issue, in turn, brings several interrelated topics into focus: the size of the urban blot; the location of urban growth by ecosystem; the relative importance of urban sprawl versus other urban forms; and, the relative significance of transportation modes for longer-term sustainability. The concluding section will examine policy options for rapidly urbanizing countries in terms of what can be done to reduce the negative consequences and maximize the potentialities of upcoming urban growth, especially in smaller cities.

C. The Importance of Meeting the Land and Housing Needs of the Urban Poor

The largest social category in the towns and cities of developing countries is often overlooked in the planning of urban space. Poor people represent anywhere from one-quarter to three-quarters of the urban population in those locations, depending on the region and on the way poverty levels are calculated. According to UN Habitat's latest exercise, developing world slums contained 933,000 inhabitants (UN

Habitat, 2006, p. 16). This is equivalent to 41 per cent of the estimated urban population of less developed countries in 2005 (United Nations, 2006a). The proportion of slum dwellers is largest exactly in some of the sub-regions that are expected to experience the most substantial absolute urban growth in coming decades. Thus, 72 per cent of urban populations in sub-Saharan Africa and 57 per cent of those in Southern Asia are slum dwellers.[2]

Similarly, *urban growth* in developing countries tends to be made up in large part of poor people (UNFPA, 2007). The new urbanites – those who will double the urban population of Asia and Africa in the 2000-2030 period – will be made up, to an even larger extent, of poor people. This is because, on the one hand, rural-urban migrants upon arrival tend to have somewhat lower average socio-economic levels than the native urban population; on the other, since poor people have higher rates of natural increase, their relative contribution to urban growth tends to be higher than their present share of the urban population.

Yet, despite their overrepresentation in existing urban areas and their even greater contribution to future growth, the presence of poor people seems to go largely unacknowledged in the formulation of city plans in developing countries. Seldom are the needs of these people contemplated realistically and explicitly. On the contrary, to the extent that they are planned, cities are largely configured and redefined basically in accordance with the political influences of real estate capital, with large-scale infrastructure designed to fit the needs of economic activity, and in keeping with the demands and preferences of middle and upper-income groups.

Thus, the real and crucial contributions of the poor to the economic life of the city tend to be overlooked, and the poor tend to enter the picture only as a source of problems. In particular, their habitats are seen as eyesores and hindrances that policymakers wish would somehow disappear. Since governments will generally not service areas where land rights are unclear, informal settlements are rarely provided, especially during their formative years, with water, sanitation, transport, electricity or basic social services. Frequently, the pattern of occupation in informal settlements is haphazard and asymmetrical, making it difficult to provide vehicular transportation, or other types of services.

It will be argued here that such difficulties not only exacerbate the miserable conditions of the poor in urban areas, but ultimately have an impact on the quality of life and sustainability of the entire city. Nowhere is the neglect of the poor more blatant, and its broader repercussions more detrimental, than in the area of housing. Disregard for the needs of the poor for land and housing makes them fend for themselves as best they can; this generally means that their quest for housing, infrastructure and services is not only a constant struggle, but one that affects the entire range of urban dwellers in various ways.

As has been pointed out repeatedly by analysts, the problems of most informal settlements are already determined by the way they come to life (Serra, 2003). Lack of access to land, for example, predetermines difficulties of access to shelter. This unnecessarily accentuates human misery and is the starting point for a vicious circle of poverty. The poor live in environments that typically concentrate hazards and lack minimal access to clean water for drinking, cooking, washing and bathing, as well as to serviceable toilets and garbage collection. These conditions increase the spread of disease-causing germs, frequently leading to chronic digestive tract illnesses. Crowded environments help promote such contact-related diseases as measles and tuberculosis, in addition to diarrhoea. Under-nutrition due to high prices of nutritious food leads to severe child malnutrition (Stephens and Stair, 2007, p. 137). In short, a large segment of the urban population is condemned to a stultifying and unremitting wretchedness that stems, to a great extent, from the lack of minimally decent housing.

Disregard for the land and housing needs of the poor also contributes significantly to environmental degradation because it affects both ecosystem services as well as the city's ability to

responsibly and effectively plan for sustainable growth. Having little choice but to invade stigmatised or off-limits terrains, the poor sometimes occupy ecologically-fragile areas and watersheds, thereby endangering the city's water supply and other ecosystem services. Deforestation to clear spaces for housing also results in flooding. Meanwhile, the occupation of urban floodplains and wetlands not only endangers the lives and possessions of the poor, it also increases the probability of flood damages to other parts of the city. By the same token, the invasion of steep slopes and the removal of tree cover increase the probability of landslides that will not only bury the residents themselves but also spill over into roads, tunnels, streets and houses at lower levels.

The lack of access to water, sewage or solid waste management systems in informal settlements pollutes rivers and ends up affecting the appearance, air quality and health of the entire city. The health costs of dealing with these impacts are very large: "A million or more infants still die each year from diseases related to inadequate provision of water and sanitation, and hundreds of millions are debilitated by illness, pain and discomfort… It is still common for one child in ten to die before their fifth birthday in urban areas in low-income nations, with much higher mortality rates among low-income urban dwellers" (Satterthwaite and McGranahan, 2007, p. 27). In addition to direct impacts on the health of poor people, the number of hours lost due to illness has severe consequences, both for the overall productivity of the labour force and for household income.

The sprawling haphazard settlement patterns that typify the invasion of urban lands by poor people also make it much more difficult to put basic infrastructure into place, including roads and pathways that would facilitate the free movement of residents. The sprinkling of such settlements throughout the city also creates hurdles for the design of effective mass transportation and increases the costs of implementing it. Continually adjusted improvisations that ineffectually attempt to accommodate the increasing flow of people and vehicles (and sometimes animals) through narrow winding streets that bypass these sprawling settlements, not only consume enormous resources, but also contribute to energy waste and pollution.

Perhaps even more telling in today's context of globalised economic competition is the fact that the lack of attention to the land and housing needs of the poor is ultimately bad for business; in a classic vicious circle, it helps to trigger a series of perverse effects that ultimately affect the very ability of a city to be competitive and thus to pursue economic and social development. For instance, it disorganizes the functioning of land markets, pushes up land prices, and increases the difficulties of providing infrastructure and services (Smolka and Larangeira, 2008). In turn, this affects the ability of the city to attract investments, to create jobs and to generate a better financial base for implementing improvements in the city.

In the context of globalization cum decentralization, cities have to generate a favourable business climate that stimulates private and public sector investment in order to generate jobs and improve the tax base. Good governance, level of corruption, quality of infrastructure, good transport and communications, level of access to services and urban amenities, expenditures on health and education, infant mortality rates, an institutional milieu that reflects respect for individual rights, the absence of violence, the effort to meet international standards for waste disposal, air quality and green space per capita are all valuable assets in attracting investments (Campbell 2003; World Bank, 2006). Lack of attention to the housing needs of the poor tends to have negative effects on each of these factors.

In short, attending to the land and housing needs of the urban poor not only has a direct impact on the reduction of poverty but also affects the city's viability and sustainability. Having secure access to a home that can gradually be improved over time is the starting point for poor urban people to gain access to what a city has to offer. Moreover, ensuring that poor people have the possibility of attaining decent living conditions can also be critical in improving the quality of life of the entire city. This affects both

the city's environmental conditions and its economic dynamism. Reducing urban poverty and environmental degradation makes the city more habitable for the entire population. In this light, attending to the housing needs of the poor helps to promote the conditions for urban environmental well-being – an effective win/win situation.

Overall, the prospects for cities and for their inhabitants in developing areas would be greatly improved if national and local governments took proactive steps to deal with the land and housing needs of the growing contingents of the urban poor. Admittedly, adopting such initiatives is never easy: it goes against the grain of both the increasingly prevalent anti-urban policies,[3] as well as the vested interests of strong local power structures that often congregate politicians, administrators, real estate agents and other speculators who benefit from informal urban land markets. Whatever the nature of these difficulties, sustainability will require that, at a minimum, the land and housing needs of the poor be given priority attention in rapidly growing urban areas.

D. The Expansion of Urban Space – Just How Big and How Bad is It?

One of the most common environmental criticisms directed at cities is that they occupy and destroy an enormous area of precious land. Such broad condemnations evidently merit qualification. To this end, we will examine here several aspects of the size, location, density, environmental characteristics and social organization of the total land area under urban use, with emphasis on their significance for future urban growth.

1. The size of the urban blot

Recent years have given us much improved estimates on the dimensions of the Earth's land area that is covered by urban localities. These new sets of global databases on urban population and extent combine census data, satellite imagery and different methods of analysis in an integrated geospatial framework. Two of the best known recent studies based on such technologies can, for purposes of this paper, be taken as the upper and lower limits of the current size of the area currently occupied by urban localities.

The Global Rural Urban Mapping Project (GRUMP) is a widely-acclaimed multi-institutional and multi-year effort to construct an improved population and consistent database of urban areas (CIESIN, 2007). Its best estimate is that urban localities occupied, in the year 2000, a land area of 3,673,155 km². This would correspond to about 2.8 per cent of the Earth's total land area, equivalent to less than half of Australia's total land area. These figures, used as basis for the Millennium Assessment, have been debated at length by specialists, and it is fair to state that they constitute the upper limit of current estimates.

On the other hand, the low estimate can be taken from a recent study commissioned by The World Bank (Angel et al., 2005). This focused only on cities having more than 100,000 persons and, within them, *only on their built-up areas* (excluding green areas and other interstitial spaces). Using a sample of 120 cities worldwide, Angel et al. estimated that cities of 100,000 or more inhabitants contained 2.3 billion of the estimated 2.84 billion urban inhabitants in the year 2000. These urban inhabitants used up a total built-up space of 400,000 km² worldwide, equivalent to 0.3 per cent of the Earth's land area.

Assuming that the total urban population living in urban localities having less than 100,000 inhabitants (540 million) had an average density of 6,000 persons per square kilometer,[4] they would occupy another 90,000 km². Under such assumptions, the total land area in urban localities would amount

to 490,000 km² (400,000 + 90,000), or an area slightly smaller than Spain and less than half of one per cent of the Earth's total land area.

In short, in 2000, approximately half of the Earth's population occupied an area equivalent to between 0.4 and 2.8 per cent of the Earth's surface, depending on how it is measured. For present purposes, the exact figure is not an issue here since any number within this range does not, in itself, represent a critical threat to the Earth's sustainability. That is, the magnitude of the land area currently occupied for urban purposes, *per se,* does not seem to be a problem at the global level. Moreover, these numbers have to be put into perspective. For instance, the annual acreage given over to urban use is much smaller than the natural lands that are lost every year to agricultural activities, forestry and grazing. It is also much smaller than the amount of prime farmland that is lost annually to erosion or salinization: the issue may thus be more the *type* of land that is being lost than the absolute scale of the loss (World Resources Institute 1997, p. 32).

Although human settlements have so far taken up a relatively small fraction of the Earth's surface area, their specific spatial location can still exert significant environmental and socio-economic consequences. Another source of concern relates to how this occupation of the Earth's land surface by towns and cities will evolve with urban population doubling. Depending on their future spatial growth patterns, urban localities could expand drastically in coming years, both in dimension and in their occupation of inappropriate areas in coming years. Such observations put our spotlight on two related issues: the decreasing density of cities and the significance of urban growth in different types of ecosystems.

2. Decreasing densities and expanding perimeters

The aforementioned World Bank study (Angel et al., 2005) provides concrete evidence that urban land areas are growing faster than ever, not only because of their increase in absolute numbers of people, but also because their average density (that is, the number of inhabitants per square kilometre) is being progressively reduced. This study, based on the actual built-up areas of towns and cities, rather than on administratively-defined areas, observes that urban density has been declining for the past 200 years, but finds that the reduction has been particularly rapid in recent years (Angel, 2006). This tendency towards declining density, combined with unprecedented absolute increases in the urban population, could greatly expand the land area of cities in the future.

As indicated earlier, according to this study, the total built-up area of cities having at least 100,000 people presently occupies a total of about 400,000 km² – half of this in the developing world (Angel et al., 2005, pp. 1-2). Cities in developing countries have many more people, but they occupy less space per inhabitant. In both developing and industrialized countries, average densities of cities have been declining quickly: at an annual rate of 1.7 per cent over the last decade in developing countries, and of 2.2 per cent in industrialized countries (Angel et al., 2005, pp. 1-2).

Should the recent rate of decreasing density persist, the land occupied by cities having 100,000 people or more will increase by a factor of 2.75 between 2000 and 2030. If current patterns continue, every new resident in developing countries will convert, on average, some 160 square meters of non-urban to urban land. The combination of absolute increases in urban population with this rate of density reduction is expected to *triple* the built-up land area of cities of 100,000 or more inhabitants in developing countries to 600,000 km² during the first three decades of this century (Angel et al., 2005, pp. 1-2). It should be noted that these figures reflect overall averages: both decreasing density and size of urban areas will obviously change more rapidly in those countries and cities that are undergoing more intense growth. For instance, the metropolitan area of Shanghai is expected to grow by 150 per cent, from 410km² to 1100km² in less than a decade (Martin, 2005, p. 127).

Cities in developed countries expand at an even faster rate per resident. Thus, despite their smaller population size and lower rates of population growth, cities in the industrialized world would increase their land area by 2.5 times in the 2000-2030 period, if they followed the recent pace. At that point, they will occupy some 500,000 km² and every new urbanite will convert, on average, some 500 square meters of non-urban to urban land (Angel et al., 2005, pp. 1-2).[5]

Overall, should recent trends be perpetuated, the built up land area of cities in the world would grow from 400,000 to 1,100,000 km² in only 30 years' time. But this is likely to be an understatement, for two reasons. First, it can be speculated that recent trends to decreasing density will not only continue but will, in fact, increase with globalization and with its impacts on lifestyles, aspirations and production processes, as well as with the rapid improvement and dissemination of transportation technology, especially automobile transport. Second, all of the above estimates, it will be remembered, relate only to the built-up areas of cities having more than 100,000 inhabitants. These contain, according to Angel et al. (2005) some 80 per cent of the world's urban population. The remaining 20 per cent will be located in smaller urban centres, where rates of growth tend to be higher.

In short, the land areas appropriated by towns and cities can be expected to increase at an ever faster rate. No matter where one stands on the "urban sprawl" versus "compact city" controversy (discussed below), one cannot avoid observing that cities are, in fact, sprawling. However, in developing countries – which again are the main area of interest of this paper – urban sprawl today is much more than just suburban residential development caused by changing values and lifestyles. Peri-urbanization (or the non-contiguous and patchwork form of urban expansion and leapfrog development, related to land speculation, to changing production modalities and to the spread of automobile transportation) may be the dominant form of urban expansion today.

Land speculation raises the price of land to a level that is considered too high for those needing land for actual use. Thus, when many speculators are sitting on land and waiting for higher prices, it obliges those who actually need land for residential or productive activity to skip around them and to obtain land farther and farther away from the city (Tacoli et al., 2008). The prospects of rapid urban growth themselves tend to favour more speculation. This can be adduced as a major cause of urban sprawl and peri-urban growth.

Moreover, the form and site of urban economic activity have been altered by advances in telecommunications, transportation and production technologies. The benefits of agglomeration can be eroded by information technologies and by transportation networks that also foster economies of scale in production and distribution networks and favour large facilities that consume large tracts of land. All of these factors can be expected to help deconcentrate firms away from the central city (Irwin, 2004).

The spread of these advances through globalization have favoured de-concentration and decentralization of production at greater distances from the centre of cities throughout the world. The end result is that, the world over, the urban blot is growing considerably faster than the number of people. Where and how this new land is incorporated into the urban makeup could have a huge impact on the social and environmental well-being of future populations, as discussed in the next section. Unfortunately, very little attention has been paid to this problem in developing countries where most future growth will occur (Angel et al., 2005).

3. Location of urban areas by ecosystem

The basic environmental concern with the conversion of rural land to urban use is that urban growth often involves the appropriation of some of the best agricultural land in the country, and/or that it

invades ecologically-fragile areas. This contention would seem validated, at least in preliminary form, by recent research that classifies urban localities according to the ecosystem in which they are situated.[6] As shown below, both ecologically-fragile coastal areas and regions under cultivation are likely to have a higher proportion of urban settlements than other systems.

Throughout history, people have favoured city-building in coastal areas to take advantage of a ready food supply, easy access to transportation, and better defence opportunities. Consequently, as shown in Table 1, based on work done for the Millennium Assessment (McGranahan et al., 2005), coastal ecosystems contain a much larger proportion of all urban dwellers (14.4 per cent) and large city population (23.9 per cent) than of the world's total land area (3.2 per cent). In all continents except North America, coastal zones have the highest share of urban population of any system. The proportion of coastal land area that is occupied globally by urban localities (10.2 per cent) is almost four times larger than in the average for all ecosystems. Moreover, the coastal system has a greater proportion of its land area occupied by urban localities, a greater proportion of its inhabitants living in urban areas and a much greater urban population density than any other type of ecosystem.

What implications do such findings have for sustainability? In general, the Millennium Assessment declined to explore the differential impacts of cities across the systems they inhabit, arguing that such consequences depend considerably on local conditions (McGranahan et al., 2005, p. 802). Yet, as has been well documented, coastal areas are critical for long-term sustainability. The occupation and development of these areas can cause severe environmental damage, which in turn ends up affecting the quality of life of urban inhabitants. Urban settlements in coastal areas cause the destruction of natural habitats and consequent biodiversity loss, while also altering local and regional hydrology. Invasion of mangroves, coral reefs, seagrass beds and sand dunes destabilizes the coastline, leading to erosion or siltation, damaging infrastructure and increasing the vulnerability of local and regional populations to natural disasters while reducing resiliency to climate change and rising sea levels. Fish stocks can also be lost when important breeding and nursery areas are disturbed.

Cultivated agricultural systems also have higher than average segments of their land areas taken over by urban localities. 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. At the global level, ecosystems classified as "cultivated" in the Millennium Assessment also have almost twice the proportion of all urban dwellers as of land area (37.2 per cent and 19.3 per cent, respectively) along with 34.2 per cent of all of the planet's large city population. The proportion of its land area given over to urban sites is 2.4 times that of the average for all ecosystems.

Inland water zones have a somewhat higher proportion of their population in large urban centres while other ecosystems – such as mountain, dryland and forest ecosystems – tend to have a much smaller proportion of their land area in cities and to harbour smaller cities.

Even more pertinent for long-term sustainability is how different types of systems are likely to be affected by *future* urban growth. Since Africa and Asia are expected to account for some 80 per cent of additional growth in the 2000-2030 period, more attention needs to be focused on trends in those regions. As shown in Table 2, these two regions, despite having the lowest proportions of their total populations living in urban areas (38.3 per cent for Africa and 39.8 per cent for Asia, in 2005, according to United Nations, 2006a), already have the highest urban density in *all* system types.

Taken by itself, this information on high urban density would bode well for sustainability, since it is an indication that sprawl is much less prevalent in those two regions: in general terms, higher density helps to minimize humankind's invasion of surrounding rural land. On the other hand, it may be of some

concern that these two continents have, by far, the highest proportion of their urban populations living in coastal areas: 72 per cent for Africa and 56 per cent for Asia (McGranahan et al., 2005, p. 801). The urban density of Africa and Asia in coastal systems is three to four times higher than in industrialized regions. Inland water systems also have particularly high urban densities in Africa and Asia.

Table 3 provides additional information on the distribution of urban population by ecosystem in Asia and Africa. Essentially, it reiterates the significance of coastal towns and cities in those two regions. Coastal systems in both Africa and Asia have a considerably larger proportion of their total area in urban land, and tend to have larger cities than other systems, in addition to having greater total and urban density. Cultivated and inland water systems are also prominent on these various indicators in both regions. The significance of these findings is less clear since, as pointed out by the Millennium Assessment, urban distribution also reflects a region's basic geography and other characteristics; thus, dryland or cultivated systems only have 20 per cent of their population in urban areas, but contain more than half of Africa's urban population for the simple reason that such systems predominate in the region (McGranahan et al., 2005, p. 802).

Without minimizing the importance of past and current trends, the more important question is: what will happen to the different ecosystems with the rapid doubling of the urban populations in these two regions? What can we predict from past and current patterns for future distribution? This is still a matter for speculation. On the one hand, although past patterns do not necessarily indicate that future growth will be concentrated in the same systems as in the past, historical linkages tend to be significant. Accumulated advantages of cities, ranging from urban amenities to agglomeration economies, are generally appreciated by investors in a market economy. Moreover, the advantages of large urban areas over smaller towns and cities in total factor productivity have been well demonstrated in the literature (World Bank, 2000, p. 37). Potential migrants are also attracted to existing larger centres since these tend to be more dynamic in creating jobs.

TABLE 1 – DISTRIBUTION OF URBAN POPULATION IN SELECTED ECOSYSTEMS

Type of Ecosystem	*Per cent of Urban Dwellers in Ecosystem*	*Per cent of Total Land Area in Ecosystem*	*Per cent of Large City Population (Cities of 5+ million people)*	*Urban land as per cent of ecosystem's land area*	*Per cent of ecosystem's population in urban areas*	*Urban Population Density in Ecosystem*
Coastal	14.4	3.2	23.9	10.2	64.9	1 119
Cultivated	37.2	19.3	34.2	6.8	45.3	793
Dryland	18.7	29.2	12.7	2.1	44.9	749
Forest	7.8	20.5	6.3	2.0	35.6	478
Inland Water	15.1	14.3	18.9	3.2	51.8	826
Mountain	6.8	15.6	4.0	1.7	30.3	636
Overall	100	100	100	2.8	46.7	770

Source: Based on McGranahan et al, 2005, Tables 27.4, 27.5 and 27.6.

NOTE – The ecosystems are not mutually exclusive. Figures in columns 2, 3 and 4 thus contain duplications of population and land area. Island systems are excluded.

TABLE 2 – URBAN POPULATION DENSITY IN SELECTED ECOSYSTEMS, BY CONTINENT

Ecosystem	*Africa*	*Asia*	*Latin America*	*Oceania*	*Europe*	*North America*	*World*
Coastal	2 123	1 934	789	610	640	497	1 119
Cultivated	1 279	1 352	548	300	630	258	793
Dryland	1 200	1 034	541	159	522	265	749
Forest	997	956	685	300	387	206	478
Inland Water	1 647	1 536	655	451	604	302	826
Mountain	810	879	746	191	387	154	636
Overall	1 278	1 272	656	427	588	289	770

Source: Based on McGranahan et al, 2005, Table 27.6.
NOTE – The ecosystems are not mutually exclusive. Island systems are excluded.

Conversely, it can be contended that globalization is already shifting trade and production away from many traditional centres, favouring localities that can demonstrate market advantage. Although decentralization has advanced at variable speeds in different parts of the world, cities are now linked more directly to international markets. This has reduced the traditional market advantages of some cities and promoted others. Such changes may, in turn, induce large shifts in population distribution, including away from traditional centres (World Bank, 2000, pp. 1-2 and 34-35).

In brief, it may be difficult to predict whether inertia, or the new forces of gravitation caused by the combination of decentralization and globalization, will have greater influence on the probable evolution of urban growth patterns in those countries that have yet to undergo a significant urban transition. In itself, this apparent ambiguity might seem to allow some leeway for influencing these processes into more sustainable directions.

TABLE 3 – DISTRIBUTION OF URBAN POPULATION IN SELECTED ECOSYSTEMS, AFRICA AND ASIA, 2000

Ecosystem	*Urban land as percentage of ecosystem's land area*		*Percentage of ecosystem's population in large urban areas**		*Urban population density in ecosystem*		*Average population density in ecosystem*	
	Africa	*Asia*	*Africa*	*Asia*	*Africa*	*Asia*	*Africa*	*Asia*
Coastal	5.4	13.0	56.1	69.6	2 123	1 934	160	451
Cultivated	1.8	6.9	49.8	47.5	1 279	1 352	56	255
Dryland	0.6	3.0	50.3	41.6	1 200	1 034	18	82
Forest	0.5	2.6	25.9	39.9	997	956	23	105
Inland Water	1.2	5.0	54.6	56.7	1 647	1 536	37	185
Mountain	1.1	1.6	19.8	34.1	810	879	42	60
Overall	0.8	3.5	45.9	50.6	1 278	1 272	27	120

Source: Based on McGranahan et al, 2005, Table 27.6.
NOTE – The ecosystems are not mutually exclusive. Island systems are excluded.
* Cities of 1 million or more

4. The structure and form of urban expansion: will it matter? [7]

What implications will current trends in the form of urban expansion have for sustainability in developing countries? Given that the world's urban population is expected to double within a relatively short time, and that most of this growth will be concentrated in Africa and Asia, where environmental concerns have generally not taken precedence, it would seem advisable to try to orient this spatial growth in ways that not only avoid the invasion and destruction of prized ecological assets but that also reduce other environmental costs.

How could this be done and in what ways? If one were to suggest models of sustainability to orient the doubling of these regions' urban population, where would one look? To this day, the most voluble discussions concerning patterns and forms of city growth, and their relation to sustainability, undoubtedly come from the debate between critics of urban sprawl and their opponents, the critics of the compact city. This debate is a veritable minefield, booby-trapped with definitional problems, measurement issues, value judgments, ideological perceptions and culture-bound assumptions. Nevertheless, it cannot be ignored simply in any discussion of urban sustainability, particularly when one considers the potential impacts of different patterns of urban expansion in those regions where most urban growth is still to come.

The prototypical urban sprawl that has become the object of many environmentalists' denunciations began with a model of suburban growth spawned in the United States of America in the late 19th and early 20th century. In its initial stages, suburbanization represented a significant improvement for many central city dwellers, who moved from congested, polluted and unhealthy habitats to pleasant, country-style, clean-air environments. This model expanded rapidly and blossomed into a critical part of the ethos associated with "The American Dream" (Hogan and Ojima, 2008). After World War II, several factors helped propel the rapid proliferation of this model across American cities, including: the post-war economic boom; the ease of access to automobile ownership and to inexpensive fuels; the availability of cheap open land on urban peripheries; and, the aesthetic and cultural attraction of single-family dwellings.

Decentralization, however, was not without its problems: some of these had already been identified in the 1930s. By the 1960s, however, "urban sprawl" became the pejorative term used by many to characterize the negative environmental, social and economic implications of suburbanization. However, by that time, suburban growth had been bolstered both by policies that encouraged urban dispersal and by the expansion of decentralized commercial and service systems catering to suburbanites. Environmental awareness, and the Bruntland Report's emphasis on sustainability, greatly expanded the disparagement of "urban sprawl" in the 1980s, helping give greater credit to the notion that alternative models could be the ideal road to urban sustainability (Arbury, n.d.).

Growing concern with low-density automobile-dependent urban sprawl, and with the environmental problems it generated, thus spawned a renewed interest in the compact city model. This focused basically on intensifying the use of urban space and on increasing the role of public transportation. Compact cities would be more sustainable because they would minimize commuting, reduce energy use, air pollution, water consumption, loss of green space and vegetation, while also avoiding the squandering of biomass on paved streets, driveways and parking lots.

Quality urban design was seen as the key to sustainability. The compact city approach combined environmental objectives with concerns about the future quality of life in urban areas and with equity. In its application, the concept of the compact city borrowed from stylized images of the physical, economic, and social conditions in "traditional" patterns of human settlement prior to the industrial age: the

archetype from which they all stem is the ancient village – physically compact, economically localized, and socially self-contained (Brindley, 2003).

More recent offshoots of the compact city approach and its emphasis on urban design as the key to sustainability have materialized through the models of "New Urbanism" (United States of America), "Smart Growth" (USA), "Urban Renaissance" (United Kingdom) and *"Machizukuri*" (Japan), and through various "healthy community" movements. Although each has specific ideas about how cities ought to develop, all these schools have their roots in the same normative ideals that were founded on the notion that urban sprawl damages the environment, sacrifices natural areas and farmland for development, wastes energy and other resources, creates traffic congestion, and in other ways lowers the quality of life (Holcombe, 2004).

The general formula to counteract sprawl in these models includes at least some of the following: compact form, high density, mixed use, intensification of public transportation, greater pedestrian and bicycle transit, utilisation of interstitial spaces, protection of natural ecosystems, revitalization of downtown areas, reduction of the amount of land affected by roads and parking lots, increased social and economic interactions and more efficient utility and infrastructure provision. During the early 1990s, various compact city policies were enthusiastically implemented throughout Europe, particularly in the United Kingdom (Arbury, n.d.).

The actual implementation of the compact city approach has been quite heterogeneous and, in the process, the model has acquired operational fuzziness. In retrospect, it has become clearer that the potential of the compact city to meet its objectives is dependent not only on the form it actually takes as a result of drawing-board designing efforts, but also on political structures, societal values, and the general preparedness of the society. There seems to be some consensus that the cities which best support the promotion of equity are those with a large proportion of high-density housing and a large quantity of locally-provided services and facilities. In the end, however, the way compactness benefits individual aspects of social equity varies, depending very much on prevailing societal values (Burton, 2003).

Overall, critics of the compact city model question whether intensification can deliver on its promises of a more sustainable urban future and whether it is acceptable to the general public (Arbury, n.d.). Some of the key points made by critics of the compact city include the following:

- All told, the results of compact city innovations have not lived up to expectations. Their claimed benefits are more ideal than real;
- Neither sustainability nor equity can be achieved through formal designs, especially those coming from the master plans of drawing board planners;
- Compact-city strategies have lost touch with a spatial reality: polycentric urban regions and not compact cities have actually become the dominant form of urbanization in Northwest Europe;
- Compact city policies are anti-democratic, certainly anti-urban, infringe on personal freedom, frustrate consumer choice, and promote homogeneity;
- Compact cities drive up the price of land and housing due to higher design, construction and common-area infrastructure costs;
- The desire to maximize density can lead to layouts that lack privacy and that present an unusual appearance that is disliked by residents;

- The models go against the grain of market forces;

- Compactness has a limited and tenuous relationship with social equity; and

- Compact cities fail to deliver what people really want: a single family dwelling on a large lot, with good automobile access to facilities.

As is evident from the foregoing brief and admittedly selective summary, the sprawl versus compact debate is politically loaded and unlikely to be resolved via academic debate, particularly so since basic methodological problems still haunt the field. What constitutes "urban sprawl" is the object of infinite discussion; not only are ideological issues rampant but the very notion of what constitutes an "urban" area, or how "sprawl" is to be measured, are still being debated. The definition of a "compact city," though somewhat less diversified, is also subject to different interpretations.

Nevertheless, criticism of the compact city approach, though at times culture-bound and variably ideological is, at least in part, based on correct assessments of the assumptions and shortcomings of this model. At the same time, most critics of the compact city models evidently stop short of defending sprawl *per* se. The declining density of cities – associated with sprawl, as well as increased commuting and, thus, greater energy use and air pollution, loss of green space, increased water consumption and squandering of biomass – is markedly difficult to defend.

More importantly, in reviewing this debate, it would seem that the critics of the compact city approach offer little by way of alternatives – particularly not for rapidly urbanizing developing countries. Neuman (2005), one of the most thorough and articulate critics of the various compact city models, supports the proposals made by Leatherbarrow and Durack (2001, pp. 67-68) for "open, indeterminate planning." This supposedly confers four advantages: "First, it supports cultural diversity. Second, it tolerates and values topographic, social, and economic discontinuities. Third, this type of planning invites ongoing citizen participation. Finally, it responds to the state of continuous adaptation, common to all living organisms and systems, including human settlements" (Neuman, 2005, p. 14).

The "advantages" cited in this proposal (cultural diversity, valuation of discontinuities, citizen participation and adaptation) are undisputedly desirable components of any urban planning system. The puzzling query, however, is – why would a rather vague "open and indeterminate" planning system be expected to produce such positive results and what environmental criteria and procedures therein will guide city growth?

Overall, the key issue may not be so much the choice between sprawl and compact as the sustainability of a given urban configuration. For instance, Neuman (2005, p. 16) reviews the case for identifying compact cities with sustainability and concludes – correctly it would appear – that "... conceiving the city in terms of form is neither necessary nor sufficient to achieve the goals ascribed to the compact city." Less convincingly, Neuman (following Kostoff), ultimately places all his chips on the primacy of "process" over form. According to this, sustainability is a process of people adapting to and changing a city over time (Neuman, 2005). It is not entirely clear whether process is understood therein as a dialogue among social groups, or as simply letting "market forces" take their course, as recommended by Holcombe (2004).

A longer-term evolutionary (laissez-faire) approach is obviously a perfect foil to the "master designer" conception attributed to compact city developments. Moreover, it may be more justifiable to let natural processes evolve in older and slow-growing cities of the developed world, wherein citizens have a historical sense of the needs, problems and advantages derived from their city's structure, form and

operation. Even there, however, if one takes a longer-term evolutionary perspective, the compact city models, despite some undeniable errors in their assumptions, could conceivably be viewed as part of the process that will eventually help promote sustainability by emphasizing the disadvantages of sprawl!

Be that as it may, the discussion has to take a different turn when discussing upcoming urban growth in developing countries. Despite its domination of the literature, most of the sprawl versus compact city debate is highly ethnocentric in its focus: it centres almost exclusively on the urban issues of industrialised countries. There, lifestyles and consumption patterns are marked by easy access to automobiles and even by subsidized fossil fuel prices. Obviously, this discussion loses a lot of its meaning in contexts where a large part of urban growth is made up of poor people who do not have even the remotest chance of access to automobile transportation.

Yet, even in the framework of developed countries, the outcomes of evolutionary processes are not necessarily "good," or permanently "good." For instance, sprawl itself is evidently the result of process. In turn, this sprawl may eventually be reduced through "natural" processes, such as increased gasoline prices or physical limitations on expansion. For instance, it is highly revealing that even Los Angeles, the acknowledged "mother of all sprawl cities," may soon become notorious as the birthplace of the post-suburban city (Cuff, 2007, p. 86). Faced with prospects of expanding population growth and limitations on land, water and commuting viability, "sprawl has hit the wall" in Los Angeles: outward growth has slowed and interior gaps in the city fabric are being plugged as neighbourhoods fill in and grow denser (Cuff, 2007, pp. 86-87).

Leaving the destiny of rapidly growing cities of poor countries to evolutionary processes does not appear to be a promising path, especially in view of the fact that the lifestyles and preferences of the ruling elites are likely to follow the consumer patterns of industrialised societies. Rapidly growing and poor developing country cities may not have the luxury of sitting around and waiting for such things as sprawl to sort themselves out and to eventually become sustainable. Too much social and environmental damage is likely to take place before that happens. On the other hand, it is true that few technocratic master plans have had much success in effectively harnessing rapid growth in developing country cities. What is the answer?

The solution would appear to lie on two levels. Firstly, planning is increasingly essential, but a different sort is needed: planning that is non-technocratic and reflects basic values that are consensually defined by all participants and not just the viewpoints of architect-planners and engineers (or other less-influential categories such as demographers). It must be founded on special and genuine efforts to incorporate the perspectives and aspirations of the poor majority. Whatever the results of this participatory approach, it must be more open-ended, continually revised on the basis of consensual values so as to reflect changing realities and the challenges of growth. New approaches to "strategic planning," that incorporate uncertainty and provide for regular and systematic revision, aim to foster a planning process which is participatory, seeks to proceed on the basis of goals and values, but whose concrete interventions are regularly updated.

Secondly, such plans must reflect an environmental, rather than a formal approach to city growth. The outlines of this orientation are suggested by McGranahan – "… Sprawl is almost always a symptom of environmentally negligent development, but the solution is not necessarily to strive for compact settlement. Rather, the response should be to take environmental concerns seriously in planning, taxing, etc. This may well yield more compact settlement, but might also yield other more environmentally sustainable forms. For example, higher gasoline taxes, more investment in public transportation and road pricing could be justified not as a means of achieving compact settlement, but as a way of limiting environmentally damaging transportation. The effects may be compact settlement, but if the result is some multi-nucleated low-transport settlement that doesn't fit the definition of compact, is that necessarily a

problem? Similarly, is it not possible that ecologically-informed development restrictions can create more green spaces and more ecological service production within urban settlements, and contribute to sustainability, but also make the settlement less compact?" [8]

So far, the noise level of the debate between sprawl and compact has mostly precluded the type of discussion suggested by McGranahan. Moreover, it has largely drowned out some really basic issues that do urgently need to be taken into consideration when the prospect of urban doubling in Africa and Asia is under the microscope.

Although it is generally recognized that the American form of suburban development is spreading to many cities throughout the world (Hogan and Ojima, 2008), it is only part of a much larger set of problems plaguing the growing cities of the developing world. Decreasing urban densities today are not primarily the product of residential preferences but, especially in developing countries, they are increasingly linked to a combination of factors that include the mobility of globalize economic activity, heightened speculation in land, lack of administrative controls and an overriding under-valuation of environmental assets.

Suburbanization in the classical North American mode affects only a small segment of the developing world's population. Developing country cities are constituted, by and large, of poor people whose primary aspirations revolve around minimal housing and access to jobs and incomes that will permit them to survive and slowly improve their housing and living standards. The house and car on a big lot that constitute "what people really want," according to some critics of the compact city, can only be attained by a small minority and represents a mere fantasy for the great majority of the urban population in developing countries. Yet, the tragedy is that the aspirations of the minority tend to dominate city planning and the allocation of resources within the burgeoning cities of developing countries.

The escalating prevalence of automobile use is one clear instance of the inappropriate, inequitable and unsustainable patterns that are dominating urban growth. It is an issue that has already received considerable interest in the literature, but it still deserves greater attention in the context of urban doubling in Asia and Africa. Most of the sprawl versus compact city debate ultimately appears to have limited relevance to these two regions. The possibility that densely populated countries will find room and resources to build freeways *a la* Los Angeles seems remote. Nevertheless, the issue of transportation and the use of the automobile are critical in developing countries, as discussed in the next section.

5. Car transportation, sprawl and equity

From a reading of the above sections, it would seem fairly evident that issues of transportation are at the root of many discussions of urban sprawl and urban density. Automobile use is both a cause and a consequence of sprawl in many countries and innate values pertaining to the realm of "the right to an individual car" seem to be at the core of many anti-compact arguments. Perhaps less evident, but even more important, is the role of transportation in equity, particularly in developing countries.

The role of automobile transportation in urban sprawl has been well documented in the case of North American, Australian and New Zealand cities (Arbury, n.d.). But there is considerable diversity in its impact elsewhere. For instance, in Western Europe and Japan, where urban growth is minimal, suburbanization and auto-cantered transport systems have been associated with higher population densities and multi-modal transportation systems (Martin, 2005, p. 125). However, the role of the automobile in developing countries tends to be much more damaging, both because of its social impacts and because of its detrimental effects on the development of public transport systems.

For developing countries faced with rapid expansion of their urban population, it would seem that the pattern of automobile-based dispersion is extremely inefficient. Yet, though automobile transportation is accessible to only a small portion of the population, it appears to be prioritized in the transportation plans, processes and road-building activities of a wide variety of places, such as Bangkok, Shanghai, Panama City and Santiago.

Cars are among the most desirable objects of consumption available on the global market and a symbol of success for the upwardly mobile. Their number has increased from 200 million worldwide in 1970 to 850 million in 2006 (Newman and Kenworthy, 2007, p. 67). Meanwhile, car production and consumption has spread quickly throughout the world, with China showing the fastest increases. The automobile industry is heavily marketed and lobbied and has enormous clout everywhere, due to its widespread forward and backward linkages on economic activity and employment.

The power elites and the better-off categories of consumers in all developing countries tend to prefer and demand access to automobile transport, leading to a prioritization of private automobile feasibility in government policies. Such priorities generally lead to car-centred transport systems, to the detriment of other forms of transit and public transportation systems.

The multiplication of private car use leads to congestion and reduced efficacy. The usual response to traffic congestion, road accidents, pollution and energy costs is to build more road capacity for automobiles, at enormous cost and with further perverse effects on public transportation and other forms of transit. Such approaches, borrowed from the lexicon of urban planning in developed countries and from the priorities of transportation engineers, are doomed to exacerbate environmental degradation and social inequity, while also impairing economic growth in poorer countries.

From an economic standpoint, since the priority accorded to car transportation directly affects the efficacy of public transport systems, it increases the number of hours spent by workers in their journey to work, thus affecting their quality of life and their productivity. The sheer cost of building roads and highways, as well as of providing the physical space that automobiles require for roads and parking, is considered to be its biggest economic impact (Newman and Kenworthy, 2007, p. 83).

The majority of the population in developing countries evidently does not have the economic resources to access this form of transportation, leading to social fragmentation and increased inequity. The environmental impacts of increased car use and motorized urban sprawl are also significant, ranging from bad air quality, energy costs, extravagant land use and invasion of farmlands and ecological reserves (Martin, 2005, p. 122; Newman and Kenworthy, 2007, p. 67). “The car is a greedy user of land because its use tends to be individualized and privatized, and because its operation requires multiple, dedicated sites… Cars demand more land area than other transport modes by large multiples” (Martin, 2005, p. 124).

In order to give sustainability a chance in the upcoming doubling of the urban population in Africa and Asia, priorities in the structure of urban transportation will obviously have to be redefined within a more organic vision that incorporates social, spatial, environmental and economic issues. Greening and democratizing transportation in rapidly growing cities is not just political correctness, it is at the core of societal subsistence. Both local and regional governments need to come up with visionary plans based on ample consultations and solid information. Political leaders need the foresight and charisma to overcome eventual obstacles and to sell greener and more equitable approaches to different audiences.

In this light, the recent experience of Bogota is enlightening. Facing gigantic traffic problems, as well as increasing social disturbances, two successive mayors undertook unconventional approaches that

not only greatly improved the traffic problem but also uplifted the face of the city. The technical solution initially proposed to fix Bogota's monumental traffic woes were the usual: build billions of dollars' worth of freeways and overpasses. Instead, Bogota's mayors chose to focus on rapid bus transport (following the Curitiba model) and to free up many of the streets and sidewalks (routinely used as parking spots) for bicycle traffic and pedestrians. Meanwhile, investments in parks and other public places, coupled with better and cheaper transport, also gave the majority of the city's population access to a much improved range of leisure activities. Evidently, this inversion of social and transport priorities initially met with considerable opposition, but the end result was a notable improvement in the quality of life for all (UNFPA, 2007, p. 75).

E. Policy Implications: "Process" or Intervention? The Need to Plan Ahead

There is little indication that ongoing urban growth in developing countries is fulfilling its social and environmental potential. Given the upcoming doubling of urban population in Africa and Asia, such failures represent a major opportunity lost. In principle, there is no question but that urbanization is critical for overall poverty alleviation (UNFPA, 2007, chapter 3). Urban proximity and concentration not only favour economic dynamism but also the provision of infrastructure and services at a much lower per capita cost to urban inhabitants. Nevertheless, urban poverty is growing faster than rural poverty; a significant part of that poverty would be preventable if proactive and effective policies were adopted in attending to the land and housing needs of the poor.

Similarly, urban concentration can constitute an important ally for sustainability. With a world population of 6.7 billion, growing at close to 80 million a year, demographic concentration in densely-populated urban areas actually favours the protection of rural ecosystems. Moreover, cities are the major source of critical technological innovations that can benefit the environment. Nevertheless, present patterns marked by the disordered spatial expansion of cities – an expansion that uses up more land than necessary, that encroaches upon valuable agricultural or ecological riches, that generates biologically sterile expanses of built-up land and that squanders biomass – also fail to maximise the potential benefits of concentration. The amount of land area that is increasingly being appropriated for urban land use is not negligible, nor is the environmental loss it causes (UNFPA, 2007, chapter 4).

Taking full advantage of the potential benefits of urbanization would require a range of initiatives from the political, social and economic domain that far surpass the scope of this paper. The point being made here is simply that the social and sustainable use of urban space would, in and of itself, make a significant difference in the welfare of people and in environmental outcomes. Moving in that direction will require foresight to orient the use of urban land within an explicit concern for both social and environmental values. This would seem applicable to both the intra-urban use of land as well as to the broader expansion of urban land uses across different ecosystems.

In this connection, it is undoubtedly interesting to observe that the World Bank – one of the key institutions in the propagation of the current liberal ethos and its tenet of non-interventionism – has undertaken a broad-based approach to improving urban management with such initiatives as the "Cities in Transition" and the "Cities Alliance" programs. In this sense, it is noteworthy that a key element of the Cities Alliance strategy is that "cities need to plan ahead in order to make more informed choices about the future and they need to act now" (Cities Alliance, 2007). Similarly, the Cities in Transition strategy paper notes that – "Urbanization, when well-managed, facilitates sustained economic growth and thereby promotes social welfare gains… But policy weaknesses can disrupt the benefits from urbanization. Policies affecting urban land use and housing investment have major ramifications for households, businesses and the nation…" (World Bank, 2000, p. 2).

More recently, the Bank also sponsored an influential study that made a stalwart case for planning ahead in the area of urban growth. Therein, it is asserted that: "the key issue facing public sector decision-makers – at the local, national and international levels – is not whether or not urban expansion will take place, but rather what is likely to be the scale of urban expansion and what needs to be done now to adequately prepare for it…the message is quite clear – developing country cities should be making serious plans for urban expansion, including planning for where this expansion would be most easily accommodated, how infrastructure to accommodate and serve the projected expansion is to be provided and paid for, and how this can be done with minimum environmental impact" (Angel et al., 2005, pp. 91 and 95). The lead author of that study has subsequently gone on to provide detailed suggestions on how city administrations could plan ahead effectively for the land needs of the poor (Angel, 2008).

Until the present, planning ahead for rapid urban growth has clearly not been the norm. On the contrary, as noted earlier, policymakers in developing countries seem to be increasingly determined not to let the inevitable process of urbanization run its course. Given the enormity of the expected expansion in their urban population, as well as the potential economic, social and environmental implications of this growth, such negativism and the consequent absence of a coordinated proactive approach towards future growth is rather astounding (Angel et al., 2005, p. 101) cite a number of cogent reasons why this is occurring: the short planning horizons of politicians; the unwillingness of most national and local governments to accept urbanization as a positive trend and, thus, to prepare for orderly urban expansion; the preference for ambitious and utopian master-plans that have little prospect for being enacted or enforced; and the fact that international organizations have refrained from engaging in policy dialogue aimed at the design and implementation of effective investment programs.

Beyond these several valid explanations, there is also an ethos defined by the present development context, wherein governments are enjoined to let the markets proceed, and to stay out of the way of economic forces as much as possible. In developing country cities, which have often witnessed several layers of "Master Plans" that became outdated before they were ever implemented, the idea that evolutionary processes (i.e., laissez-faire), rather than drawing-board plans, should orient the organization of urban space may seem even more attractive.

In such a context, technical people have, in recent times, been admittedly hesitant about proposing long-term orientations for the sustainable use of space. It is pertinent, for instance, that the Millennium Assessment shied away from advocating any particular direction for future urban growth on the grounds that, in a liberal market economy, investors rather than planners make the decisions as to where growth will occur (McGranahan et al., 2005, p. 802). [9]

The extent to which the location and form of urban expansion are amenable to public sector intervention is an issue that would merit considerably more discussion, especially in the context of Africa and Asia. There is a real question as to what margin of manoeuvre national and local policymakers there will have with respect to the sustainable use of space in future urban growth. This margin is established in large part by the nature of political processes, by the relative significance of different political issues in country contexts, and by the extent to which where social advances, rather than personal gain, are a pre-eminent objective of politicians and administrators.

There is also a real question as to the capacity of local governments to diagnose the nature of the problems associated with rapid urban growth and, more importantly, with the nature of the solutions that must be adopted. With few exceptions, local governments are the most unprepared level of decision; they often have a poor understanding of the challenges and a mediocre capacity to propose and implement effective solutions. Moreover, intentions of personal gain often predominate over public goals, especially in the area of land use where corruption seems particularly enticing and resilient to accountability efforts.

This situation is made more complex by overall development goals. Currently, there is little doubt that the effort to reach and maintain high rates of economic growth holds priority on the agenda of most developing countries, with social and environmental issues being relegated to a vague set of postponed desiderata. This seems to give investors, public or private, a bigger voice in decisions as to where and how production will expand, thus essentially determining future patterns of population distribution. Since, in a globalised market, economic opportunities can often be volatile, the possibilities for impressing specific spatial orientations on population distribution appear tenuous.

Nevertheless, environmental awareness and reactions to unsustainable or polluting kinds of growth are having an influence on the location and characteristics of economic activity, even in the context of traditional centrally-planned economies such as China (Bai, 2008). To the extent that environmental awareness is allied to good governance (which includes not only representation of all relevant groups but also good information and analyses as to what can effectively be done), it would still seem possible to influence the direction and the form of urban growth in positive ways. Thus, advocacy for the effective consideration of social and environmental concerns in urban planning appear to be a valid starting point for action.

Such intervention, however, requires clear ideas on what is desirable with respect to the social and sustainable use of space. Ultimately, letting "process" and "indeterminate planning" resolve the future destiny of cities sounds disturbingly like putting our faith in market forces and their ultimate capacity to somehow make everything right in the end. Surely there have to be some overarching concerns, standards, criteria or desiderata on which people already agree and these should be able to help shape urban growth policies in more sustainable ways.

Despite the current standoff on the sprawl versus compact city debate in developed countries, some alternatives for the use of urban space are more sustainable than others and could be recommended in the orientation of future urban growth in Asia and Africa. Thus, most people would agree that urban sprawl (decreasing density) is *per se*, less sustainable, at least in those regions. At a minimum, there would appear to be agreement that the prototypical American suburb should not be reproduced throughout the world. Applying this model, based on individual housing and automobile transport, to rapidly-expanding cities of developing countries does not seem feasible, practical or desirable, especially when viewed in environmental terms.

On the other hand, most of the desiderata cited earlier as part of the formula of compact cities all seem quite valid for the orientation of upcoming growth within a systematic concern with environmental issues: high density, mixed use, intensification of public transportation, greater pedestrian and bicycle transit, utilization of interstitial spaces, protection of natural ecosystems, revitalization of downtown areas, reduction of the amount of land affected by roads and parking lots, increased social and economic interactions and more efficient utility and infrastructure provision.

Perhaps the biggest problem with the compact city approach was less its environmental desiderata than its faith that drawing board designs could concentrate all these advantages in "compact cities" rather than in the urban forms that would result from negotiations among different environmentally-conscious sectors of society.

Within the framework of the broader and non-formal environmental approach suggested above by McGranahan, it would seem appropriate to promote the sustainable use of urban space through environmentally-inspired approaches to a variety of interrelated issues. A very partial list, for purposes of illustration might include, *inter alia*:

- ensuring that new developments are properly sited with respect to the conservation of biodiversity, wetlands, watersheds and other resources, as well as other sensitive or valuable lands;

- taking a proactive and effective stance to attend the land and housing needs of the poor, thereby relieving human poverty and misery while also contributing to the sustainability, quality of life and economic attractiveness of the city;

- emphasizing public transport over private automobile use. Changing the transportation paradigm by financing public transportation projects, and eliminating subsidies to automobile traffic would seem to be absolutely essential in practically all urban contexts of developing countries;

- ensuring the existence and effective management of facilities for waste collection treatment and disposal;

- promoting recycling, restriction of carbon emissions and energy use;

- ensuring provision of clean water and sanitation and other key environmental services;

- maximizing access by all to wide urban swaths of public space, and guaranteeing the preservation of diverse and diversified green spaces; and

- allowing natural processes to generate diversity, beauty and health, laying to rest the conception of cities as biologically sterile environments and 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.

NOTES

[1] For instance, Latin America accomplished an urban epidemiological transition over a much shorter period of time through a combination of macroeconomic improvements and preventive health measures. "The more urbanized the country, the faster mortality rates fell" (Stephens and Stair, 2007, p. 141)

[2] Admittedly, not all slum dwellers are "poor" and not all poor urban residents live in "slums." Nevertheless, the orders of both categories' magnitude is sufficiently compatible for present purposes.

[3] The number of countries reporting that they had policies to curb migration towards urban agglomeration rose steeply from 51 per cent in 1996 to 73 per cent in 2005 (United Nations, 2006b).

[4] The Angel et al. study assumed an average density of 8,000 per km2 in developing countries and 3000 per km2 in industrialized countries.

[5] This may actually be a low estimate of declining densities. In the United States, at least, a study of 282 metropolitan areas found that the growth of land area outpaced population growth two to one (Reported in Hogan and Ojima, 2008).

[6] Since these ecosystem data do not consider lifestyles, consumption patterns or ecological footprints, they evidently provide only broad indications of the nature and extent of "damage" that can be caused by urban expansion. Nevertheless, they provide useful indications as to what types of ecosystems are most affected by urban growth in different regions.

[7] This section is largely based on a literature review prepared by Martine and Odelius in preparation for UNFPA (2007).

[8] Gordon McGranahan, IIED (International Institute for Environment and Development), London. Personal communication, May 12, 2007.

[9] It should be noted that, despite its reticence to interfere with market forces, the Millennium Assessment did recommend that urban growth should be restricted where it threatens ecosystem services such as watersheds or ecologically fragile areas (McGranahan et al., 2005, p. 802).

[10] The data base does not discriminate between urban and rural areas of municipalities. However, since Brazil is now 83 per cent urban, according to official data, the size categories of municipalities are a fairly good proxy of urban size categories.

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THE PLANNING AND GOVERNANCE OF ASIA'S MEGA-URBAN REGIONS

Aprodicio A. Laquian, University of British Columbia, Canada

A. ASIA'S MEGA-URBAN REGIONS

By 2010, 12 of the 21 mega-cities in the world are expected to be in Asia. Tokyo, the largest, is projected to have a population of 35.4 million, followed by Mumbai (20.0 million), Delhi (16.9), Shanghai (15.7), Kolkata (15.5), Jakarta (15.2), Dhaka (14.6), Karachi (13.2), Manila (11.7), Beijing (11.7), Osaka-Kobe (11.3), and Istanbul (10.5). By 2015, Guangzhou with a population of 10.4 million may qualify as a mega-city. Not too far behind are nine other Asian cities with large populations including Seoul (9.5 million), Shenzhen (8.9), Lahore (8.3), Wuhan (8.2), Tianjin (8.1), Bangalore (7.9), Hong Kong (7.8), Bangkok (7.4) and Hyderabad (7.4) (United Nations, 2006).

The population figures for the mega-cities mentioned above are based on official country definitions confined to formal political boundaries. However, it is now increasingly recognised by researchers and government authorities that the actual "urban field" of economic, social and technological influences of mega-cities extends way beyond their formal boundaries. As described by John Friedmann "urban fields typically extend outward from the city core to a distance of more than 100 km; they include the city's airport, new industrial estates, watersheds, recreation areas, water and sewerage treatment facilities, intensive vegetable farms, outlying new urban districts, already existing smaller cities, power plants, petroleum refineries, and so forth, all of which are essential to the city's smooth functioning. City regions on this scale can now have millions of inhabitants, some of them rivalling medium-sized countries. This space of functional/economic relations may fall entirely within a single political/administrative space (…) More likely, however, it will cut across and overlap with a number of (…) political-administrative spaces of cities, counties, districts, towns, provinces, etc." (Friedmann, 1992).

T.G. McGee, noting the unique feature of Asian urban agglomerations has coined the term *desakota* development to describe their growth, combining the Bahasa terms *desa* (village) and *kota* (city) to indicate their mixed rural-urban characteristics. He observed that these city-regions tend to "produce an amorphous and amoeba-like spatial form, with no set boundaries or geographic extent and along regional peripheries; their radii sometimes stretching 75 to 100 km from the urban core. The entire territory – comprising the central city, the developments within the transportation corridors, the satellite towns and other projects in the peri-urban fringe and the other zones – is emerging as a single, economically integrated "mega-urban region" or "extended metropolitan region" (McGee, 1995).

Following Friedmann and McGee, I have noted, in a recent book, that most Asian mega-cities have expanded into mega-urban regions that encompass much larger territories and populations. Despite governmental efforts to restrict or even reverse the growth of mega-cities by using various administrative and economic measures (for instance, internal passport systems that limit benefits to bona fide urban residents in China and Vietnam; use of green belts to confine growth within highly urbanized areas in India and Malaysia; eviction and resettlement of inner city dwellers to outlying areas in the Philippines and Bangladesh; and transmigration schemes to move urban residents to frontier areas in Indonesia) mega-urban regions have continued to grow. While some inner city areas have lost populations because of out-migration and forcible eviction, suburban and exurban areas around mega-cities have continued to grow. This "spreading pancake" or "palm and fingers" expansion pattern has engulfed small towns, cities

and other settlements in the urban periphery, joined the urban fields of other large cities, and formed city clusters or sprawling mega-urban regions (Laquian, 2005).

The proper definition of mega-urban regions, of course, is not an easy task. However, it may be possible in the future to go beyond formal country definitions of urban agglomerations by using technological tools such as geographic information systems (GIS) and satellite imagery to determine the actual extent of urban built-up areas that make up mega-urban regions. This is particularly important because of the rapidly rising urbanization levels in many developing countries, the blurring of urban-rural distinctions, and the emergence of city clusters. For urban planning and governance purposes, there is a need to go beyond the demographic and spatial features of urban agglomerations and to fully consider the complex economic, social, political and technological processes and linkages involved in what has been called "urbanism as a way of life" (Wirth 1938). This change of perspective is called for in the light of the increasing influence of globalisation forces that are transforming the functioning and structure of mega-urban regions.

1. Types of Mega-Urban Regions

Based on their demographic, geographic and socio-economic characteristics, mega-urban regions in Asia fall into at least three distinct types:

(a) *Urban corridors* such as the Tokyo-Yokohama-Nagoya-Osaka-Kobe-Kyoto *Shinkansen* or "bullet train" corridor in Japan; the Beijing-Tianjin-Tangshan-Qinhuangdao transport corridor in northeast China; or the Mumbai-Pune development corridor in India.

(b) *Mega-city dominated city regions* such as Metro Manila in the Philippines, the Jakarta-Bogor-Tangerang-Bekasi (JABOTABEK) region in Indonesia; the Bangkok-centred region in Thailand; or the Dhaka metropolitan region in Bangladesh; and

(c) *Sub-national city clusters* such as the Guangzhou-Shenzhen-Hong Kong-Macau-Zhuhai region in the Pearl River Delta in southern China; the Surabaya-Surakarta-Semarang-Yogyakarta-Malang region in Indonesia; or the Daegu-Ulsan-Busan-Guangjiu region in the Republic of Korea.

a. Urban Corridors

Urban corridors are contiguous highly urbanized human settlements linked together by trunk urban infrastructure and services. In some ways, they are similar to the "megalopolis" described by Jean Gottman in the north Atlantic seaboard of the United States that stretches from Washington, DC to New York and Boston. The best example of an Asian urban corridor is the *Shinkansen* or "bullet train" region on the main Japanese island of Honshu. The combined population of the mega-cities within this *Shinkansen* corridor has been estimated at about 60.6 million and, if the surrounding urban wards, cities and districts within the prefectures are included, it could easily exceed 70 million.

The Jing-Jin-Tang expressway that links Beijing, Tianjin, Tangshan and Qinhuangdao and connects China's national capital to the port of Tanggu on the Gulf of Bohai is the major urban corridor in the People's Republic of China (PRC). Along this main corridor, nine special economic development zones are found – science parks, hi-tech development enclaves and research and development centres. Also within this corridor are two major cities under the direct jurisdiction of the central government (Beijing and Tianjin), two intermediate-sized cities (Tangshan and Langfang) and hundreds of county seats and designated towns. The region's population has been estimated at about 56.4 million.

b. Mega-city dominated city regions

Most of the mega-city dominated regions are found in Southeast Asia where urbanization is marked by primacy where the main city, usually the national capital, is many times larger than the next largest city. The Metro Manila national capital region, for example, is formally defined as including 22 chartered cities and the municipality of Pateros in Rizal province with a metropolitan area population of 11.7 million. However, Philippine urban planners argue that a comprehensive development plan for the national capital region should encompass a whole region covering seven provinces in Central Luzon (Rizal, Bulacan, Pampanga, Tarlac, Nueva Ecija, Pangasinan and Zambales), the three Southern Luzon provinces of Cavite, Laguna, Batangas and Quezon (CALABARZON) and the island provinces of Mindoro, Marinduque, Romblon and Palawan (MIMAROPA). This extended city region has been referred to as Mega-Manila by Filipino mass media and marketing specialists who recognise the actual geographic extent and socio-economic influence of the mega-urban region.

c. Sub-national city clusters

In countries with very large populations and wide national territories, a number of sub-national city clusters have evolved as mega-urban regions. In the Pearl River Delta of the PRC, for example, the concurrent growth of cities like Guangzhou, Shenzhen, Hong Kong, Macau and Zhuhai has created the potential for a "southern China megalopolis." These clustered cities development pattern includes a city under the jurisdiction of the national government (Guangzhou), a sub-provincial city also under the jurisdiction of the central government that is also a special economic zone (Shenzhen), two former colonial enclaves absorbed by the PRC as special administrative regions (Hong Kong and Macau) and a special economic zone (Zhuhai). By 2021, Hong Kong based planners have projected the emergence of a poly-nucleated mega-urban region in the "Greater Pearl River Delta Region" with a population of 51 million, 18 per cent of which will be in Hong Kong (Enright and others, 2003).

2. Characteristics of Mega-Urban Regions

Although Asian mega-urban regions represent a wide range of human settlements, they share a number of common characteristics. First is their wide land area coverage and large population size. For example, the Beijing-Tianjin-Tangshan-Qinhuangdao corridor covers about 168,000 sq km and has a population of about 56.4 million. The six mega-cities that make up the "bullet train corridor" in Japan have a combined population of at least 60.6 million. In southern China, the sub-national urban cluster of Shanghai-Nanjing-Suzhou-Changzhou-Zhenjiang-Nantong-Yangzhou-Wuxi in the Yangtze River Delta had a population of 72.7 million in 1995 (Shi, Lin, and Liang, 1996) and the Guangzhou-Shenzhen-Hong Kong-Macau-Zhuhai region in the PRD had a population of 40 million in 2003 (Enright and others, 2003).

Moreover, some Asian mega-cities are continuing to grow at higher than the average annual urban growth rate of 2.4 per cent. Dhaka, for example, grew at an annual rate of 7.1 per cent between 1985 and 1995, continued to grow at 4.9 per cent in 1995-2005, and is projected to grow at 3.2 per cent in 2005-2015. Other Asian mega-cities with high annual growth rates in 1995-2005 were Hyderabad (4.0 per cent), Karachi (3.7 per cent), and Jakarta (3.6 per cent). These mega-cities are bursting their boundaries, jumping their confining greenbelts and becoming mega-urban regions (UNCHS, 2005).

Second, the "fields" of influence of mega-urban regions encompass both urban and rural areas. As pointed out by McGee, *desakota* development in the Greater Jakarta area has expanded beyond the boundaries of the Special Capital Region of Jakarta with its population of 11.4 million and includes rural sectors within the regencies of Bogor, Tangerang and Bekasi. Two Indonesian planners have even suggested that the Jakarta-centred region should actually include Bandung and the largely rural regencies

(*kabupatens*) around it. If this is done, the JABOTABEK cum Bandung mega-urban region would have a population of 26 million, with 6.9 per cent living outside the urban built up areas (Dharmapatni and Firman, 1995).

As mega-urban regions expand, they engulf towns and cities in the urban periphery. For example, the Bangkok Metropolitan Area (BMA) had a population of only 4.7 million in 1980. However, the rapid expansion of the city covered areas within the provinces of Pathum Thani, Nontaburi, Samut Prakan, Samut Sakhon and Nakhon Pathom so in 1988, the Bangkok Metropolitan Region (BMR) was created, increasing the city-region population to 8.5 million. Even though the United Nations had projected the population of Greater Bangkok to reach only 9.0 million by 2010, the National Economic and Social Development Board of Thailand had already formulated plans for an "extended BMR" that includes parts of the provinces of Ayutthaya, Saraburi, Chachoengsao, Chonburi and Rayong, resulting in a population projected to reach 17 million by 2010 (National Economic and Social Development Board, 1990).

Third and finally, despite the obvious economic and technological interrelationships among the urban places within the mega-urban region, there is usually no overall political or administrative structure with overarching authority for comprehensive planning or governance. Even in the highly developed city-regions of Japan, governance mechanisms in the Tokyo to Osaka-Kobe development corridor are terribly fragmented. The city of Tokyo is made up of 23 special wards (*ku*), 23 cities (*shi*), five towns (*cho or machi*), and eight villages (*son or mura*). Each one of these local units has its own local government. The Greater Tokyo area includes the city and prefecture of Tokyo as well as parts of Kanagawa, Saitama, Chiba, Gunma, Tochigi, Ibaraki and Yamanashi prefectures. Greater Tokyo also includes 26 cities within Tokyo prefecture, the Tama area also known as Western Tokyo and the islands of Izu and Ogasawara. Functionally, the city of Yokohama, capital of Kanagawa prefecture and with a population of 3.6 million is well integrated with Tokyo Metropolis but is a separate local unit. The same governmental fragmentation is also found in Osaka, with its 23 wards and Kobe with its nine wards.

B. Planning Asian Mega-Urban Regions

The emergence of mega-urban regions in Asia has posed a number of challenges to city and regional planning. First, the traditional instrument for development of Asian cities has been physical planning that is designed to control and guide the material elements in cities and towns (for instance, roads and transportation networks, waterworks, drainage, sewerage and sanitation systems, energy generation and distribution, garbage dumps, landfills and incinerators, housing, etc.). This approach is usually confined to "hardware" elements and fails to take into consideration the economic and social processes ("software") that often exert stronger influences on the development of city regions.

Second, there is a shortage of planners who are adequately trained in comprehensive planning and take economic, social and environmental factors into consideration when formulating city region plans. Most city and regional planners in Asia are architects, engineers, surveyors and other technically-oriented individuals who often fail to appreciate the important role played by socio-economic processes in urban life. As observed by a former World Bank economist, most big city problems in developing countries may be traced to "wrong headed national urbanization policies promoted by physical planners with visions of optimal geography and very little sense of economics" (Hamer, 1994).

Third, urban and regional planning in Asia is deeply influenced by the concept of rural-urban dichotomy. Many government officials as well as staff members of multilateral and bilateral aid agencies firmly believe that the main issue in Asia is rural development and that the solution to alleviating absolute poverty is improving agricultural productivity, building farm to market roads, instituting land reform schemes, and encouraging farm mechanization. This belief persists despite the fact that about 42.0 per cent of Asia's population is already living in cities and towns and that by 2030, 54.1 per cent of the

population is projected to be urban. Many policymakers are slow to acknowledge that rural improvements do not keep people down on the farm and that in fact, once the economic and social situation of rural dwellers improve, they tend to migrate to urban areas. As shown in North America and Europe, people will stay in villages only if the full benefits of urbanization are made available to them in these settlements.

Fourth, the legal and institutional basis for local governance in Asia upholds decentralisation and local autonomy. Because of this, urban areas suffer from extreme fragmentation among competing local jurisdictions. They are fragmented sectorally as line agencies in charge of functions such as transport, energy generation, water and sewerage jealously guard their respective turf. They are also fragmented hierarchically as agencies are organized at the district, town, city, prefecture, province and national levels. The fragmentation is often complicated by the creation of special authorities that look after specific functions such as railways, flood control, and ports and harbours that are designed to cut across jurisdictional lines but end up being autonomous agencies themselves. Because of extreme fragmentation, urban plans are confined to the formal boundaries of municipalities or metropolitan areas. Legal ordinances, zoning codes and land use rules and regulations promulgated by city councils and municipal boards are applicable only within their jurisdictional areas. As cities have become mega-cities and these, in turn, have evolved into mega-urban regions, traditional planning approaches have not kept pace with substantive and technical developments.

Fifth and finally, most city region plans in Asian agglomerations are not formally adopted as legally binding enactments – many are primarily conceptual and regarded as "indicative guidelines" for the future development of mega-urban regions. This phenomenon is mainly due to the legalistic tradition that vests authority for planning and enactment of zoning codes and land use regulations in cities or municipalities that have their own specific charters. In India, for example, the 74th amendment to the Constitution decentralised authority to local government bodies. In the Philippines, the 1987 Constitution makes the creation of metropolitan governments extremely difficult because it requires voluntary consent of local units and the Local Government Code of 1991 and its amendments in 2007 continue to uphold local autonomy.

1. City and Regional Planning Approaches

Historically, city and regional planners in Asia have utilised various approaches, such as classical city planning, colonial city planning, socialist planning and comprehensive strategic planning. Each one of these planning approaches has been based on specific assumptions, objectives and procedures. For example, classical city planning was essentially a component of rites and rituals extolling the divine rights of emperors. Colonial city planning simply tried to replicate in Asian colonies planning ideas and practices in the home country. Socialist planning was based on the assumption that future conditions were knowable and could be manipulated to achieve specific conditions. Comprehensive strategic planning, in turn, integrates socio-economic with physical planning elements and uses an iterative approach to get to targeted objectives.

a. Classical city planning

Cities in Asia have been planned and built for more than 3,000 years. Chinese cities like Chang'an (present day Xian), Luoyang and Shenyang were planned in accordance with classical principles based on the divine nature of the emperor, the metaphysical influence of wind and water (*feng shui*) and admixtures of Buddhist, Taoist, and Confucian traditions. Although the Chinese capital of Beijing is relatively new in the millennial context of Chinese history, the plans for the city are said to be derived from guidelines prescribed in the Zhou Li, which explicitly set down the principles and prescribed rites for city building practiced during the Zhou Dynasty (1051-403 B.C.) (Wright, 1977; Wu, 1999).

The key elements of Chinese classical city planning included four basic principles. First, the main axis of a city's structure had to be rigidly oriented in a north-south alignment directly oriented to the North Star. Second, the city had to be bounded by a city wall formed as a square or a rectangle. Third, the classical city building treatises demanded strict compliance with precise instructions on issues such as how many gates the city should have, the alignment of streets along a geometric grid, the balanced location of public buildings, temples and residences, and the provision of parks and open spaces. Finally, the exact location of a city as well as the time for initiating its construction were determined by prescribed rituals, usually tortoise shell divination ordered by the emperor. The physical structure of the classically planned Chinese city, therefore, had the imperial palace within the imperial city as the centre of everything. From this core, the emperor's powers radiated outward in the form of the imperial city, the important role of China as the "middle kingdom" and the position of the country in the world and the whole universe.

The same adherence to religious precepts governed the establishment of cities and towns in the Indus River Valley. Archaeologists have suggested that the plans for Mohenjo-daro and Harappa reflected cosmological efforts to establish on earth an idealised notion of the universe. The Khmer cities and temples of Angkor Wat and Angkor Tom as well as the urbanized centres of Hinduized kingdoms in Indonesia (Borobudur) were also planned along cosmological lines. There have even been suggestions that the original plan for old Delhi was derived from the mythical city of Indraprastha, the capital of the Pandavas in the Mahabharata epic.

b. Colonial city planning

Through the centuries, of course, the planning and establishment of cities in Asia have been influenced by many factors. The physical features of most present-day Asian cities bear the marks of colonial rule by Western powers. In the Philippines, the walled city of Intramuros in Manila and the military forts in cities like Cebu and Zamboanga reflect the country's Spanish heritage. The so-called "plaza complex" town plan focused on the parade grounds around which are found the Catholic church, the residence of the governor, the municipal hall, the military barracks, the jail, and the grand houses of elite families. Similar colonial structures are found in many Indian cities, like Delhi with its Red Fort and Mumbai with its Maidan. In Indonesia, Dutch planners even tried to replicate their cities and towns in the colonies, right down to the canal networks in Jakarta that were copied from those in Amsterdam.

In the 19th century, city and regional planning in Asia was greatly influenced by British and American concepts and approaches. First, there was the "garden city" idea of Ebenezer Howard who envisioned an ideal city based on agricultural production, industry and commerce that would retain its closeness to nature. This garden city plan was followed in the establishment of New Delhi by architects led by Edwin Lutyens. It also influenced the planning of Bangalore and Singapore. The second important influence on Asian city planning came from the United States, mainly through the work of the Chicago-based architect David H. Burnham. In making the master plan for Manila and the Philippine summer capital of Baguio, Burnham was inspired by the L'Enfant plans for Washington, D.C. that featured wide boulevards lined by monumental buildings.

A major shortcoming of the colonial city plans mentioned above was that they were essentially elitist because they mainly catered to the production, welfare and comfort needs of the colonists. The plans ignored the organic nature of communities and cities. They did not take into consideration indigenous architecture, the use of local building materials, native construction techniques or the aesthetic values of the Asian populations. As such, the colonial enclaves became the original "gated communities" that were physically and functionally separated from the indigenous city. When national elites took over the colonial enclaves after independence, however, the operation and maintenance of the urban

infrastructure and services were not continued, generating inner city decay and dilapidation that characterize many Asian cities today.

c. Socialist city planning

It is interesting that in China and Vietnam, the transition from classical city planning to socialist planning happened with apparent ease, because both planning processes were based on a "top down" approach. In ancient times, the planning authority came from the ruler and divine rites while in socialist planning, it emanated from the state. Socialist planning was based on the premise that aspired for future conditions could be set – for example, by 2025, Hanoi would have a population of five million, per capita GDP of $800 per year, and each resident would have 12 sq m of living space, etc. From these targets, the planners simply calculated the material, financial and institutional resources required. However, because historical events did not usually unfold according to expectations, socialist planning encountered many pitfalls.

Socialist planning did have at least two salutary effects. First, the strong emphasis on providing urban infrastructure and services in cities helped the residents a lot. The concentration on heavy industries also provided useful outputs and employment to people although it generated serious environmental pollution. The location of housing adjacent to factories and other work sites cut down on travel time. Making work units responsible for the welfare benefits of their workers also ensured amenities needed for basic needs.

The other major benefit from socialist planning involved the state's commitment to improving the lives of citizens and other underprivileged groups. Housing projects, schools, hospitals, old folks' homes and other social services institutions were built. Subsidized grain, cooking oil, and other basic needs were provided to urban residents. The human capital generated by policies and programs carried out under socialist planning may be regarded as mainly responsible for the tremendous progress currently being achieved in the transitional economies of China and Vietnam.

d. Comprehensive strategic planning

Unlike traditional planning approaches that focused on the physical structure of the city, comprehensive strategic planning (CSP) encompasses economic, social, and technological aspects of urban growth. Thus, it is concerned with population growth, internal and international migration, people's productive behaviour, trade and commerce, and social and cultural activities that determine the shape and geographic extent of the mega-urban region.

CSP is based on the idea that urban centres are the engines of development and they should be planned and managed to make them run in an efficient and sustainable manner. If urban centres are planned and managed properly, they can act as "transformational agents" that can energize whole countries. To achieve this, CSP calls for a holistic approach instead of segmented sectoral interventions. People's productive activities, their travel habits, what they buy and where, and what leisure and cultural activities they pursue have spatial implications.

It is not surprising, then, that CSP has been mainly adopted in market-oriented countries like Indonesia, Malaysia, India and the Philippines. As used in these countries, CSP has the following characteristics: (a) it covers not just individual cities or metropolitan areas but whole city regions; (b) it is concerned with the full gamut of economic, social and environmental activities in the whole city region; (c) it follows an iterative rather than a linear process which involves regular and periodic assessments and updating of planned activities based on feedback information gathered through monitoring and evaluation mechanisms; (d) it is formulated on the basis of inputs from citizens and concerned stakeholders who

actively articulate their stand on key issues; and (e) it includes financing, management and governance provisions in the plan. In other words, comprehensive strategic planning does not draw a sharp distinction between the plan formulation and the implementation processes, both are considered necessary elements of the plan.

2. Issues in Mega-Urban Region Planning

As more mega-urban regions emerge in Asia, planning authorities face a number of problems created by their size and continued expansion. These are: (a) the decay and deterioration of inner city areas; (b) urban sprawl and uncontrolled peripheral area development; and (c) environmental pollution. A number of measures have been adopted by some urban authorities to deal with these problems but the accelerating pace of mega-urban expansion indicates the need for more effective interventionist policies and programs.

a. Inner city redevelopment

Unlike their Western counterparts, mega-cities in Asia tend to have thriving inner city areas where old-time residents live in active and vibrant communities. Because the inner city areas are usually the oldest parts of the city, however, they are subject to physical deterioration and decay. Basic services like water supply, drainage, sewerage and sanitation originally installed when the cities were first set up have become inadequate. Narrow streets and lanes built before the coming of the private automobile constrict mobility and make solid waste collection and firefighting extremely difficult. As inner city areas have deteriorated physically, they have attracted urban poor residents seeking cheaper rent. Many inner city areas have also become notorious as centres for crime, juvenile delinquency, drugs and prostitution.

Happily, the strong community ties among inner city dwellers in Asia have made it difficult for government authorities to simply use the "bulldozer" approach. Inner city squatters and slum dwellers have tenaciously fought campaigns to evict them and dump them into relocation sites on the urban periphery. In Chinese cities, there are programs to redevelop "dangerous and dilapidated houses" through community upgrading that maintains the traditional structures instead of demolishing and replacing them with high-rise apartments. In Indonesian cities, the Kampung Improvement Program (KIP) provides basic services like potable water, sanitary toilets, electricity and pathways, but leaves the construction, repair and maintenance of dwellings to individual households. In most Asian countries, laws have been enacted prohibiting eviction of people from their communities without providing them with housing and other amenities that are acceptable to them. These have tended to slow down some inner city redevelopment schemes but served to avoid confrontations and at times violent incidents with urban poor groups.

Some Asian countries have adopted development schemes that seek to balance inner city redevelopment with peripheral area growth. In Beijing, Shanghai, Guangzhou and other large cities in China, public/private development companies have cleared sections of inner city areas and built hotels, luxury condominiums, offices, and commercial and tourism-related malls. These urban renewal schemes usually required the resettlement of inner city inhabitants to high-rise apartments in suburban areas. The families who choose to remain in the inner city are provided housing in new apartments or upgraded traditional courtyard houses. Those who agree to move to suburban areas are provided with larger apartments equipped with individual toilets, kitchens, balconies, electricity, gas and other amenities. Both new apartments and upgraded homes in the inner city and the suburbs are financed by cross-subsidies from profits earned by the development companies from their up-market ventures and the private sale of the units to individual households who are extended low-interest loans by banks and mortgage companies.

In other Asian cities, tourism development has been used as an instrument for redeveloping inner city areas. In Bangkok, for example, the area around the imperial palace and the temple of the Jade

Buddha have been conserved and maintained to reflect traditional architecture and Thai community life. In Hanoi, a cultural conservation scheme for the area known as the "36 Ancient Streets" preserves the tree-lined lanes and the old "tube houses" that served both as residences and work places for families belonging to ancient craft guilds. Also, the preservation of old trees, traditional homes and small shops around Hoang Khiem Lake maintains the cultural atmosphere of the area even as it has become the city's most popular tourist destination. In ultra-modern cities like Tokyo, Kyoto, Nagoya and Kobe, the pleasant atmosphere around palaces, temples and shrines in inner city areas have served as the main attractions to tourists and residents alike.

b. Controlling urban sprawl and developing peripheral areas

Most Asian cities do not yet have the huge number of private automobiles that have caused urban sprawl in most North America cities. However, as household incomes rise and globalisation generates a revolution of rising expectations, the demand for private cars is escalating. Asian planners are now engaged in a hectic race to come up with measures to prevent what has happened in North America from happening in Asia. Some of the measures they have used to control urban sprawl include: (a) planned development of self-contained industrial estates, hi-tech zones, special economic zones and other productive enclaves to concentrate growth in selected urban nodes within the mega-urban region; (b) construction of trunk infrastructure systems linking clustered cities together; (c) conserving agricultural land and open spaces; (d) encouraging the establishment of high-density settlements where people can live, work, shop, and have access to cultural activities; and (e) creating area-wide metropolitan planning committees with open stakeholder participation.

The PRC has adopted as part of its national urban development strategy the establishment of five special economic zones (Shantou, Shenzhen, Zhuhai, Xiamen and Hainan Island), 14 "open coastal cities," and three "open economic regions" (in the Pearl River Delta in Guangdong province, the Yangtze River Delta around Shanghai and Jiangsu province, and the Minnan Delta in Fujian province). SEZs are small areas "demarcated within a country's territory and suitably insulated for adopting special and flexible policies to attract and encourage foreign investment in industrial and other economic activities" (Yee, 1992). In Shenzhen, for example, the government built a whole city from scratch, transforming a fishing village of 3 sq km and a population of 30,000 to a mega-city of 2,022 sq km with a population of 9.1 million. Shenzhen has attracted foreign investments not only from Hong Kong but from many other countries like Japan, Korea, the United States and Canada. Even as it developed into a compact urban region, it has served to energize surrounding urban nodes like Dongguan, Foshan, Zhongshan and Huizhou. It has also sparked visions of a southern China megalopolis linking it with Hong Kong, Macau, Zhuhai and Guangzhou (Laquian 2006).

India's largest city, Mumbai, with a population of about 20 million, has adopted a regional plan to control urban sprawl. As early as the 1960s, Mumbai planners had proposed a new settlement across the harbour called New Mumbai. Focused on the development of the port in Nava Sheva, the plan was designed to concentrate industrial and manufacturing activities so as to form a "counter magnet" to the old city (Jain 1996). New Mumbai was established in 1972 as the largest new planned city in the world with a total land area of 344 sq km. Two bridges were built to connect New Mumbai with the old city and railway links were established with other urban nodes. The new city had a population of 1.5 million (2001 census).

An ambitious scheme to control urban sprawl in Malaysia involves creation of two "intelligent cities" linked to Kuala Lumpur by massive infrastructure facilities – Putrajaya and Cyberjaya. Putrajaya is being built on a green field site about 25 km from Kuala Lumpur, where about 500,000 people are expected to be residing by 2010. Some 53 per cent of the buildings will be for government activities, 29 per cent for commercial use and the rest for private residences and services. About 38 per cent of the

city's land area will be devoted to green spaces and wetlands. Five km from Putrajaya is Cyberjaya, Malaysia's centre for high-technology. It covers an area of 2,894 ha and developing it is estimated to cost $5.3 billion. It is linked to Kuala Lumpur by the Shah Alam Expressway. As a settlement fully devoted to hi-tech development, Cyberjaya has a national fibre-optic backbone, broadband connectivity to all buildings, wireless hi-fi spot services in all public areas, local online electronic commerce portals and "smart" homes and schools (Yuen, Ahmad and Chin, 2006).

c. Dealing with environmental pollution

Environmental pollution does not recognise political boundaries and planning measures to prevent and control it demand area-wide authority. For example, one of the major costs of rapid development in the Pearl River Delta (PRD) has been air and water pollution. The air quality in both Hong Kong and Shenzhen has become a real problem. The Dongjiang River is the main source of water for both mega-cities, but the rise of local industry and the rapid growth of urban settlements along the river have caused serious contamination. However, it has been extremely difficult to control this. To some extent, the lack of attention to pollution problems has been attributed by one study to political fragmentation among local units. From the point of view of a local unit, it does not make sense to impose fines on local polluters if other units are not doing this. Also, pollution fines in the PRD are relatively low, so industries find it easier to pay the fines rather than curtail their productivity (Enright and others, 2003).

Unfortunately, while many Asian governments have promulgated environmental laws, enforcement of such laws has been a problem. To some extent, this is due to lack of technically qualified personnel who can clearly prove legal violations. Although environmental auditing and "green reporting" techniques have been developed in technologically advanced countries, these are not yet well known in Asia. Ideally, public and private agencies setting up urban projects together with domestic and foreign institutions financing such projects are legally liable for environmental damages. However, weak technical capabilities together with graft and corruption make such actions incredibly difficult to prosecute.

3. Resolving City Region Planning Issues

It is obvious from a careful study of urban planning in Asia that traditional approaches such as physical planning and the formulation of elaborate "master plans" are inadequate to face up to the many problems that mega-urban regions face. To make city and regional planning in the region more relevant to future development it needs to have the following elements:

- A future vision or desired goals to be achieved within a specified time period (short, medium or long term);
- A systematised process of choosing among various options to attain the desired vision;
- Specification of material, financial, human and organizational resources needed for plan execution and ways to mobilise such resources; and
- Processes and procedures for monitoring and evaluation to ensure that course corrections can be made based on information feedback.

An assessment of city region plans of many Asian mega-urban regions reveals that the most common vision held by key leaders is to achieve "global city" or "world class status." This is seen in the

development plans for Shanghai that is focused on the Pudong New Area, a 522 sq km zone on the eastern banks of the Huangpu River. When Pudong was inaugurated in 1990, the stated goal was "transforming Shanghai into one of the leading economic, business and cultural centres of Asia and the world." The vice mayor of Shanghai at the time said he accepted "the historical heavy burden of developing China's largest metropolis into a world class city…and take the lead in setting up a socialist market economy with Chinese characteristics" (Pudong New Area Administration, 1991).

The grand visions embodied in city region plans, however, are usually not matched by careful assessments of various options for achieving them. Most city region plans rely on the building of physical infrastructure and services that reflect the grand visions despite the availability of less ostentatious alternatives. For example, no less than 24 rail-based rapid transit systems are currently under construction in Asian cities and another 10 are in the planning stages, despite the argument by many transport planners that such systems are very expensive to build, operate and maintain. The latest world-class transport mode preferred by top officials is the magnetic levitation (maglev) train capable of speeds of up to 900 km/hour. In 2002, Shanghai inaugurated the first operational high-speed conventional maglev train linking the downtown metro system to Pudong International Airport. The Chinese government has also approved another project for a maglev train system to Hangzhou to be finished by 2010. In Japan, there is a plan to build a maglev train system linking Tokyo to Osaka by way of Nagoya targeted for completion by 2025.

In India, rail-based rapid transit systems have been built in Mumbai, Delhi, Chennai, and Kolkata, and new lines are currently under construction in Bangalore, Hyderabad, Mumbai and Thane. As pointed out by many Indian transport planners, however, the great bulk of transport users in Indian cities use bicycles, rickshaws and three-wheeled vehicles, and most of them cannot afford to pay rapid transit fares. Geetam Tiwari has proposed a fixed route bus rapid transit system for Delhi that will have the advantage of a rail-based system but will entail much lower cost. By integrating this bus rapid transit system with more traditional modes like walking, riding bicycles and rickshaws, and three wheelers, Delhi can have a more cost-effective transport system (Tiwari, 2002).

To weigh various options to achieve planned goals, urban authorities in Asia have used various qualitative and quantitative methodologies such as cost-benefit analysis, cost-effectiveness analysis, and sensitivity analysis to assess the viability, effectiveness, efficiency and profitability of various options. They have also used tests of potential outcomes such as possible effects of projects on employment, capital investments, people's mobility, and social class formation. Environmental impact and social impact analysis are also widely used in deciding what options to pick. One approach that has been used in Dhaka has been scenario building that was used to analyse the Metropolitan Area Integrated Urban Development Project. Scenario A focused on development of land close to the inner city providing for heavy investments for flood protection. Scenario B advocated land development in the urban periphery where localities were not subject to flooding. Scenario C also proposed developments in the northern and western suburbs where flooding was not a problem. For each of these three scenarios, the costs of land acquisition, flood control measures, roads and other infrastructure, and operation and management were calculated. The expected benefits were also assessed, including employment creation, access to services, agricultural production and environmental improvement. After careful analysis of the costs and benefits, the planners concluded that a combination of Scenarios B and C were the most appropriate ones for the Dhaka city region.

A common problem of mega-urban region plans in Asia is that they are great in expressing grand visions but terribly vague about what financial, material, human and institutional resources will be required to achieve these. In reality, most city and metropolitan governments in the region do not have adequate resources and from a third to more than half of their incomes are in the form of grants in aid and their shares of tax revenues allocated by central governments. The potentials for relying on "user charges" to pay for urban infrastructure are quite limited because of the low incomes and capacity to pay of most

citizens. In some Asian mega-urban regions, private-public partnership has been used to finance urban infrastructure and services, and there have been quite a few successful cases showing the viability of this approach. Programs and projects that have tapped the material and human energies of the people themselves in such schemes as garbage collection, composting, recycling and disposal as well as community-based sewage and sanitation schemes have also proven successful in cities like Dhaka and Karachi.

C. The Governance of Mega-Urban Regions

The recent literature on urban governance has been mainly concerned with how public affairs in city regions can be conducted effectively and efficiently. This is probably because most studies have been conducted in technologically advanced countries where provision of urban services is very important. In most Asian countries, however, city regions are not just settlements that rely on efficient delivery of services – they are the engines of economic growth, the agents for transformation of societal values, the loci of authority and power, and the source of national leaders. Thus, the governance of Asian mega-urban regions goes beyond mere management of urban services. In the words of a recent study: "urban governance is the relationship between civil society and the state, between rulers and the ruled, the government and the governed" (McCarney and others, 1995). As such, it is concerned with political activities such as articulation of a common vision for the city region, selection of political leaders, formulation and adoption of development policies and programmes, mobilisation of resources, and the implementation and evaluation of government programs and projects.

1. Governance Problems in Mega-Urban Regions

a. Fragmentation and Jurisdictional Conflicts

Political and administrative fragmentation of local units in Asia is often related to the survival of indigenous local units that encourage a spirit of localism among the people (e.g., *barangays* in the Philippines, *kampungs* in Indonesia and Malaysia, *panchayats* in India, or *upazilas* in Bangladesh). Fragmentation is also a legacy of colonial governance structures such as municipal corporations, military cantonments, special service wards and development trusts. In national capitals, most urban functions are carried out by central government ministries, special purpose authorities or quasi-governmental corporations. The governance structure is also hierarchically fragmented at ward, district, municipal, metropolitan, prefecture, provincial, and central levels.

In India, Bangladesh, and Pakistan, the tradition of local autonomy is deeply rooted in indigenous local units, legal norms and political processes. Local leaders often members of dominant families try to preserve their bailiwicks and contribute to political fragmentation. Local governments jealously guard their autonomy and central government agencies are reluctant to devolve some of their functions to metropolitan bodies. In Dhaka, for example, proposals for metropolitan consolidation started as early as 1951 with the creation of the Dhaka Improvement Trust (DIT). The DIT was charged with formulation of a regional master plan but political turmoil caused by Partition disrupted this process. After independence in 1971, the Dhaka Metropolitan Development Ordinance created another metropolitan authority. The Dhaka Municipal Authority (DMA) established in 1982 proposed a single metropolitan organization to govern the metropolitan area but local government leaders rejected the idea. The creation of RAJUK (Capital Development Authority) in 1987 revived the idea of a unified body to carry out planning and management functions but the agency's efforts failed. The main objections to metropolitan consolidation came from no less than 42 organizations operating in the metropolitan area including central government agencies (Ministry of Housing and Public Works, Ministry of Local Government), specialised boards (Dhaka Electric Supply Authority, Dhaka Water and Sewerage Authority), local government units (Dhaka

City Corporation, Dhaka Cantonment Board), and traditional local units (*pourashavas* or municipalities and *upazilas* or rural sub-districts).

In Metro Manila, metropolitan consolidation efforts were started in 1975 with the creation of the Metro Manila Commission. However, because the MMC was headed by the former First Lady, Mrs. Imelda Marcos, it was abolished in 1986 when the Marcos dictatorship was toppled. So strong was the antipathy to metropolitan governance that the 1987 Philippine Constitution, promulgated under former President Corazon Aquino, made the creation of metropolitan governments extremely difficult by requiring that such structures can be established only upon the voluntary and complete concurrence of all local government units in the metropolitan area. The present Metro Manila Development Authority (MMDA) is weak and dependent on financial contributions of the 17 local governments in the national capital region. In 2002, the Chairman of the MMDA complained that the problem of flooding in Metro Manila could not be solved because of lack of cooperation of Mayors and City Councils. He complained that some Mayors did not even attend meetings of the MMDA Council but sent junior staff members instead (Laquian 2002a).

b. Lack of financial capacity

Most local governments in Asia are dependent on tax revenue allocations, grants in aid, and other forms of financial assistance from central or provincial governments. The local revenue base is weak. Income from real estate taxes, the usual source of local government revenue is low – a study carried out for the Asian Development Bank found that most real properties in Asian cities are under-assessed and that less than 5 per cent of real property taxes are based on real market value (Roberts and Kanaley, 2006). Most Asian governments do not allow local government units to borrow from foreign and domestic sources for capital investments. Institutional and private sector investors are also hesitant to lend money for public infrastructure and services without national government (sovereign) guarantees, which governments are often reluctant to give. While public agencies provide urban services like water, sanitation, and transport, cost recovery through user charges and fees is often inadequate. For example, a large proportion of potable water supplied in many Asian cities is unaccounted for. So-called non-revenue water (NRW) has been estimated at 62 per cent in Metro Manila, 53 per cent in Delhi, and 51 per cent in Jakarta. The huge water loss is attributed to leakage from ancient pipes, unauthorised and illegal tapping of water mains and public standpipes, and the non-payment of user charges by public and private enterprises (Brennan-Galvin, 2007).

c. Popular participation

Most Asian governments are committed to people's participation in public decision making but many local government theorists fear that urban governance structures on the scale of metropolitan areas or mega-urban regions are too big and too bureaucratic to make this possible. In India, for example, the 74th Amendment to the Constitution decentralised authority and powers to local governments in 1992. The amendment was designed to provide for a participative platform in metropolitan planning and governance. However, popular participation was focused on the establishment of urban wards because there was "a growing feeling that in the larger municipal bodies the citizens do not have easy access to the elected representatives since the ward sizes become very large." Cities with a population of more than one million were supposed to organize metropolitan planning committees where various stakeholders could participate in decision making but as of the middle of 2007, only the Kolkata Metropolitan Planning Committee had been established (Sivaramakrishnan, 2007).

Similarly, the Local Government Code of 1991 decentralized powers to local government units in the Philippines in an effort to encourage "grassroots democracy." However, like other decentralisation measures before it, the law devolved powers to units like the *barangay* or village council, municipalities

and cities. These local units, however, did not have the financial resources, tax base, or the human and managerial resources to actually bring about positive development. The law was silent on the issue of setting up metropolitan or mega-urban governance arrangements, perhaps because the 1987 Constitution required that such units of governance required the common agreement of local government authorities to voluntarily create a federation of local units, a near-impossible move in a country where acute political partisanship at the local level is the norm (Laquian, 2002b).

d. Transparency and accountability

Because most urban infrastructure projects in mega-urban regions are big ticket items, they offer excellent "rent seeking" opportunities for government officials. Although most governments have passed legislation to enhance transparency and accountability, graft and corruption continues to be a serious problem. The reasons for this are well known: (a) political officials have to spend large sums of money to win elections and they have to recoup these "investments" once they get elected; (b) administrators and civil servants have low pay and they are tempted to augment these by engaging in graft; (c) economic and political life in most cities is dominated by powerful families and "political dynasties" that remain in power by sharing rent seeking opportunities with petty leaders in their political machines; (d) military groups who have control over the official use of violence gain political power and use these for economic advantages; and (e) the judiciary is often weak and also corrupted, thereby becoming ineffective in demanding accountability. Research on graft and corruption in Asia has revealed the complex cultural factors that underpin its prevalence. The strong kinship ties in Asian societies is said to encourage family and clan members to protect each other. The tradition of gift giving and reciprocal granting of favours makes it difficult to differentiate between gifts and bribes. A value system based on avoiding shame and loss of face rather than suffering from guilt makes not getting caught a stronger motive than not doing something because it is wrong. Finally, the real or imagined belief that all officials (especially top level ones) are all corrupt encourages potential grafters.

In some Asian city regions, of course, judicial reforms have helped in enhancing accountability and controlling corruption. In Hong Kong, research on corruption found that one of the main reasons for corruption was the overly cumbersome process for deciding city affairs. The study found that if there are too many steps in decision making, corruption is encouraged because each step opens up opportunities for rent seeking. Aside from streamlining bureaucratic processes, Hong Kong also created the Independent Commission against Corruption (ICAC) and gave it strong powers to punish erring officials. In Singapore, the certainty that corrupt acts are going to be punished and that sentencing would be done transparently and quickly have also served to inhibit corruption.

In the Philippines, a strong civil society and an unbridled mass media has been a factor in efforts to limit graft and corruption. Non-governmental organizations (NGOs) have taken on a watchdog role and exposed cases of corruption. The Philippine Center for Investigative Journalism (PCIJ) has been instrumental in exposing many cases that have resulted in the indictment of a number of officials. Despite these efforts, however, corruption continues to be a fact of life especially in Metro Manila. Lack of transparency and accountability is particularly widespread in the awarding of large contracts for urban infrastructure and services, procurement of supplies and materials, tax assessment, collection and audit, and appointment of individuals to lucrative posts such as the customs bureau or the internal revenue service (Laquian 2002b).

3. Types of Mega-Urban Region Governance

There are essentially three approaches to governance of mega-urban regions in Asia: (a) autonomous local government systems; (b) mixed regional governance approaches; and (c) unified governance systems. These systems are based on the types of political structures used to perform specific

functions, where formal authority is located and the relationships among local units with each other as well as with the central government.

a. Autonomous local governance

In an autonomous local governance system, individual cities and municipalities in a city region function independently of each other. Responsibility for urban infrastructure and services is lodged in each local government unit. A good example of autonomous local governance was Metro Manila before the creation of the Metro Manila Commission (MMC) in 1963 when four cities with their own city charters and four towns belonging to the Province of Rizal ran their own affairs. In those days, a road built in one local government jurisdiction ended at the border and was not continued by another. If a fire broke out in one city, the fire department of another did not come to help, especially if the mayors of both localities belonged to different political factions. This local fragmentation was supposed to have been solved by the creation of the MMC which had been replaced by the Metro Manila Development Authority (MMDA) in 1995 but fragmentation continues. The MMDA, however, continues to be a weak agency. It is formally in charge of comprehensive planning, land use control, urban renewal, traffic and transport management, solid waste disposal, flood control and drainage, engineering and public works, and public safety but it does not have the financial and human resources to carry out these function. It has prepared a metropolitan development plan but this has not been formally adopted and made into law. Thus, individual local government units pass their own zoning codes and regulations without any reference to the plan (Laquian, 2002a).

b. Mixed regional governance

In a mixed regional governance system, authority and power over city region affairs are shared by local and central government bodies. For example, services such as public works and construction, education, public health and environmental protection are vested in central government ministries; some area-wide functions like water supply, electricity, solid waste disposal, and traffic control may be lodged in a metropolitan authority, and purely local functions like garbage collection, police, and fire protection may be the responsibility of local government units.

The Special Capital City District of Jakarta or *Jakarta Raya* is a good example of a mixed regional governance system. There are at least four levels of governance in the capital district: (a) central government ministries; (b) Jakarta Raya itself which is a Level 1 unit (with the status of a province); (c) municipal level bodies called *kabupaten* or *kotamadya* such as Tangerang, Bekasi and Bogor; and (d) village level governments. In areas within Jakarta Raya that belong to the Province of West Java, however, there are smaller local government units such as (e) administrative zones called *wilayah kota*; (f) sub-districts or *kecamatan* within each administrative zone; (g) local units called *kelurahan* within each sub-district; and (h) neighbourhood and street level bodies called *rukun warga* and *rukun tetanga.* The sheer number of governmental bodies in Jakarta Raya has created coordination difficult. For example, problems like environmental pollution, over-drawing of ground water for commercial, industrial and household use, and the uncontrolled activities of private housing developers especially in the outlying areas require closer cooperation and coordination among the local bodies (Dharmapatni and Firman, 1995).

c. Unified regional governance

To cope more effectively with problems created by local government fragmentation, unified regional governance has been proposed in a number of Asian mega-urban regions. However, there are no examples as yet of such a broad-based governance structure. At most, there are unified *metropolitan* governance systems such as the Bangkok Metropolitan Administration (BMA), the metropolitan

governments of Beijing, Shanghai and Tianjin, and the national capital authorities of Delhi and Dhaka. In these metropolitan areas, an institution is vested with the authority and power to manage urban affairs. Central government agencies continue to carry out specific functions in the region but, in general, most functions needed for the smooth functioning of the area are lodged in the metropolitan body.

One problem posed by unified regional governance is the sheer size of mega-urban regions and the complex variety of local units included within their territories. Fears have been expressed that the existence of a second governance tier between autonomous local units and the central government will hinder citizen participation and cause delays in decision-making. There are those who argue, however, that hi-tech innovations in electronic communication will enable citizens, assisted by civil society activist groups and mass media to participate more easily in public decision-making. This is certainly the vision in the planned developments of Cyberjaya and the new administrative capital of Putrajaya in Malaysia that are linked together by "smart" communication networks.

Some advocates of mega-urban region governance are hoping that the formulation of comprehensive city region plans will eventually lead to the creation of unified mega-urban region governance. For example, in the Pearl River Delta, there is a call for closer integration of public decision making among the metropolitan governments of Guangzhou, Shenzhen, Hong Kong, Zhuhai and Macau. Planners who have cooperatively initiated the formulation of a mega-urban region plan envision a future where they will be able to achieve their development goals of "competing together rather than competing against each other" (Yeh, 1996).

D. Inclusive Development in Mega-Urban Regions

As the forces of globalisation dominate developments in the 21st century, mega-urban regions have become key foci of economic growth, technological innovations and societal change. As John Friedmann has observed, to understand the functioning of the world economy, it is more instructive to consider what is happening in 30 or 40 mega-urban regions or quasi-city states rather than events in 185 nation-states. Mega-urban regions are "linked to each other in a global system of economic, social and political relations." They are "vital command centres, switching points, and global investment hubs through which the national economy is articulated – a network of city-regions that function as the new core areas of the world economy" (Friedmann, 1998).

The main challenge in the world at present, as noted by the presidents of both the World Bank and the Asian Development Bank is how to achieve "inclusive development" that encompasses all sectors of society. Advocates of mega-urban region development in Asia and elsewhere are hoping that inclusive development can be achieved by using planning and governance mechanisms for mega-urban regions. As they begin to understand the dynamics of economic and social processes in these mega-urban regions, they envision them as the generators not just of economic development but of genuine social and technological changes.

Careful analysis of mega-urban regions reveals that inclusive development can be achieved in these places in at least five ways: (a) by closely integrating rural and urban areas within mega-urban regions; (b) by including all levels of local governments in the city region in planned development and governance schemes; (c) by including all sectors of society, especially the poor and underprivileged in city region development; (d) by integrating all urban infrastructure and services in area-wide networks; and (e) by conceiving of city region development as a policy instrument for achieving economic, social and environmental sustainability.

Past approaches in mega-urban region planning and governance have been negatively influenced by an approach that drew a sharp distinction between urban and rural areas. Inclusive development

realizes, however, that both urban and rural sectors are essential part of a mega-urban region. It recognizes that food is a basic necessity and it should be produced as close to consumers as possible to cut down on transport, packaging, preservation and handling. Efficient urban waterworks systems require protection of watershed areas outside the political boundaries of the city. The disposal of solid and other types of urban waste demand sanitary land fills or incinerators located far from population centres. Forests, green areas, parks and open space act as the lungs of the city and have to be included in the mega-urban plan to achieve environmental sustainability.

City region development requires that all types of governance structures including big cities, small and medium-sized cities, provincial and state units and agencies of the national government should be included in the whole development strategy. Decentralisation and adherence to local autonomy fragments governance structures and makes cooperative and coordinated action difficult. Improved communication technologies in mega-urban regions enables citizens, with the assistance of civil society groups and the mass media make it possible for citizens to receive information they need for active participation in public decision making. Policies and strategies that achieve the welfare of the whole society rather than the particularistic interests of specific groups are needed for inclusive city region development.

Planning and governance of mega-urban regions should include all sectors of society within the expanded territory. It should not create separate and well-serviced "gated communities" for the rich in some areas and ghettoized slums and squatter communities of the urban poor on the other. It should treat as stakeholders men, women, the young, the elderly, ethnic groups, cultural groups, and all other segments of society who should be free to participate in decision making.

Unified development requires an integrated approach to providing urban infrastructure and services in mega-urban regions. Planning a waterworks system, for example, requires careful consideration of energy generation (as in hydroelectric projects), food production (irrigation for agricultural crops), health and sanitation (faecal matter contaminates sources of water supply), solid waste management (uncollected garbage dumped into rivers and streams clogs up waterways, hampers drainage and pollutes surface and ground water), and transport systems (air and water pollution from vehicle exhausts causes acid rain that degrades surface water sources).

Finally, inclusive development calls for strategies for achieving economic, social and environmental sustainability. Economic sustainability requires the full valuation of natural resources, the maintenance of capital stock, promotion of growth with equity, poverty reduction and the internalisation of the impact of economic activities. Social sustainability requires consideration of "social capital" which enhances the capabilities of human beings (education, good health, skills training), means for achieving social stability, the empowerment of disadvantaged people, and preventing social disorganization. Environmental sustainability addresses ecosystem integrity, habitat conservation, the preservation of species and consideration of the carrying capacity of ecological systems. By including all these aspects of sustainability in the planning and governance of mega-urban regions, the role of these city regions in overall development will be enhanced.

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INTERNAL LABOUR MIGRATION IN CHINA: TRENDS, GEOGRAPHICAL DISTRIBUTION AND POLICIES

Kam Wing Chan, University of Washington, USA

A. INTRODUCTION

Whether you like it or not, products "Made in China" are going to stay in the foreseeable future. China (i.e. mainland China) would not have become the "world's factory" had it not been for the plentiful supply of low-cost young migrant labour from the countryside to its coastal export-processing industrial cities (Fallows, 2007). Indeed, migrant labour is definitely part of China's economic success story in the last quarter century (and, as will be explained below, part of its problem too). Internal migration, mainly from rural to urban area, has also driven China's rapid urbanization (Chan and Hu, 2003). This perhaps irresistible deluge of labour has been the focus of much attention of journalists and scholars for quite some time. Some journalists have even contended this human wave of movements in China the world's largest, and even the largest in history (Scott, 2006; Xiaokang, 2007).

Despite the importance and the huge attention on this subject (see for instance, Davin, 1999), the study of migration in China continues to be plagued by many problems in statistics and, relatedly, interpretations (Goodkind and West, 2004; Liang and Ma, 2004). Understandingly, migration is a more "elusive" component of demographic change than birth and death. The Chinese case is much more complex because of its institutional arrangements and resulting population/migrant management and statistical reporting systems. The difficulties in tackling the Chinese migration statistics can be illustrated by the fact that the United Nations researchers once called the Chinese floating population, the largest migrant group inside China, "statistically invisible" (United Nations, 1999, p. 66). Others, such as Roberts (2002), term it "invisible residents." Indeed, in order to get to some consistency and the "truth" of the trends, there is often quite a bit of a "hide-and-seek" game one has to play with Chinese population and economic statistics (Scharping, 2002; Holz, 2002). An assortment of seemingly incongruent, or even contradictory, migration statistics have been used or reported (see Mallee, 1998; Solinger, 1999, pp.19-21), and they are often misinterpreted.[1] In order to study migration and policies, we will begin our work ground up by sieving through the data and synthesizing them whenever possible. The next two sections of the paper build on the specific works of Mallee (1998), Liu and Chan (2001), and Chan (2001; 2007). We then assess the recent trends and the geographical patterns, taking into account the latest data made available. Finally this essay looks at two broad areas of policy importance to migration: migration and regional disparities, and migration and the reforms of the *hukou* system. This will also be useful in helping us better migration dynamics and complexity, and perhaps also debunk the claim of a paradoxical co-existence of rising migration geographical disparities in the last 15 years.

B. THE *HUKOU* SYSTEM AND DEFINITIONS OF MIGRANTS

Any meaningful analysis of Chinese migration must begin with an understanding of the *hukou* (household registration) system and its relationship with migration. In China, migration was an area of heavy state control in the past and still active state regulation at present. People wanting to change residence permanently are required to get approvals from one or more authorities (Chan and Zhang, 1999). A change in residence is deemed legal only when it is formally approved and registered with the public security authorities. For urban residents, changing residence *within* the same city or town (i.e. "moving" the *hukou* to a new address) due to housing change (moving to a new apartment) or residential changes caused by marriage is generally permitted. A similar freedom is also given to rural residents

moving *within* the rural areas because of marriage or other family reasons. However, formal (or "permanent") moves crossing city, town and township boundaries are heavily regulated and require the possession of a "migration permit" issued by the public security authorities. The permit is granted only when there are good reasons, especially when the move serves, or at least is not at odds with, the central or local state interests defined in various policies, such as controlling the growth of large cities (Cheng and Selden, 1994; Mallee, 1995; Chan and Zhang, 1999). Hence, to an ordinary person without official connections, getting a migration permit for moves from rural to urban areas, or from smaller cities to larger cities is still very hard, if not totally impossible. The *hukou* system in the pre-reform era functioned as a *de facto* internal passport mechanism; today, it still serves many similar functions, though peasants can now travel to many places to take up jobs or stay with relatives "temporarily" – i.e. without local *hukou* – meaning that they are ineligible for many benefits and rights ordinary local residents have.

At the administrative operational level, rural-urban migration involves two steps: converting one's status from rural to urban and getting permission to move to a specific urban centre. The latter – getting the local *hukou* – is the final substantive outcome (Chan and Buckingham, 2008). Therefore, one can differentiate *hukou* and non-*hukou* migrants based on whether or not local *hukou* is conferred in the move. Two categories of migrants can therefore be differentiated:

a. Migration with "local" residency rights (*bendi hukou*) (hereafter, *hukou* migration);

b. Migration without *hukou* residency rights (non-*hukou* migration) (see also Chan et al., 1999).

In China, officially only *hukou* migration is considered as *qianyi* ("migration"). Anything else is merely *renkou liudong* (population movement or "floating"), implying a low degree of expected permanence: the transients are not supposed to (and are legally not entitled to) stay at the destination permanently, and therefore they are often termed "temporary" migrants, despite the fact that many of non-*hukou* migrants may have been at the destination for years. *Hukou* migration, on the other hand, is provided with state resources and falls into the "planned" migration (*jihua qianyi*) category, whereas the floating population is outside of the state plans. From the Government's administrative point of view, the *hukou* and non-*hukou* differentiation is the most important. The Chinese *hukou* system basically keeps track only statistics of *hukou* (*de jure*) population and recently, also the registered non-*hukou* population (Chan, 2007). Since the early 1980s, along with reforms, researchers and statistical agencies have also started to collect information on migrants based on a *de facto* basis through its various kinds of surveys.

To many observers, what stands out in China's recent mobility change is not only the vast numbers of migrants reported here and there, but also that a great portion of them are, confusingly, permanent "temporary" population (non-*hukou* population), and enormous circulating labour moving back and forth between urban centres and villages every year (Roberts, 1997; Fan and Taubmann, 1999; Liang and Ma, 2004). Many of these labourers and "circulators" may not qualify as migrants defined in the conventional way (that is, requiring residence at the destination for at least 6 months) because they may stay in one place for only a few months and then move on to another place in search of jobs. The continuing massive waves of "temporary" migrant labourers in the urban areas, however, pose a host of data measurement and policy issues, some similar to but some different from those brought by "permanent" migrant labourers from the countryside.

Table 1 presents the "universe" of migration in China at the national level by use of several major "migration" series, on *de jure* or *de facto* basis (or both), from a variety of sources. Some of these data were collected at the destination; other at the origin (mainly villages). Despite the variety and the varying quality of each data set and the complaints of Chinese watchers about the difficulties of using them, these data, when analyzed side by side, have shown some surprising consistency and use, as will be illustrated below.

TABLE 1 – MAJOR AGGREGATE MIGRATION FIGURES, 1982-2006 (IN MILLIONS)

	Hukou Migrants (Yearly flow figures)	*Non-Hukou Population (Stock figures) or "Floating Population"*					
		Accepted general estimates	*"Temporary Population"*			*"Rural Migrant Labour"*	
			Registered with MPS	*National Censuses/ NBS Population Surveys*		*Data compiled by Lu et al (2002)*	*Estimates based on MOA Surveys*
Geographic boundary (to cross)	*City, Town, or Township*			*Township, Town, or Street*	*County, or City*	*Generally, township*	*Township*
Minimum length of stay	*No minimum*	*Usually overnight*	*3 days*	*6 months*	*6 months or one year*	*Regularly engaged in work outside townships*	
Series	A	B	C	D	E	F	G
1982	17.30	30			6.6 (1 yr)		
1985	19.69	40					
1987	19.73				15.2 (6 mos.)*		
1988	19.92	70				26.0	
1989	16.87					30.0	
1990	19.24				21.6 (1 yr)		
1991							
1992	18.70	60-70					52.8
1993	18.19	70				62.0	
1994	19.49	80				70.0	
1995	18.46			49.7	29.1**(6 mos.)	75.0	69.0
1996	17.51			60.0			
1997	17.85	100	37.3	61.8			
1998	17.13		40.5	62.4			79.8
1999	16.87	100	40.4	63.7			
2000	19.08		44.8	144.4			
2001	17.01		55.1	N/A			
2002	17.22		59.8	108.0			
2003	17.26	140	69.9	105.9			98.2
2004	19.49		78.0	103.0			102.6
2005	19.33		86.7	153.1			108.2
2006			95.3	121.6			114.9

Sources: A: MPS (1988-2006a); NBS and MPS (1988)
B: compiled from various newspapers (see Chan, 2006).
C: MPS (1997-2006b)
D and E: NBS (1988), SC and NBS (1985; 1993; 2002; 2007), National Population Sample Survey Office (1997).
F: Lu et al. (2002)
E: *Renmin ribao* (2003), MOA (2006a; 2006b).

NOTES: * the geographic boundary is based on city, county or town.
** the geographic boundary is based on county- level units.
MPS = Ministry of Public Security. NBS = National Bureau of Statistics. MOA = Ministry of Agriculture

The *Hukou* Migrant Series (A): This series refers to *hukou* migrants and is the only "flow" data series in Table 1. This is the number of in-migrants who are formally granted *hukou* status in new

destination (city, town and township) each year. The *hukou* migration figures are drawn directly from statistics published by the Ministry of Public Security (MPS). They represent the total number of 3 officially approved *hukou* (residence) changes within a particular year of all types (from townships to cities; from cities to cities, etc.) but excluding those occurring *within* cities, towns and *within* townships.[2] From our understanding of the logistics of data collection in this area, it is very likely that these numbers are tabulated from the numbers of migration certificates issued each year. Though these numbers are not totally problem-free (Mallee, 1998; Liu and Chan, 2001), observers generally consider these problems to be small and the numbers are reasonable indicators of the *hukou* migration (Yang, 2003).

The Non-*Hukou* Population Series (Series B-G): This refers to the common term "floating population" (*liudong renkou*) used in many sources, from public media to more serious statistical tabulations. It refers to the population staying in an administrative unit (usually city, town, street, or township) other than the place of their *hukou* registration. This group does not belong to the *de jure* population; there are some huge discrepancies in the *de facto* and *de jure* population for some migrant cities, such as Shenzhen.[3] Different from the *hukou* migration data, the non-*hukou* population series presented in Table 1 are all "migrant stock" figures, which represent the cumulative numbers (or the balance) of non-*hukou* migrants who still exist in a certain locale at different points in time. Owing to the different purposes, coverage and criteria used in defining the geographic boundary and the minimum duration of stay, the numbers in each series may not be quite different even for the same year.

Series B: This is broadest, also most popularly used, definition of floating population, which covers usually anyone staying overnight in the destination without the local *hukou*.[4] As such, this version of the floating population that covers a diverse bundle of people such as tourists, people on business trips, traders, sojourners, and peasant migrants, both employed and unemployed. This definition is based on a *de jure* consideration, and not a *de facto* one, in the sense that someone without a local *hukou* can stay in a place for several years and is still considered as a floater. The numbers in circulation includes broad guestimates of the stock of floating population at certain times. Some are educated guesses; many more are extrapolations, presumably, from other more reliable series and sample surveys (such as Series C-E and rail passenger volume figures and city surveys) (see Solinger, 1999). Presented in Table 1 are some “accepted” numbers compiled from a variety of sources. The neatly rounded numbers used indicate the imprecision of this series.

Series C: Another series of floating population, beginning in 1997, is supplied by the Ministry of Public Security (1997-2006b). By law, anyone staying in places other than his/her place of household registration for three days or more should register with the police and apply for a *zanzhu zheng* (“temporary resident permit”). Therefore, this number is also called “temporary population” (*zanzhu renkou*). Obviously, a large number of the floaters fail to comply (*Renmin Ribao,* 1995), contributing to the large discrepancies between Series B and C. Probably because of the floaters’ lack of legitimate residence status in the destination and the logistical difficulties in tracking them down, there was no attempt made to count the floaters for the whole nation until the 2000 Census. The experience in 2000 shows that the task was extremely challenging, fraught with problems (see, for instance, Yu, 2000; Chan, 2003).

Series D and E: These two are basically one series put out by National Bureau of Statistics (NBS) with some definitional and coverage changes over time. The population are defined first on a *de jure* (those without a local *hukou*) and then on a *de facto* criterion. This *de facto* definition stipulates a far longer residence requirement (6 months or one year) than in B and C. Therefore, Series D and E

expectedly, count a smaller population than Series B. The National Bureau of Statistics still calls it "floating population"; elsewhere, it is known as "temporary population" or "temporary residents" by some researchers (for example, Yang, 1996). Though, again, this group is not necessarily "temporary." In fact, by this definition, it is less temporary because most visitors, tourists, and shorter-term migrant workers are excluded. The National Bureau of Statistics rightly treats this group as part of the *changzhu* population ("residents") in its various statistical counts. And more recently, the National Bureau of Statistics has also stipulated that this group be counted as part of the resident population in calculating per capita GDP at the local level[5] (Chan, 2007). Data for Series D and E are drawn from national censuses (1982, 1990 and 2000), the "mini-censuses" (One Per Cent National Population Sample Surveys) in 1987, 1995 and 2005, and annual surveys (from 1996 on) conducted by the National Bureau of Statistics at the place of destination. The numbers in Series D are naturally larger than those in E even for the same year (such as in 1995) because D is based on smaller geographic units.

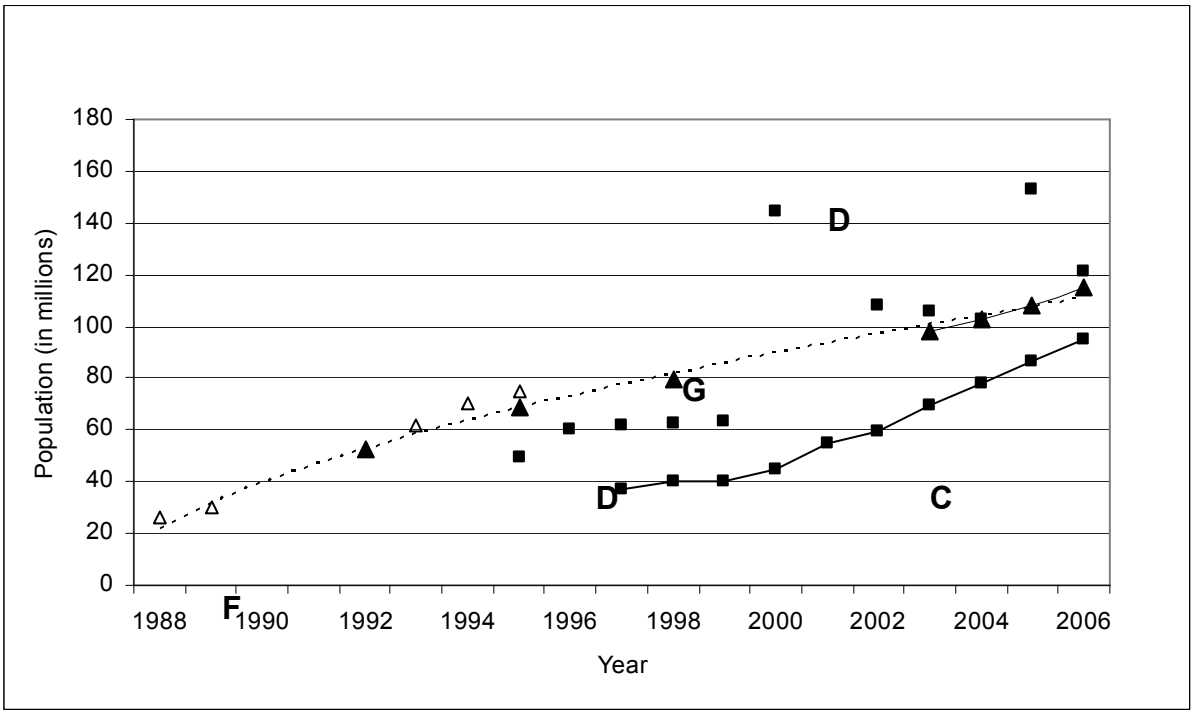
Series F and G: These are the "rural migrant labour" (*minggong*) series. Massive rural labour outflows in search for work are the most important aspect of China's geographic mobility in the last twenty years. "Rural migrant labour" is a definition that counts only the working population without local *hukou* in the destination and from the countryside. By inference, it is a subset of the floating population. Different from B, C, D and E, derived from the destinations, those of the rural migrant labour figures are collected from sample surveys conducted in the rural areas. Most of the rural migrant labour is unskilled labour; only a small percentage are skilled craftsmen and traders, often self-employed (Li and Hu, 1991). A portion of the *mingong* is seasonal, operating in synchronisation with farm work schedules (there are more outflows in winter when there is not much work on the farm). Numerous large-scale national surveys of rural migrant labour have been conducted, especially since the early 1990s, when this group started to grow quite rapidly (Mallee, 1996). Many surveys of this kind are one-time studies and are not strictly comparable; the two series selected for inclusion in Table 1 are either compiled from an established authority on this subject or have annual national sample surveys based on relatively consistent definitions over time conducted by the Ministry of Agriculture. The national rural migrant labour estimates are usually derived from the percentages of outside workers generated from these sample surveys. The sample used by the Ministry of Agriculture covers about 300 villages and 7,000 households and the definition used is very close to what is generally understood as "*mingong*." By this definition (Series G), there were about 100-115 million rural migrant labourers in the country in the early years of the twenty-first century. This series covers a longer time span (1992-2006) with presumed internal consistency.

C. Migration Trends Since the Early 1980s

Based on the figures in Table 1, some general migration trends are identified. Despite the general surge in migration, the annual volume of Ministry of Public Security *hukou* migrants remained quite stable, between 17 and 20 million, throughout the 25 years under study. The rate has actually declined slightly, relative to the size of the Chinese population. An analysis of the detailed MPS (1993-2005a) figures shows that between 80 and 90 per cent of all *hukou* migrants were recorded in urban areas since 1993. The stability reflects strong Government intervention in this area of *hukou* migration crossing city, town and township boundaries, through mechanisms such as a quota system (Chan and Zhang, 1999). The *hukou* migration data have not been much studied, and this is an area that deserves more attention. On the other hand, there is a clear rising trend in the size of the non-*hukou* migrant population since the early 1980s. The various figures about the sizes of the non-*hukou* migrants assembled in that table show a general upward trend in the last quarter century. For instance, the floating population started to grow rapidly in the mid-1980s to about 70 million in 1988, then dropped somewhat in 1989-1991 due to an economic austerity programme, but regained momentum around 1992 through probably 1997, reaching 100 million then. The current figure is probably very close to 200 million. Similarly, over the period between 1992 and 2006, the size of the rural migrant labour more than doubled from 53 million to 115

million. Similar upward trends are also seen from other indicators of non-*hukou* population which have a substantial time span; these data points are plotted in Figure 1. The numbers and trends identified in the 1990s are also broadly consistent with Yang (1996; 2004), Zhao (1998), Chan (2001), and Rozelle *et al.* (1997). Based on the One Per Cent National Population Survey in 2005, there were 153 million "floating population," slightly half of which were registered with the police.

Figure 1. Migration trends, 1988-2006



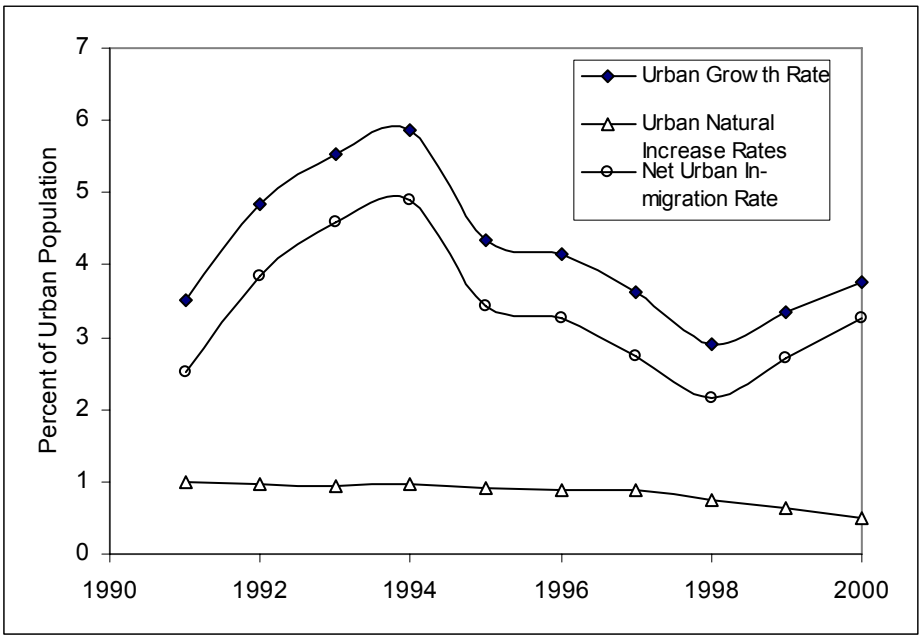
Source: Table 1

NOTES: Letters refer to the data series in Table 1.

However, the trend depicted by Series D is much less consistent: two data points, 2000 and 2005, are clearly "out of the line," far larger than the other years' figures. We know that accuracy of 2000 and 2005 are greater than the rest of the series because they are from either a full census (2000) or a 1 per cent sample (2005) while the rest is from a 1 per 1000 sample. From the research by Chan (2003; 2006) on the 2000 Census data, it appears that the 2000 figure is likely to have over-counted the number of migrants while the 1 per 1000 samples may have under-counted the migrant population. If this same logic can be applied to the figures in 2005 and 2006 in D, then it is reasonable to believe that the "temporary population," defined as such, was between 120 and 150 million in 2005-2006. Another careful examination of the data will show that there was a slowing down of migration in 1996-99. For example, D between 1996 and 1999 only inched up slightly; the average growth rate of G also dwindled to 4.8 per cent per year in 1995-1998, compared to 7.3 per cent per year in 1992-95. It is believed that this slowdown in rural outflows was related to the sluggish performance of the urban economy, job competition from laid-off workers of urban state-owned enterprises, increasingly protectionist policies used by local Governments against recruitment of outsiders, and improvement in the rural economy, at least between 1996 and 1999 (Zhao, 1998; Cai and Chan, 2000). The above trends coincide quite well with the rural-urban migration trend identified by Chan and Hu (2003), as shown in Figure 2, and those in Cai (2002, p. 70). The net rural-urban migration in Figure 2 includes urban reclassification, which was much more significant in the first half of the 1990s than in the second half of the decade. Therefore, the

net migration trend, especially for the period 1990-1995, depicted in Figure 2, will overstate the true net (physical) rural-urban migration.

Figure 2. Annual urban growth and migration rates



Source: Chan and Hu (2003)

D. THE GEOGRAPHY OF MIGRATION

Significant disparities in wages between the urban and rural sectors and among regions explain a great portion of labour migratory flows in China (Chan, 1994; Cai, 1999; 2000; Fan, 2005a). As pointed out earlier, the bulk of migratory flows in the last 25 years involves predominantly those without any *hukou* change (non-*hukou* migration), mainly the rural migrant labour. The root cause of migration is the lack of sufficient gainful employment in the countryside in many agricultural provinces. Because of the serious institutional barriers, mainly the *hukou* system, the rural and urban population segments and the labour markets (as defined by the *hukou* system) operate as two largely separate "circuits" or six strata (Chan et al., 1999; Li, 2004). The choice for rural migrant workers is mainly between a farm job (or no job) at home and a low-end job in the cities. Rural migrant workers move across different geographic scales to make monetary gains, which can broadly balance the wage and living cost differentials between the origin and the destination. Most of them go to nearby towns outside the villages; others cross thousands of miles to big cities on the coast. Two major sources of data of a different nature allow us to examine the national geographic patterns of migration in the 1990s and beyond.

The first set of data is from the censuses (1990 and 2000) and the One Per Cent National Population Surveys in the interim period (1987, 1995, and 2005). In the data covering "migration flow," a "migrant" is defined as a "resident" (staying more than six months or one year in an administrative unit) who lived in a different administrative unit five years earlier. A summary of the aggregate figures are in Table 2. These data, plus those from the 1982 Census, also provide information on the size of the non-*hukou* population (migrant stock), based on roughly similar but not exactly the same criteria, as shown in Series D and E in Table 1. It is important to point out that the 2000 and 2005 data define migrants as those crossing township-level units while the 1990 and 1995 data define migration only as a move

between county-level unit boundaries, as explained in Table 2. The 1995 survey reports a total of 33.23 million migrants crossing county-level units in the preceding five-year period. 72 per cent of some inter-county migration was within provinces; the remaining 28 per cent (9.2 million) was inter-provincial migration.

TABLE 2 – MIGRATION FLOW FIGURES FROM CENSUSES AND MINI-CENSUSES, 1982-2000 (IN MILLIONS)

Year of Census or Survey	*Five-year period*	*Minimum length of stay for non-hukou migrants*	*Geographic boundary*	*Total volume*	*Hukou Migrants*	*Non-hukou Migrants*
1987	1982-87	6 months	County- and town-levels	30.44	20.5*	10.0*
1990	1985-90	1 year	County-level	33.84	18.3*	15.8*
1995	1990-95	6 months	County-level	33.23	N/A	N/A
2000	1995-2000	6 months	Township-level	124.7	43.0*	80.3*
			Of which:			
			Rural to urban	50.32*		
			Urban to urban	45.70*	N/A	N/A
			Rural to rural	22.52*		
			Urban to rural	4.69*		
		6 months	County-level	69.30*	N/A	N/A
2005	2000-2005	6 months	Province-level	38.0	N/A	N/A

Sources: National Bureau of Statistics (1988), State Council and National Bureau of Statistics (1993; 2002; 2007), National Population Sample Survey Office (1997), and Yan (1998).

NOTE: * Tabulated from 1 per cent microdata.

In 1995-2000, the volume of migration increased substantially. Based on the same definition of inter-county migration, the volume had doubled in 1995-2000 – bearing in mind the likely over-counting of migrants in the 2000 Census. Using information from a one per cent survey, one can also classify and estimate the flows by rural/urban origin and destination. The predominant flow was from rural to urban areas (50.32 million), followed by urban to urban flows (45.70 million) (Table 2). The intra-urban flows include a large portion of "residential mobility" within cities.[6] Tables 3 and 4, and Figures 3 to 6 focus on inter-provincial migration in three consecutive five-year periods from 1990 in detail. The total inter-provincial migration volume has increased significantly since 1990, from only 9.2 million in 1990-1995 to 38 million in 2000-2005 (Table 4). The different definitions and procedures used for collecting the data between 1990 and the rest obviously account for a small part of the increase; the remaining growth can be considered to be real. Of all inter-county migration, inter-provincial migration also accounts for an increasing share of all moves in the 1990s (Table 3). For example, its proportion grew from only 28 per cent in 1990-1995 to about 44 per cent in 1995-2000. Such increase is likely to continue in the early twenty-first century.

Figures 3 to 5 show the largest 30 inter-provincial migration flows in each period. They are overwhelmingly towards the coastal provinces, with Guangdong being the prime destination of the flows and the lower Changjiang delta the secondary one. More precise breakdowns of inter-provincial migration based on in-migration, out-migration and net migration by province, ranked by net migration volume are given in Table 3. Plots of the in-migration figures against the out-migration figures show that flows involving major inter-provincial migration provinces are basically unidirectional. The pattern shows largely an "L" curve in Figure 6. In other words, these provinces have overwhelming either in-migration (such as Guangdong) or out-migration (such as Sichuan) with relatively small flows in the opposite direction. As such, the "net percentage," which measures the net inter-provincial migration as a percentage of the total in-migration (the same as out-migration) is a useful gauge of the relative share of the individual provinces in inter-provincial migration (Table 3).

Data in Table 3 indicate that there was a greater concentration of the inter-provincial migration to the coastal provinces over time, especially between the first and second half of the 1990s. In the second half of that decade, the sum of "net percentage" of the top 5 coastal provinces having the largest net inter-provincial migration is 54.1 per cent, compared with only 39.0 per cent in the first half (see also Ding et al., 2005). The high concentration in the coastal provinces continued to be maintained in 2000-2005 (54.8 per cent). Significant convergence into one single province – the largest net population importer – Guangdong, in the 1990s is also clear from Table 3. Based on "net percentage," Guangdong reached 34.3 per cent in 1995-2000, compared to only 19.6 per cent in the earlier period (see also Fan, 2005b). The pattern was slightly altered in 2000-2005 with Zhejiang's rapid rise to become the second net importer, with a "net percentage" of 10.6 per cent. Guangdong dropped slightly to 27 per cent in the most recent period.

On the net exporter side, the opposite trend is true. Sichuan, the largest exporter province, was the single dominant net exporter in 1990-1995 ("net percentage" was -14.1 per cent), far exceeding the second place net exporter (Anhuai, -7.2 per cent) by a significant margin. Sichuan's dominance (the "net percentage" was -11.8) was slightly eroded in 1995-2000, partly because of the split of Chongqing from the province. More importantly, the second, third and fourth largest net exporters (Hunan, Anhui, and Jiangxi) all had "net percentage" values (-7.6 to -9.0 per cent) much closer to Sichuan's in 1995-2000. This has become very clear in the latest data, in 2000-2005: the four largest net exporters have essentially about the same "net percentage" (-7.4 to -8.4 per cent). In other words, in those 15 years, while there was a convergence of the inter-provincial migration flows into one (or two) provinces, origins became more diverse. This is consistent with the patterns depicted in the migration flow maps in Figures 3 to 5. These changes seem to be related to the intensification of the regional industrial restructuring beginning in the late 1980s, whereby inland provinces lost proportionally more manufacturing jobs to the coastal provinces in the second half of the 1990s (Yang , 2004), giving rise, in particular, to the emergence of Guangdong as the "world's factory." The pattern also speaks to the spread of out-migration to a greater number of provinces in the non-coastal provinces.

Further examination of Table 3 also reveals some interesting ups and downs of a few provinces though the line-ups of the provinces are broadly stable in the three periods. Most striking is Zhejiang. Migrants from this province are almost everywhere in the country (and many parts of Europe too) and their flows have been well studied. The province has now changed from being a major net exporter of migrants (the seventh largest net exporter in 1990-1995) to a top net importer of migrants (the third largest in 1995-2000 and second in 2000-2005), likely related to the success of the job growth of the province. With also large net migrations to Shanghai and Jiangsu, the total net migration to this lower Changjiang region was about 23 per cent of the total inter-provincial migration; this is consistent with the observation that this region has now rivalled Guangdong as the prime destination of rural migrant workers. On the other hand, Xinjiang has successively slipped its position in the ranking in those 15 years. Indeed, the flows to Xinjiang are among the largest 30 in the three five-year periods in prior to 2000 (Chan et al., 1999; Figure 3 and 4), this is no longer the case in 2000-2005 (Figure 5).

The poorest provinces, like Guizhou and Tibet, are not among the lowest in rank, reflecting the fact that it is not simply abject poverty that drives long-distance migration (Chan, 2001). While most provinces are predominantly either importers or exporters, indicating a clear regional division of labour in China, there are some notable exceptions, such as Jiangsu, Fujian, Shandong, Hubei, Hebei, and Zhejiang in 1990-1995; Jiangsu in 1995-2000, and Shandong, and Hebei in both 1995-2000 and 2000-2005. The fewer number of provinces in the more balanced in- and out-migration category seems to be consistent with the greater regional economic specialization or polarization that took place in the 1990s. It is also

TABLE 3 – INTERPROVINCIAL MIGRATION IN CHINA, 1990-2005 (IN THOUSANDS)

Rank	1990-1995	Migration			NET %	Rank	1995-2000	Migration			NET%	Rank	2000-2005	Migration			NET%
		In	Out	Net				In	Out	Net				In	Out	Net	
1	Guangdong	1 886	87	1 799	19.6	1	Guangdong	11 501	438	11 063	34.3	1	Guangdong	11 996	1 715	10 281	27.0
2	Shanghai	666	56	610	6.6	2	Shanghai	2 168	163	2 005	6.2	2	Zhejiang	5 062	1 041	4 021	10.6
3	Beijing	658	53	606	6.6	3	Zhejiang	2 715	970	1 745	5.4	3	Shanghai	3 025	375	2 650	7.0
4	Xinjiang	498	61	437	4.8	4	Beijing	1 890	174	1 715	5.3	4	Jiangsu	3 290	1 328	1 963	5.2
5	Jiangsu	748	430	319	3.5	5	Xinjiang	1 142	217	925	2.9	5	Beijing	2 246	330	1 916	5.0
6	Liaoning	371	122	248	2.7	6	Fujian	1 346	625	722	2.2	6	Fujian	1 934	802	1 132	3.0
7	Tianjin	206	35	171	1.9	7	Jiangsu	1 908	1 241	667	2.1	7	Tianjin	908	107	802	2.1
8	Nei Mongol	324	165	159	1.7	8	Tianjin	492	104	388	1.2	8	Xinjiang	577	182	395	1.0
9	Yunnan	231	127	104	1.1	9	Liaoning	755	380	375	1.2	9	Liaoning	674	416	257	0.7
10	Fujian	297	194	104	1.1	10	Yunnan	733	398	335	1.0	10	Hainan	191	158	33	0.1
11	Shanxi	165	79	87	0.9	11	Hainan	218	130	88	0.3	11	Ningxia	74	68	7	0.0
12	Hainan	91	54	38	0.4	12	Shanxi	383	334	49	0.2	12	Tibet	26	31	-6	0.0
13	Tibet	34	6	27	0.3	13	Ningxia	129	87	41	0.1	13	Qinghai	74	85	-12	0.0
14	Qinghai	64	47	17	0.2	14	Tibet	71	35	35	0.1	14	Nei Mongol	394	417	-23	-0.1
15	Ningxia	44	40	4	0.0	15	Shandong	904	878	26	0.1	15	Yunnan	469	601	-132	-0.3
16	Shandong	347	357	-9	-0.1	16	Qinghai	77	123	-46	-0.1	16	Shanxi	210	345	-135	-0.4
17	Shanxi	147	172	-25	-0.3	17	Hebei	770	872	-102	-0.3	17	Shandong	924	1 123	-199	-0.5
18	Hubei	246	291	-44	-0.5	18	Nei Mongol	325	441	-116	-0.4	18	Jilin	218	532	-315	-0.8
19	Hebei	354	427	-74	-0.8	19	Jilin	254	529	-275	-0.9	19	Gansu	118	494	-376	-1.0
20	Gansu	102	178	-77	-0.8	20	Shanxi	423	719	-296	-0.9	20	Hebei	612	990	-378	-1.0
21	Guizhou	181	288	-107	-1.2	21	Gansu	204	561	-357	-1.1	21	Shanxi	255	827	-572	-1.5
22	Jilin	126	260	-134	-1.5	22	Heilongjiang	301	940	-639	-2.0	22	Heilongjiang	195	1 020	-825	-2.2
23	Heilongjiang	307	495	-188	-2.0	23	Chongqing	448	1 103	-655	-2.0	23	Chongqing	427	1 437	-1 010	-2.7
24	Zhejiang	345	618	-273	-3.0	24	Guizhou	261	1 232	-970	-3.0	24	Guizhou	531	1 766	-1 235	-3.2
25	Jiangxi	96	443	-347	-3.8	25	Guangxi	287	1 838	-1 551	-4.8	25	Guangxi	397	2 123	-1 726	-4.5
26	Guangxi	82	532	-450	-4.9	26	Hubei	606	2 210	-1 604	-5.0	26	Jiangxi	499	2 476	-1 977	-5.2
27	Henan	166	680	-514	-5.6	27	Henan	470	2 309	-1 839	-5.7	27	Hubei	501	2 715	-2 214	-5.8
28	Hunan	134	666	-532	-5.8	28	Jiangxi	236	2 681	-2 445	-7.6	28	Hunan	501	3 328	-2 827	-7.4
29	Anhui	101	762	-662	-7.2	29	Anhui	313	2 893	-2 579	-8.0	29	Henan	280	3 433	-3 154	-8.3
30	Sichuan*	171	1 465	-1 294	-14.1	30	Hunan	363	3 261	-2 899	-9.0	30	Anhui	671	3 836	-3 165	-8.3
						31	Sichuan	590	4 396	-3 806	-11.8	31	Sichuan	763	3 941	-3 178	-8.4
Total		9 189	9 189	0				32 282	32 282	0				38 042	38 042	0	
Inter-Provincial Migration as % of all inter-county migration		27.6						44.2						N/A			
Top 5 coastal provinces		4 329	748	3 582	39.1			19 412	1 962	17 454	54.1			25 619	4 789	20 830	54.8

NOTE – * including Chongqing. Sources: NPSSO (1997), SC and NBS (2002, 2007)

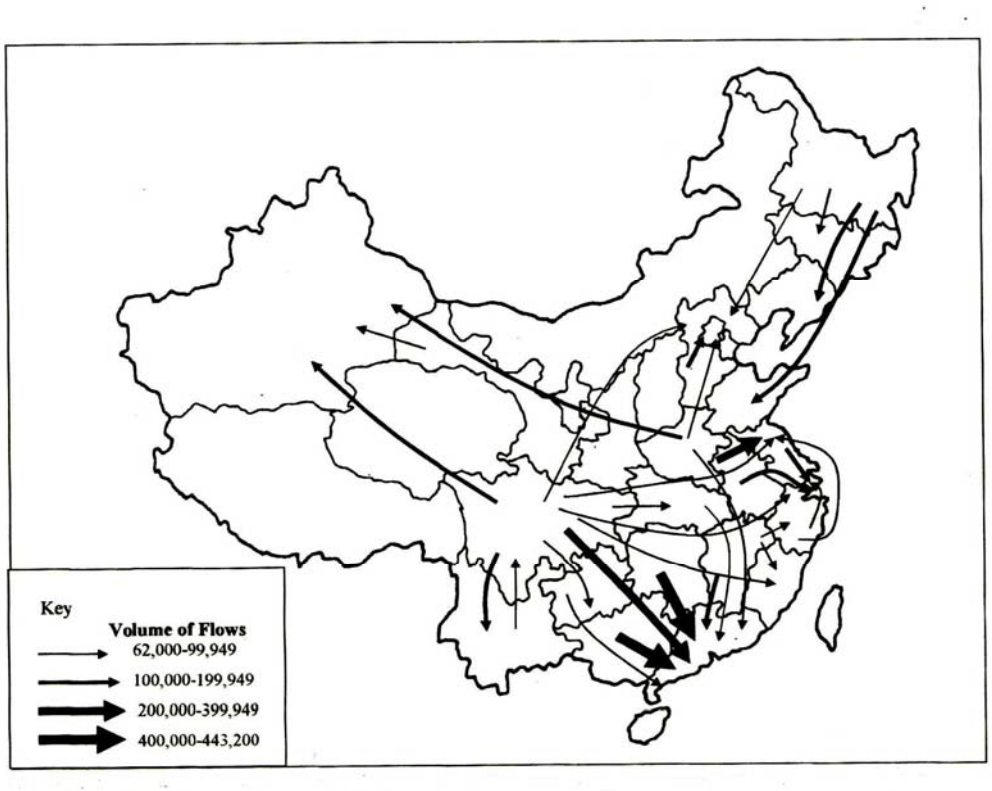
TABLE 4 – INTER-PROVINCIAL MIGRATION, 1990-2005

Period	*(a) Migration from another province (Migration flow)*		
	Total (in millions)	*As % of nation's population at the beginning of the period*	*Increase over the previous 5 years (in millions)*
1990-1995	9.2	0.81	
1995-2000	32.3	2.61	23.1
2000-2005	38.0	3.00	5.7

Year	*(b) Population with hukou in another province (Migrant stock)*		
	Total (in millions)	*As % of nation's population*	*Increase over the previous 5 years (in millions)*
1995	9.3	0.75	
2000	42.4	3.35	33.1
2005	47.7	3.65	5.3

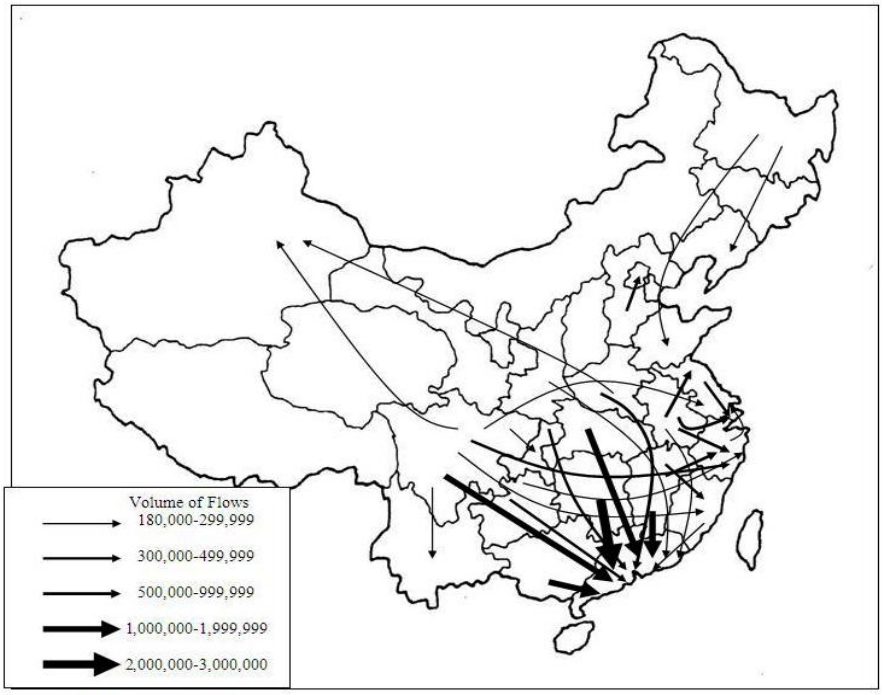
Sources: National Population Sample Survey Office (1997); State Council and National Bureau of Statistics (2002; 2007).

Figure 3. The 30 largest inter-provincial migration flows, 1990-1995



Source: National Population Sample Survey Office (1997)

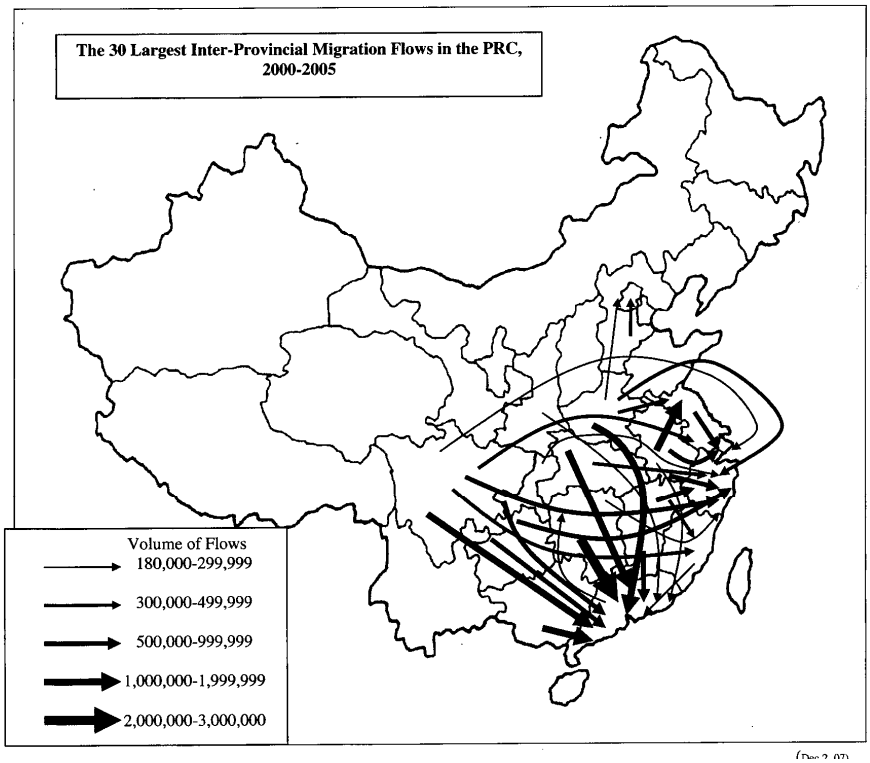
Figure 4. The 30 largest inter-provincial migration flows, 1995-2000



Source: State Council and National Bureau of Statistics (2002).

interesting to note that Guangdong also registered a significant out-migration (1.7 million) in the latest period (2000-2005). A detailed examination of the 2005 data in State Council and National Bureau of Statistics (2007, Tables 12-8) suggests that the out-migration was largely to provinces where in-migrants originated (such as Hunan and Jiangxi). This out-migration is most likely a return migration than a diversion of migrant labour from Guangdong to other coastal provinces.[7] The second major set of migration labour data draws from national surveys of rural household/labour surveys by the National Bureau of Statistics and rural migrant labour surveys undertaken by other agencies or research institutions. The data provide some direct and useful information about this special group (see Mallee, 1998). Because rural migrant labour, defined on the basis of the *hukou* status of migrants, is more a unique Chinese phenomenon, some of the "migration" statistics compiled are less "standard." The national estimates are all derived from large sample surveys which were conducted in different times and often using not exactly the same definition of "rural migrant labour." As mentioned above, this kind of rural labour migration study covers only labour migration from the countryside *regardless* of a migrant's length of stay at the destination. Therefore, these surveys capture more comprehensively all labour migrants, in contrast to the census data which exclude migrants staying in the destination less than six months or a year. These survey data are stock data, different from the census and mini-census migration flow data examined earlier.

Figure 5. The 30 largest inter-provincial migration flows in the PRC, 2000-2005



Source: State Council and National Bureau of Statistics (2007)

Available geographic data from three separate major national sample surveys undertaken in late 1993/early 1994, 1998 and 2004 are particularly useful. According to the 1993 survey, the stock of rural migrant labour (those who participated in work "outside" the village, including seasonal labour) at the end of 1993 and early 1994 reached 51 million, accounting for about one eighth (12.5 per cent) of the country's rural labour force (Table 5). The flows were predominantly toward urban areas (77.9 per cent).

Using the common three-region division,[8] the Central region was the largest source of rural migrant labour, having the highest labour out-migration rate (15.9 per cent) and volume (22.8 million), followed by the West region (13.5 per cent and 15.4 million). The East region had the lowest rate (8.5 per cent) and the smallest volume. This pattern is broadly consistent with the findings of other studies of the early and mid-1990s (such as Rozelle et al., 1997). Because of the large size of the labour force (population) in Central provinces, this region accounted for 44 per cent of the estimated total outflows. The low rate of out-migration in the East region is attributed to the high level of development of rural enterprises in many villages and townships, which absorbed local and nearby rural labour. This is not the case for the Central or West regions. A great portion of the *mingong* movement was within counties (36 per cent) and even more within migrants' own provinces (71 per cent). A decade later, the overall labour out-migration rate almost doubled the one in 1994 (23.8 per cent). The three-region distribution of the rural migrant labour is about the same as before, with the East now gaining a significantly bigger share. Rural migrant labour was essentially found in cities in towns (94.3 per cent), with a large percentage in mainly large cities (62.4 per cent).

Figure 6. In-migration and out-migration by province, 1995-2005

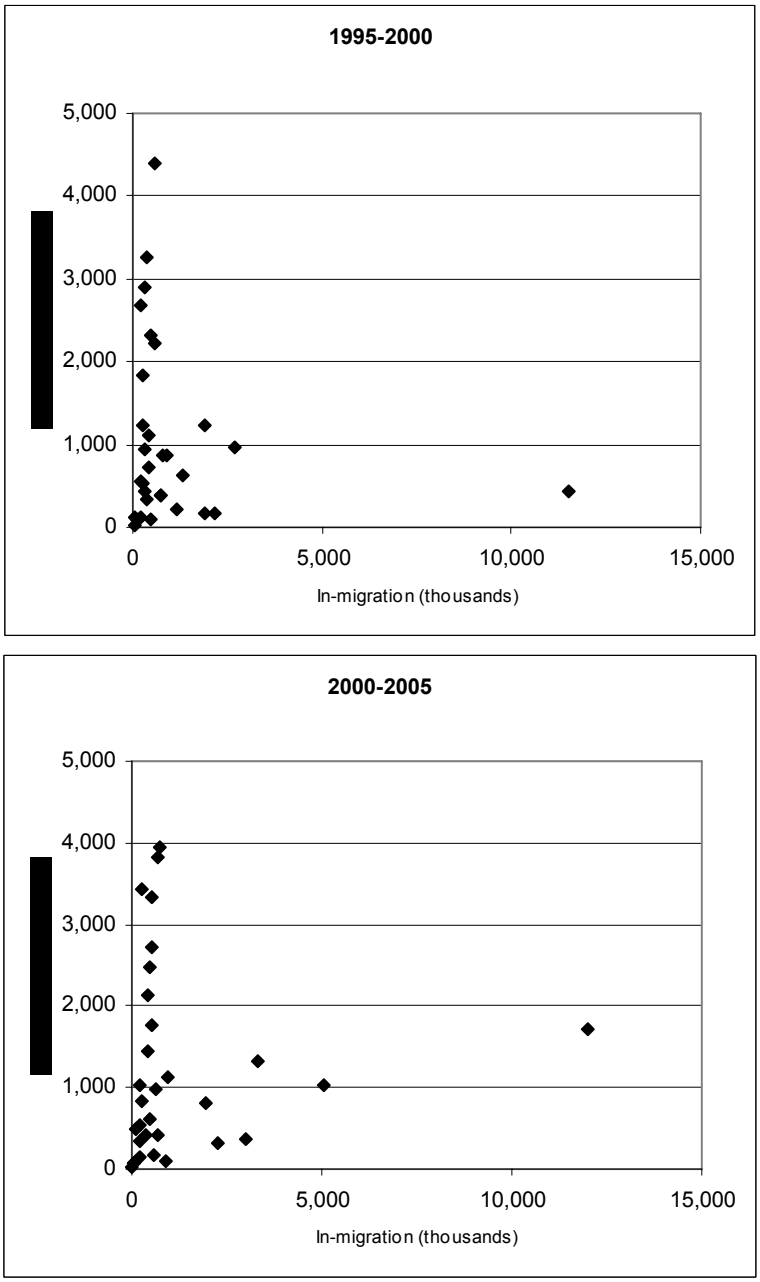


TABLE 5 – COMPOSITION OF RURAL MIGRANT LABOUR, 1993

Region	*Total rural labour*	*Out-migration rate*	*No. of migrants*		*Geographic distribution (per cent)*				
	Size (in millions)	*Per cent*	*Size (in millions)*	*Per cent*	*Within Counties*	*Within Provinces*	*Toward Urban Centres*		
				1993/94					
East	154.5	8.5	13.1	25.6	28.4	66.3	82.0		
Central	143.3	15.9	22.8	44.4	40.6	70.4	83.3		
West	113.8	13.5	15.3	30.0	37.0	76.4	66.5		
TOTAL	411.6	12.5	51.2	100	36.4	71.1	77.9		
				2004					
East	198.7	19.8	39.3	33.3	Province-level cities and provincial capitals	Prefecture-level cities	County-level cities	Designated towns	Others
Central	173.8	27.2	47.3	40.0					
West	124.4	25.4	31.6	26.7					
TOTAL	496.8	23.8	118.2	100	28.1	34.3	20.5	11.4	5.7

Source: Li (1994) and National Bureau of Statistics Survey Group (2006).
NOTES: Rural migrant labour refers to rural workers who had been outside the townships for work in that year.
Classification of Regions:
East = Liaoning, Beijing, Tianjin, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Guangxi and Hainan.
Central = Heilongjiang, Jinin, Nei Mongol, Shanxi, Henan, Anhui, Hubei, Hunan and Jiangxi.
West = Xinjiang, Qinghai, Gansu, Ningxia, Shaanxi, Sichuan, Guizhou, Yunnan and Tibet.

A comparison of the 1993 data with another, and broadly similar, national rural migrant labour survey of 1998[9] yields some interesting trends. Both of them report a stock of rural migrant labour of about 50 million (Table 6(a)). While the size and percentage of within-county migration remains quite stable (17-18 million, or 34-36 per cent), there is a significant increase in migration to other provinces, mostly to another region, between 1993 and 1998. This means that rural migrants are moving to farther destinations. This is consistent with what has been shown earlier based on 2000 Census and 2005 mini-census data. Drastic increases in the number of migrants crossing both provincial and regional boundaries are obvious. In 1998, this group accounted for 31 per cent of the migrant stock, compared to only 18 per cent in 1993.

Another regional comparison of the inter-provincial migration between 1993 and 1998 in Table 6(b) shows that the Central region has further consolidated its role as the largest generator of rural migrant labour crossing provincial boundaries (55 per cent in 1998 compared to 46 per cent in 1993), and the East region is the destination of a vast majority of inter-provincial rural migrant labour (increased from 70 per cent to 83 per cent). Inter-provincial rural migrant labour generated in and from the West region has witnessed the most rapid growth, with its share rising from about one-quarter to one-third in those five years. The share of out-of-provinces rural migrant labour in the East region, however, dwindled from about 30 per cent to only about 11 per cent of the total inter-provincial rural migrant labour in the same period.

TABLE 6(A) – DISTRIBUTION OF RURAL MIGRANT LABOR, 1993, 1998 AND 2004
WITHIN-PROVINCE MIGRATION AND INTER-PROVINCIAL MIGRATION

	1993		*1998*	
Volume (in millions)				
WPM Within Counties	18.66		17.18	
WPM Outside Counties	17.82		13.46	
WPM Subtotal		36.48		30.64
IPM Within Region	5.83		3.24	
IPM Outside Region	8.97		15.38	
IPM Subtotal		14.80		18.62
All	51.28	51.28	49.26	49.26
Percentage				
WPM Within Counties	36.4		34.9	
WPM Outside Counties	34.8		27.3	
WPM Subtotal		71.1		62.2
IPM Within Region	11.4		6.6	
IPM Outside Region	17.5		31.2	
IPM Subtotal		28.9		37.8
All	100	100	100	100

TABLE 6(B) – REGIONAL DISTRIBUTION OF INTER-PROVINCIAL MIGRANTS

Destinations	*Origins*			
	East	Central	West	All
1993 % of IPM	29.9	45.6	24.5	100
East	71.4	79.2	52.2	70.3
Central	21.8	18.9	9.4	17.4
West	6.8	1.9	38.4	12.3
All IPM (=14.8 million)	100	100	100	100
1998 % of IPM	11.0	55.0	34.0	100
East	72.7	87.3	79.4	83.0
Central	18.2	9.1	5.9	9.0
West	9.1	3.6	14.7	8.0
All IPM (= 18.6 million)	100	100	100	100

TABLE 6(C) – REGIONAL DISTRIBUTION OF MIGRANTS 1998 AND 2004 (PERCENTAGE)

Destinations	*Origins*			
	East	Central	West	All
1998				
East	89.9	32.3	29.4	37.7
Central	6.7	66.3	2.2	37.9
West	3.4	1.3	68.4	24.4
All Migration (= 49.3 million)	100	100	100	100
2004				
East	96.6	65.2	41.0	70.0
Central	2.1	32.8	2.9	14.2
West	0.8	1.8	55.8	15.6
All Migration (=118.2 million)	100	100	100	100

Sources: Li (1994), Liu (2000), Sheng and Pang (2006).
NOTES – WPM = Within-province migration; IPM = Inter-provincial Migration
See notes in Table 5 for classification of regions.

The regional flow matrix in Table 6(b) also shows that most of the inter-provincial rural migrant labour in the East region stayed within the region (71-72 per cent) throughout the 1990s. In the Central and West regions, a huge, and increasing, majority of the inter-provincial rural migrant labour has moved to the East region (87 per cent from the Central region and 79 per cent from the West region). In fact, in terms of the regional outflow pattern, migrants from the West region followed the footsteps of migrants from the Central region. Five years earlier, a large portion of out-of-province rural migrant labour (38 per cent) from the West region moved within the same region. In the late 1990s, a much smaller percentage still did (14 per cent), while almost three-quarters of them moved to the East region. It has been argued that such moves would place migrants in the best position to benefit from the largest geographic wage disparities possible (Cai, 1999), and one would also expect that migration would narrow the spatial disparities (see discussion in the next section).

Another comparison between 1998 and 2004 is shown in Table 6(c) based on both rural migrant labour within and between provinces. The table shows that the East region has further concentrated the rural migrant labour, accounting for 70 per cent of all migrants, as compared to only 38 per cent in 1998. The two net exporting regions (Central and West) show a similar trend; in terms of the destination distribution of all rural migrant labour, the Central region still had a much higher percentage in the East region than the West region did (because the Central had a higher rate of migrating out of provinces).

It is no coincidence that our data show that the two provinces having the largest net migration change (Guangdong and Sichuan in-migration and out-migration, respectively)[10] in 1995-2000 are also the same provinces with the lowest and highest per capita GDP growth rates in the same period, respectively (see Chan and Wang, 2008). If we add the remittances migrants sent back to their home towns, the calculated economic gains of migration to the sending provinces would be even greater. This postulate is consistent with the general pattern of higher rural income growth rates in places that have higher rates of out-migration (after controlling for other factors) in China, as has been quite amply documented in the literature (for example, Ma et al., 2004).

E. RECENT POLICIES

Migration affects and is also affected by many factors in China. This can be seen in the centrality of the *hukou* system, which is essentially a migration regulatory system, in the Chinese society and economy through the last half-century. The limited space here allows me to focus on two important aspects, which, I believe, are central to migration in China, and are closely related to the Government's recent major concern about the large income gaps between the rich and the poor (mainly the migrants) in the country.[11] I would like to draw on some of my recent research to examine them.

The first aspect is migration and regional disparities. A major current concern is the wide economic gaps between the coastal and the inland regions. Most of the existing studies on long-distance (inter-provincial) migration focus on the response of migration to the regional economic disparities (such as Chan et al., 1999; Cai et al., 2001; Lin et al., 2004; Fan 2005a; 2005b). Many of them have contended that the surge in long-distance migration is driven by widening regional inequalities in the 1990s. Chan and Wang (2008) have recently shown that previous wisdom of widening regional disparities observed for the period 1995-2000 was constructed on a faulty ground of a misunderstood *de jure* provincial population series. The misapplication results in significantly overstating inter-provincial inequalities in 2000. Their analysis shows that it is most probable that China's regional economic disparities as measured by the chosen inequality index began to level off in the mid-1990s and has remained stable since then (see also Tsui, 2007). A major explanatory factor for the stable regional disparities from 1995 was the surge in the long-distance migration, as has been shown in the paper. The story told in Chan and Wang (2005) is that migration and regional development in China are closely related in the past twenty years; it is consistent with the arguments made by Wang and Hui (2004). Of course, one should be very careful in interpreting this kind of "average" regional inequality data as rural and urban populations, as defined by the *hukou* system, operate in two largely separate strata (Chan et al, 1999; Li, 2005).

The central Government's concern over the regional inequalities in the 1990s also led to a number of programmes and efforts, such as the introduction of the new tax assignment reforms in 1994, which recentralised fiscal power of the central Government and expanded hugely its redistributive capacity (Wong, 1997). More prominently, since 1998, a number of new policies and program "tilting" toward the poor regions have been introduced. Among the major ones are the fiscal stimulus program in 1998 to counter the effects of the Asian financial crisis and the massive "Western Development Program" in 1999. One of the major achievements in this was the rapid spread of basic education in many poor provinces (hence the levelling of basic education among provinces), as shown in the provincial education index data for 1990 and 1995 (UNDP, 1999; Chan and Wang, 2008). Most observers agree the new administration under Hu Jintao and Wen Jiabao has paid more attention and channelled more resources to the rural areas and poor provinces.

Therefore, it would not be unreasonable to hypothesize that the rapid increase in basic education in many poor provinces paved the way for faster development in those provinces later, partly through long-distance migration, as shown earlier. The trajectory of development ordered in this sequence – getting a basic education, then (for some) engaging in migration, and finally achieving higher incomes – is not unfamiliar at the personal or regional level in many parts of China and perhaps, in the world too. This tale of economic development is also consistent with the emphasis on human capital for development. The enhancement of human capital includes not only education but also equally importantly, migration – which provide opportunities of employment and accumulation of job skills), as has been increasingly recognized by Third World development experts (UNDP, 2005). While China has made great strides in spreading basic education to the poor provinces in the last two decades, the new

front of fighting against inequality is now at the higher ladder of education. Wang and Chan (2005) and Wang (2005a), for example, have shown that the exam-score based college admission system for recruiting students into China's top universities in 1999 and 2000 were still seriously biased in favour of big cities and many coastal provinces.

The second aspect is migration related to *hukou*. This comprises two parts: one deals with migration involving conversions of *hukou*, and the other one is about policies that improve conditions of migrants without local *hukou* (non-*hukou* migrants). The first one has the focus of much attention in the last fifty years, *hukou* is the core of China's system of institutional exclusion and discrimination (Chan, 1994; Wang, 2005a). There has been a good deal of rhetoric in the press about the recent reforms aiming at abolishing the *hukou* institution (see Reuters, 2005; Kahn, 2005). Chan and Buckingham's (2008) research into this issue shows that many new initiatives have been grossly misunderstood. Almost all the changes in the *hukou* system and various initiatives since the late 1990s have had only marginal impact on weakening the foundation of the system – i.e. the separation of two segments of population (loosely, rural and urban) and discrimination based on that. The *hukou* system, directly and indirectly, continues to be a major wall in preventing China's rural population from settling in the city and in maintaining the rural-urban "apartheid." Wang's (2005b) earlier evaluation of the system as "adapted and adjusted" but "alive and well" remains true today.

The only major change is the administration of the system. Recent initiatives aim at devolution of the decision-making power of granting *hukou* from the central Government to local Governments, thereby also abolishing the quota control, held by the central Government.[12] City Governments have used these new powers mostly to attract the very rich and the highly educated (by granting local permanent *hukou* mostly to those who are mostly millionaires and are able to purchase a high-end apartment in the market or make large investments to open a company, or those who have a degree or professional qualifications), and to those who are immediate family members (usually spouses and children) of existing urban residents. Therefore, there is now some easing in the *hukou* migration system for mostly the above three groups. A handful of cities experimented with schemes to allow a limited number of lower-skilled migrant workers to acquire city *hukou* in the early 2000s (Shijiazhuang in Hebei being the most famous example). But these schemes were very limited in scope and were all withdrawn after being briefly implemented. For the 100 million-plus mostly poor rural migrant labour, the chance of getting a city *hukou* has not been improved under these new initiatives. The admission criteria set by local Governments are clearly beyond the possible reach of ordinary peasant migrants. Chan and Buckingham (2008) have documented that these new entry conditions under the more "entrepreneurial" approach of local (city) Governments have actually reduced the chance of poor migrants getting a *hukou* in cities.

The policies (and practices) affecting the livelihood and rights of those without local *hukou* (mostly rural migrant labour) are broad and cannot be fully covered here. Below are some highlights drawn from Chan and Buckingham (2008).

1. In 2003 in Guangzhou, a college student migrant from Wuhan died as a result of police brutality, sparked by the student's failure to produce a temporary resident ID because he did not have a local *hukou*. While this case illustrates the continued vulnerability of even the well-educated "undocumented" migrants, the event also led to a welcome and almost immediate change of Chinese law two months later to curb the abuse of police powers (detention and fines for those failing to produce a valid ID) and better protect migrants.

2. Later that year Premier Wen Jiabao led a national campaign to help migrant workers get back their wage debts, a serious problem for many migrant workers throughout the country, when he provided assistance to one peasant family in recovering the breadwinner's (a migrant) wage arrears during an impromptu detour to a village in his visit to Chongqing. This campaign has since become perennial, indicating the tenacity of the problem.

3. A major policy document issued by the State Council in May 2001 stipulated that local Governments take up the responsibility of providing nine-year compulsory education for migrant children through the public school system at the destination. It appears that there has been progress in a few cities like Beijing. According to one report, in 2006 62 per cent of the city's 370,000 migrant children were enrolled in public schools and 25 per cent in unauthorised migrants' schools.[13] But many serious problems remain: migrant children often have to pay a school fee several times higher than what local residents pay in public schools; a significant portion of them are in sub-standard schools or are not in school at all.[14] In fact, few local Governments have actually implemented this policy of accommodating migrant children in public schools, at least until the end of 2006 (Liang, 2006).

4. In the early 2000s, several provinces and cities such as Guangdong, Beijing, Shanghai, and Xiamen started to set up limited social security schemes to cover rural migrant labour. By the end of 2005, about 14 million, out of more than 100 million rural migrant workers, had joined some form of pension schemes.[15] In a large survey done by the National Bureau of Statistics in 2006, about one third of rural migrant workers had some injury accident insurance coverage.[16] In general, the participation rate in these schemes is low, and the coverage is still very partial, far below that in similar schemes for urban workers (Du and Gao, 2005). There are also serious questions about the usefulness of some of these schemes for migrants: for example, all the pension schemes are not potable, and given the high mobility and turnover of migrants in work, one wonders if any migrant will ever be eligible to collect the benefits when they get old.[17]

5. In 2006, the central Government also abolished the *hukou* requirement in its hiring of new civil servants; new positions are now open to all citizens, including rural residents, regardless of *hukou* status. The new move will benefit the educated. Potentially more important for long-term policy change affecting rural migrants' rights, the State Council in late January 2006 issued a 40-point document entitled "Several opinions of the State Council on the question of rural migrant labour."[18] The directive asks local Governments, among other things, to make entry conditions easier for *mingong* (rural migrant workers) to settle in towns and cities, including giving priority to "model workers" and highly skilled workers in the rural migrant labour pool. On the other hand, the document also acknowledges that *mingong* is a phenomenon set to last in Chinese cities, further suggesting that the *hukou* system which created this special social group in the first place will very likely remain in place for many more years, if not decades. Nonetheless, the generally pro-*mingong* rhetoric of the document is a welcome move in setting a more positive tone for creating a better work and living environment for migrant labour.

6. In June 2007, the National People's Congress passed a law that called for a host of protections for workers (including a greater role for the state-sponsored union to negotiate wages and the guarantee of written contracts) has the potential to increase workers' ability to obtain long-term, stable employment. The law, set to go in effect in 2008, was passed allegedly in response to growing unrest among China's migrant labour force amid countless cases of unpaid wages and unsafe working conditions.[19] The law also requires that employers treat migrant workers as they treat other employees.

The overall record in the last six or seven years has been quite mixed. The above cases highlight various efforts across the country and at the national level to address the most flagrant abuses associated with the existing *hukou* system, which left unreformed, could seriously jeopardize the lives or livelihoods of migrant labour, and perhaps disrupt "social harmony." But these local cases also illustrate the contradictions of the new localized *hukou* management system that can – and often does – counteract the central Government's rhetoric. In one expert's analysis, these contradictions result from a conflict of interests between the central Government's goals of alleviating rural-urban inequality and streamlining a national labour market and local Governments' (to which power in these matters has been given) aims to attract only the "best and the brightest" and wealthy investors to the city in order to exploit the cheapest labour possible in the more globalised world (Wang, 2005b). Maintaining a competitive edge in labour costs is crucial to China's strategy of being the "world's factory."

F. CONCLUSION

This paper has analyzed the migration trends in the 1990s through a synthesis and triangulation of different sources of migration data. The data are based on many different definitions but are broadly quite consistent and as expected. It is quite clear from this essay that the *hukou* system is an inseparable part of the Chinese broader migration and rural-urban systems, whether one is concerned with the migration statistics, the patterns of migratory flows or the welfare of the rural and urban populations. This study has highlighted the peculiarities of Chinese migration and its management system. Migration has steadily increased since the early 1980s, with a rapid rise in the first half of the 1990s. It is estimated that there were about 150 million people (or persons) without local *hukou* in 2005. This number also includes a large portion of the 110 million rural migrant workers.

The second part of the paper has studied the geography of people (or persons) migration, focusing especially on inter-provincial migration flows. Inter-provincial migration was on the rapid rise, especially since the mid-1990s. Our analysis is consistent with the thesis that more migrants moved to distant provinces because of large wage differentials, as they acquired more information and built their networks. At the same time, long-distance migrants were increasingly concentrated and converged into one single province, Guangdong, in the 1990s, which has since become the core of the "world's factory." The supply side of migration, however, has become more diverse: more peasants in the different low-income provinces have taken part in long-distance migration, primarily to improve their livelihood through taking up employment in coastal provinces. The notion of migrating to and working in the coastal provinces has become more widespread, even in the distant provinces in the Western region.

The last part of the paper has examined two major set of issues related to migration policies. I have argued that migration helped narrow regional economic disparities. This is different from the existing wisdom of rising migration and simultaneous increase in disparities in China. From a human capital perspective, it is important for the Chinese Government to continue promoting education and migration as a way to narrow the gaps between the coastal and inland provinces. More importantly, migration is also closely tied with the reforms of the *hukou* system. Despite official rhetoric about abolishing the *hukou* institution, the reality is not quite different. Almost all the changes to the *hukou* system and new initiatives have had only marginal impact on weakening the foundation of the system – i.e. the separation of two segments of population and discrimination based on that. The *hukou* system, directly and indirectly, continues to be a major barrier in preventing China's rural population from settling in the city and in maintaining the rural-urban "apartheid." This problem has become more acute as rural migrant labour has turned more and more permanent (vis-à-vis seasonal) with an increasing proportion of

women and children, as a comparative study of Chinese labour migration and Mexican migration to the United States of America has demonstrated (Roberts, 2007). The problem lies not just in employment, but also in education, health and many aspects of social security (Hansen, 2001; Lu, 2004). Despite the good intentions of the central Government, it is questionable that local Governments are ready to implement any sweeping change to the *hukou* system. China cannot abolish the system without a significant change of the rural-urban politics and economics.

NOTES

1 See, for example, migration figures cited in Knight and Song (1995), p.114. Another common mistake in the literature is the confusion over migration *flow* and *stock*. See discussion later.

2 One footnote in SBS (2006, Table 3.5) states that its *hukou* migration data after 1990 exclude migration within the city, suggesting that the data before that may have included migration within the city.

3 The 2000 year-end *hukou* or *de jure* population total for that city was 1.25 million, whereas the 2000 Census, based on exactly the same geographic boundary, reported a *de facto* resident population of 7.0 million (including 6 million without local *hukou*) on November 1, 2000 (see Chan, 2003, p. 3). A discrepancy between the two definitions is common and understandable, as in some other places (see Chen and Liu, 2002), but some huge differences in mainland China are truly phenomenal.

4 Li and Hu (1991) estimate that about half of the floating population in large cities stayed longer than six months and a third, longer than one year.

5 According to Chan (2003, pp. 6-7), for example, the official per capita GDP of Guangdong, as published in NBS (2001), is calculated from a population figure that largely excludes this group (about 9 million in size), thereby effectively exaggerating Guangdong's per capita GDP of that year by 13 per cent.

6 For a study specifically on urbanization and rural-urban migration in the 1990s, see Chan and Hu (2003).

7 This is confirmed by a report that many rural migrant workers have returned to Jiangxi (Jiangxi yu, 2007).

8 For definitions of these (macro) regions, see notes in Table 5.

9 The definitions and coverage used in the two surveys are not exactly the same, but the findings are broadly comparable.

10 Guangdong increased its net in-migration from 1.8 million in 1990-1995 to a whopping 11.1 million in 1995-2000 while Sichuan raised its net out-migration from 1.3 million in 1990-1995 to 3.8 million in 1995-2000 (National Population Sample Survey Office, 1997; State Council and National Bureau of Statistics, 2002). The two provinces were also the largest net importer and exporter of internal migrants in that period, respectively.

11 Economic inequality has been a major policy issue on the agenda of the last two Party Congresses in China (2003 and 2007).

12 Many journalists, most recently Zheng (2005), Reuters (2005), and Kahn (2005), have (mis)interpreted this change as China abolishing its *hukou* system.

13 The figures cited are reported by an organization of migrants' schools in Beijng, see "Beijing daguimo quid zhenggai mingong zidi xuexiao" (Beijing launches large-scale campaign to close down migrants' schools), *Xinjing Bao* (New Beijing News), 28 August 2006, at http://news.xinhuanet.com/edu/2006-08/28/content_5015898.htm, accessed 18 August, 2007.

14 "Beijing Closes Schools for Migrant Children in pre-Olympic Clean-Up," 26 September 2006, http://hrw.org/english/docs/2006/09/26/china14263.htm, Accessed 26 January, 2007.

[15] "2006 niandu laodong he shehui baozhang shiye fazhan tongji gongbao" ("The 2006 Report of Development and Statistics of Labour and Social Security"), at http://www.molss.gov.cn/gb/news/2007-05/18/content_178167.htm, accessed 14 August, 2007.

[16] NBS, "Nongmingong shenghuo zhiliang diaocha zhiyi: laodong jiuye he shehui baozhang" (Quality of life survey of rural migrant labour 1: Employment and social security), http://www.cpirc.org.cn/tjsj/tjsj_cy_detail.asp?id=7485, accessed 21 August, 2007.

[17] All the schemes require migrant workers to have worked for 15 years in a specific city to be eligible for pension (Lu, 2004).

[18] See http://www.china.com/cn/chinese/news/1167155.htm, accessed 9 January 2007.

[19] See Joseph Kahn and David Barboza, "As Unrest Rises, China Broadens Workers' Rights," *New York Times,* 30 June, 2007.

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SPATIAL DISTRIBUTION OF THE POPULATION, INTERNAL MIGRATION AND DEVELOPMENT IN LATIN AMERICA AND THE CARIBBEAN

Jorge Rodríguez, Economic Commission for Latin America and the Caribbean/CELADE, Chile

A. INTRODUCTION AND CONTENTS OF THE DOCUMENT

Latin America and the Caribbean have undergone significant transformations in the last 30 years. Many of the changes relate to the territorial distribution and mobility of the population. This document describes those changes and links them with the socio-economic, political and cultural shifts experienced by the region.

The document is structured around certain hypotheses that are common in the literature (ECLAC, 2007). Each section aims to provide evidence to assess the validity of each hypothesis. The first three hypotheses, presented below, concern the spatial distribution of the population, while the last six deal with internal migration:

1. Urbanization in the region is not a statistical artefact, although it is linked only indirectly to the process of economic and social development;

2. Changes in the development model that have taken place since the 1980s revalue rural areas over cities, which could lead to rural areas becoming more attractive;

3. Various "deconcentration" forces have made large cities less demographically dynamic than medium-sized cities. As a result, the region's urban system should be diversifying and reversing its degree of polarization;

4. The economic and social development process should stimulate all forms of migration;

5. Internal migration has an increasingly complex relationship with development at the subnational level. Although flows can still be predicted on the basis of subnational differences in development, there are several exceptions that cast doubt on the strength of that relationship.

6. Given the predominant direction of migratory flows (see previous hypothesis) and the selectivity in terms of age and level of schooling, migration is unlikely to help reduce territorial inequalities;

7. Migration is very likely to contribute to the creation of territorial "poverty traps" in areas that have traditionally been socio-economically disadvantaged;

8. Rural-to-urban migration continues to erode population growth in the countryside, while playing an increasingly smaller role in the growth of cities;

9. The region's large cities register real net emigration, rather than merely being part of a "concentrated deconcentration."

Following a review of those hypotheses, the document concludes by outlining the policy implications of the findings contained in the previous sections.

A. SPATIAL DISTRIBUTION OF THE POPULATION AND DEVELOPMENT IN LATIN AMERICA: HYPOTHESES AND EVIDENCE

1. Is Latin America's urbanization real?

Latin America and the Caribbean[1] is the world's most urbanized less-developed region, with a percentage urban of 77.4 per cent in 2005, which is only surpassed by North America (80.7 per cent) and is higher than that of Europe (72.2 per cent) (United Nations, 2006).

Expressions such as over-urbanization and hyper-urbanization have been used to describe the region's high level of urbanization without the level of economic and social development typical of industrialized countries (Rodríguez and Martine, 2008). Nonetheless, in purely demographic terms, Latin American urbanization is undeniable and in no case could be termed a "statistical fiction" resulting from the lack of an official definition of "urban" in the region. The evidence for this comes from the *Distribución Espacial de la Población y Urbanización en América Latina y el Caribe* (DEPUALC) database (www.eclac.cl/celade/depualc), which allows for the identification of unquestionably urban agglomerations to avoid problems of consistency in comparisons (Montgomery et al., 2004).

The region has a much higher proportion of the total population living in cities of 500,000 or more inhabitants than Europe (table 1). Calculations for a group of nine countries in the region with data from the 2000 round of censuses[2] indicate that 65 per cent of the region's total population and 81.5 per cent of the urban population were living in cities with 20,000 or more inhabitants (CELADE - Population Division of ECLAC, 2007). But there is considerable heterogeneity among countries behind these "regional" figures. The diversity follows a relatively familiar pattern: countries with a higher level of human development (Argentina, Chile and Uruguay) tend to have higher proportions of population living in cities.[3] One exception is Costa Rica, which has a lower percentage of population living in cities than would be expected given its high human development index (table 2).

TABLE 1 – POPULATION LIVING IN CITIES OF 500,000 HABITATS AND OVER (IN THOUSANDS) AND PERCENTAGE OF THE TOTAL POPULATION LIVING IN SUCH CITIES BY REGION, 2005

Region	*10 million or more*	*5 to 10 million*	*1 to 5 million*	*500,000 to 1 million*	*Percentage of total population in cities with 500,000 inhabitants or more*
Latin America and the Caribbean	61 764	25 919	95 236	42 067	40.1
Africa.....	22 014	6 049	82 110	35 226	16.0
Asia.....	167 145	118 329	356 191	159 886	20.5
Europe.....	10 654	29 244	79 464	53 243	23.7
Oceania	0	0	13 472	517	42.4
North America	31 016	24 951	86 729	27 265	51.3

Source: prepared by the author, on the basis of United Nations, *World Urbanization Prospects. The 2005 Revision Executive Summary. Fact Sheets. Data Tables* (ESA/P/WP/200), New York, 2006 [online], www.un.org/esa/population/publications/WUP2005/2005WUPHighlights_Final_Report.pdf, table 2 and A.17 [date of reference: 27 November 2007].

2. Change in the development model: a demographic boost for the countryside?

Up to the 1980s, the prevailing development strategy in the region (promoted by ECLAC) was known as Import Substitution Industrialization (ISI). It contributed to a pro-urban bias, as it was geared

TABLE 2 – HUMAN DEVELOPMENT INDEX (HDI) IN SELECTED LATIN AMERICAN COUNTRIES IN 2000 AND PERCENTAGE OF THE POPULATION LIVING IN CITIES OF 20,000 INHABITANTS OR MORE, BY COUNTRY AND CENSUS ROUND

Country (HDI, 2000)	*Census round*					
	1950	*1960*	*1970*	*1980*	*1990*	*2000*
Argentina (0.860)	50.8	60.1	66.9	71.0	74.9	76.5
Bolivia (0.675)	19.7	…	34.1	…	49.6	54.1
Brazil (0.785)	28.8	28.9	40.7	52.2	58.4	64.5
Chile (0.843)	47.1	55.1	62.0	68.5	72.1	75.4
Colombia (0.775)	22.5	37.2	45.5	55.1	59.2	60.2
Costa Rica (0.832)	18.4	22.8	30.8	33.8	33.8	49.2
Cuba (0.826: 2004)	38.3	…	43.8	47.9	47.9	…
Ecuador (0.732: 1995)	18.0	27.7	35.3	42.5	48.0	54.7
El Salvador (0.715)	14.7	19.5	21.9	…	35.9	…
Guatemala (0.656)	14.5	19.2	22.2	22.6	24.3	32.5
Haiti (0.451: 1995)	5.5	…	13.7	17.4	17.4	…
Honduras (0.654)	6.8	11.5	20.5	28.0	28.0	34.7
Mexico (0.811)	29.3	36.9	45.7	52.8	57.1	60.7
Nicaragua (0.667)	15.2	23.0	29.6	…	41.0	…
Panama (0.797)	28.2	34.6	39.1	43.6	46.8	52.7
Paraguay (0.754)	19.6	23.0	27.6	33.1	39.0	44.6
Peru (0.760)	15.9	30.3	42.0	49.9	55.2	…
Dominican Republic (0.733)	11.1	18.7	30.5	41.9	45.2	52.7
Uruguay (0.841)	66.9	66.9	69.9	71.8	74.3	…
Venezuela (0.774)	38.7	52.7	63.5	70.5	71.5	74.3

Source: Latin American and Caribbean Demographic Centre (CELADE)-Population Division of ECLAC, on the basis of the [online] www.eclac.cl/celade/depualc database on spatial distribution and urbanization in Latin America and the Caribbean (DEPUALC) / and United Nations Development Programme (UNDP) [online] http://hdrstats.undp.org/indicators/10.html [date of reference: 14 November 2007].

towards promoting industry and the significant role to be played by the State (ECLAC, 2005a). When the development strategy was changed – to one that was more open to the outside world, based on the exploitation of natural resources and more influenced by market forces – there were predictions of strong productive buoyancy in rural areas, which might in turn have recovered their retentive capacity and possibly even become a pole of attraction for the first time in centuries (Guzmán et al., 2006; Rodríguez, 2002).

Two types of evidence lead to the conclusion that the new development model has not led to a recovery of the demographic dynamic in the countryside. The first relates to the process of urbanization, which has remained fast. The rate of urbanization, or the average rate of increase of the percentage urban, has definitely been falling as the region nears an urban percentage of 100 per cent: from 1.6 per cent in the period 1950-1960 to 0.5 per cent at present (Table 3). However, if this urbanization rate is divided by the percentage rural, the pace of urbanization has only dropped off slightly. The second type of evidence is directly related to the rural population, which has been shrinking in absolute terms since 1990. Given the rural population's positive natural increase, this implies that there is significant net rural emigration. Thus, it is possible to conclude that the new development model has not increased the rate of population growth in rural areas.

This should come as no surprise, as the region had already lived through agricultural modernization processes that resulted in substantial migratory outflows between 1940 and 1980 (Alberts and Villa, 1980). Although there has been an agricultural revitalization since the mid-1980s — expressed in a slight increase in agricultural value added over total GDP (ECLAC, 2005b) — this has mainly been based on large farms and forestry businesses that tend to crowd out traditional farming. Furthermore, the labour demand of these businesses is highly seasonal, and is therefore often met by urban workers from nearby and sometimes faraway cities (ECLAC, 2005b).

TABLE 3 – LATIN AMERICA AND THE CARIBBEAN: URBANIZATION INDICATORS

Year	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*	*2010*	*2020*	*2030*
Total	167 321	218 577	285 196	362 210	443 747	522 929	598 771	666 955	722 377
Rural	97 084	111 062	122 178	126 522	129 007	128 717	125 210	120 613	113 409
Urban	70 237	107 515	163 018	235 688	314 739	394 212	473 561	546 342	608 968
Per cent Urban	42.0	49.2	57.2	65.1	70.9	75.4	79.1	81.9	84.3
Urbanization rate	1.58	1.51	1.29	0.85	0.62	0.48	0.35	0.29	
Per cent Rural	58.0	50.8	42.8	34.9	29.1	24.6	20.9	18.1	15.7
Ratio UR-Per cent R	0.029	0.032	0.033	0.027	0.023	0.021	0.018	0.017	

Source: United Nations [online] http://esa.un.org/unup/p2k0data.asp [date of reference: 27 November 2007].

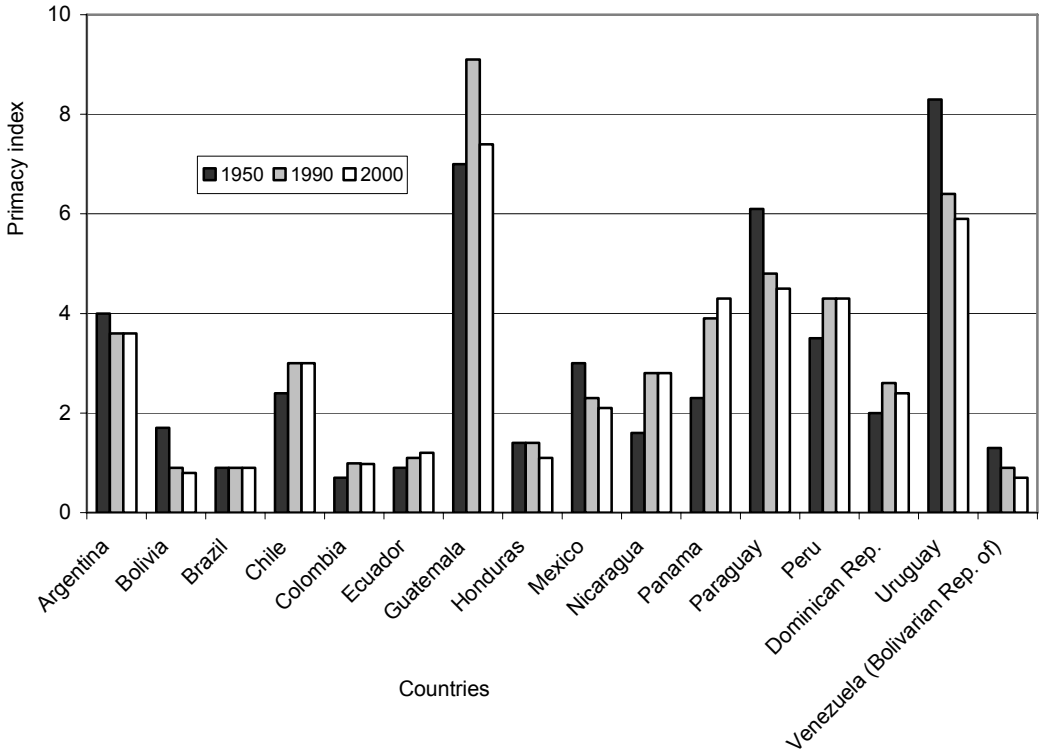
Thus, there are no signs of counter-urbanization in the region, nor does this seem likely to be triggered by production causes. If counter-urbanization were to occur it would be as in Europe, the result of housing-related forces promoted by technological progress, improved infrastructure and connectivity, and changes in population structure and people's purchasing power (Gans, 2007; Ferras, 2007). In other words, any eventual return to the countryside would not represent a return to agriculture, but rather a decision to combine the quality of life in rural settings with the employment, educational and leisure opportunities in nearby urban areas. Furthermore, it is difficult to conceive of a high quality of life in rural areas, as long as social indicators there remain below those of urban settings (ECLAC, 2007 and 2005b).

3. Are urban areas becoming deconcentrated?

Historically speaking, urbanization in Latin America was based upon large cities characterized by a population growth rate considerably above the national and urban growth rates, and by an unordered physical expansion (Guzmán et al., 2006). Indeed, up until the 1970s, urbanization and concentration in the largest city (or the two largest cities in countries such as Brazil, Ecuador and Honduras) were overlapping phenomena in most of the region. As in the case of urbanization, the inward development model and overinvestment in the main city were held responsible for the fact that urbanization was concentrated in one or two cities (Alberts and Villa, 1980). The change of development model therefore generated expectations of deconcentration (Pinto da Cunha, 2002). This combined with several other processes under way since the 1980s, namely decentralisation, industrial relocation, downsizing of the public administration (concentrated in the main city), signs of crises in major cities and a series of public policies aimed at promoting such deconcentration (ECLAC, 2005a; Dupont et al., 2002).

The evidence available suggests that these factors have had an impact, as the strong demographic dynamism in the main city is on the wane. Although it is not yet clear whether large cities account for a smaller proportion of the total population, they are definitely losing significance in terms of urban areas. During the last intercensal period, the ratio of the population of the largest city over the population of the next three largest cities combined, which will be called the "primacy ratio,"[4] shows that it increased in just two countries, while dropping in the vast majority of cases, sometimes significantly and at times reversing the historic growth of the main city's power of attraction (Figure 1).

Figure 1. Latin America, selected countries: primacy ratio circa 1950, 1990 and 2000



Source: Prepared by the author on the basis of the [online] www.eclac.cl/celade/depualc/ database on spatial distribution and urbanization in Latin America and the Caribbean (DEPUALC).

Despite this, the traditional pattern of urbanization concentrated in one or two major cities has had permanent effects in the region, including a considerable number of mega-cities,[5] the relatively high primacy ratios in many countries, and the large proportion of the population that lives in cities with over one million inhabitants.

In order to study the regional system of human settlements in more detail, several categories were created (see table 4 and figures 2 and 3).[6] Cities with 20,000 or more inhabitants were counted individually.[7] Smaller urban areas were added together rather than being counted individually. The population in places with fewer than 2,000 inhabitants or dispersed populations were counted as residual.[8]

This information was used to create table 4, which shows the number of areas with over 20,000 inhabitants by census and size category. Regional urbanization has clearly involved a striking expansion and diversification of the city system, as between 1950 and 2000 the region went from 272 to 1,528 cities with more than 20,000 inhabitants. This more complex urban network forms a social and territorial basis that is more conducive to regional development, given the long-term disadvantages associated with top-heavy urban systems (Davis and Henderson, 2003). Although the number of cities of over a million inhabitants also increased (sevenfold between 1950 and 2000), the increase suddenly stopped in the 1990s. Furthermore, the limited number of cities in the smaller-sized category is such that no major increases are expected in the present decade. Medium-sized intermediate cities (50,000 to 500,000 inhabitants) and small intermediate cities (20,000 to 50,000 inhabitants) are the fastest growing categories, which confirms the tendency towards a more robust and complex urban system.

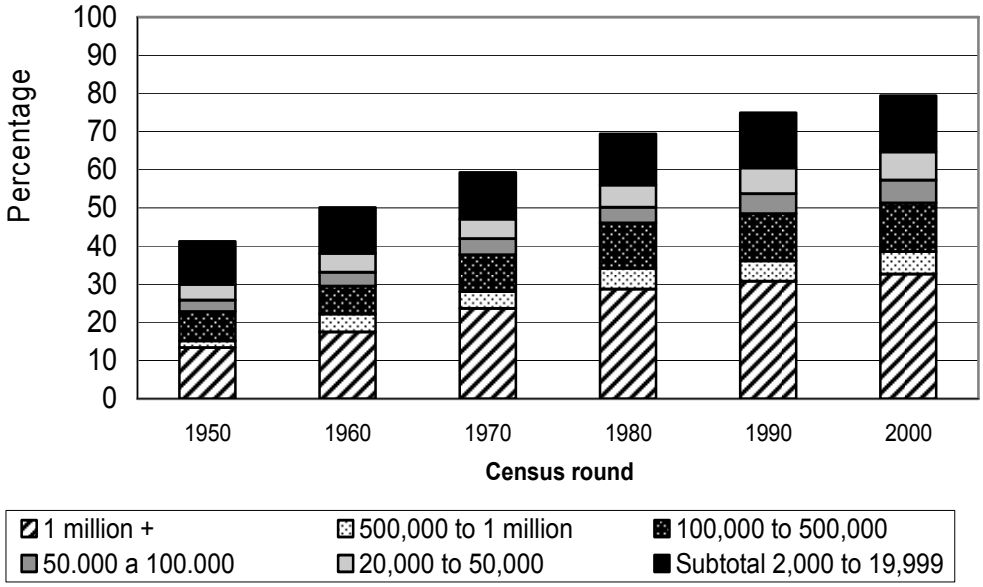
TABLE 4 – NUMBER BY SIZE IN SELECTED COUNTRIES OF LATIN AMERICA AND THE CARIBBEAN, CENSUS ROUNDS 1950 TO 2000

Size category	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
1 000 000 and above	5	9	17	23	33	35
500 000 to 1 000 000	4	13	14	20	28	33
100 000 to 500 000	42	64	112	171	202	225
50 000 to 100 000	54	95	135	166	261	314
20 000 to 50 000	167	261	374	540	754	921
Total cities with 20 000 and above	272	442	652	920	1 278	1 528

Source: prepared by the author on the basis of the [online] www.eclac.cl/celade/depualc/ database on spatial distribution and urbanization in Latin America and the Caribbean (DEPUALC).

Increasing urbanization and the rise in the number of urban centres in each category have increased the relative proportion of all categories within the total population (figure 2). Cities of more than one million inhabitants more than doubled their share to reach extraordinary proportions on a worldwide scale: one in every three of the region's inhabitants live in such a city. Figure 2 shows that the population momentum of these cities slowed significantly in the 1990s. The fragmentary evidence from the current decade (from counts and censuses carried out around 2005) suggests that the growth rate has slowed even further. In contrast, intermediate cities are growing faster, which ties in with the hypothesis of diversification (now considering the population instead of the number of urban centres). Lastly, the smallest category of the urban hierarchy is also highly relevant, with an abundance of centres between 2,000 and 20,000 inhabitants that are often more similar and more closely connected to the rural areas than to the rest of the urban system.

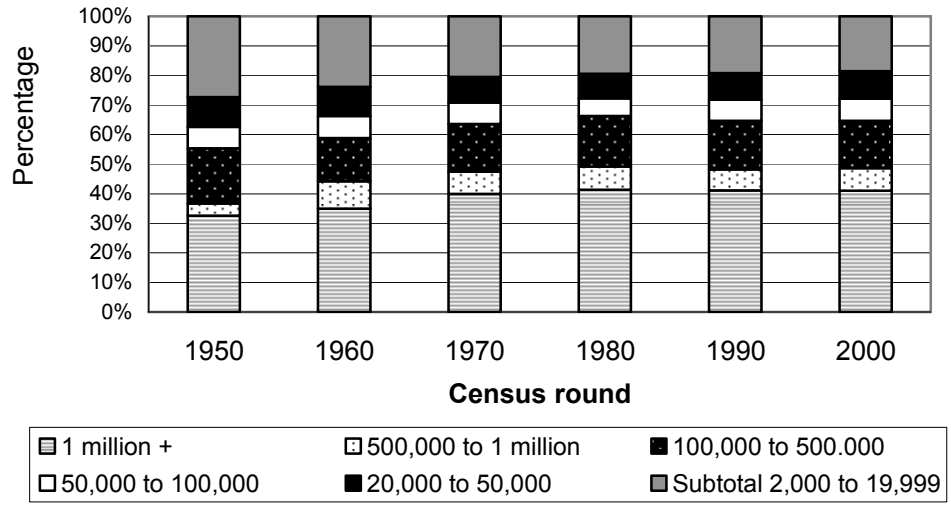
Figure 2. Latin America and the Caribbean (selected countries): share of towns with 20,000 or more inhabitants in total population, by size category



Source: Prepared by the author on the basis of the [online] www.eclac.cl/celade/depualc/ Database on Spatial Distribution and Urbanization in Latin America and the Caribbean (DEPUALC).

The main finding of a study, on the internal structure of the urban system – areas with 2,000 or more inhabitants, as shown in figure 3 – was the fast growth of intermediate cities, especially in the last 30 years. Indeed, the proportion of the urban population in cities of above one million has remained stable at 40 per cent since 1970, while the share of small locations (fewer than 20,000 inhabitants) has also stabilized at around 20 per cent following two decades of decline (such places represented 25 per cent of the urban population in 1950). This means that 40 per cent of the urban population lives in intermediate cities (subdivided into large intermediate, medium-sized intermediate and small-sized intermediate).

Figure 3. Latin America and the Caribbean (selected countries): relative structure of the urban system by size classification



Source: Prepared by the author on the basis of the [online] www.eclac.cl/celade/depualc/ database on spatial distribution and urbanization in Latin America and the Caribbean (DEPUALC).

In summary, although urbanization in the region is naturally concentrated in cities, concentration is shifting to become more diversified. This is because intermediate cities are growing more quickly than big cities. That may well be due to a difference in natural increase in migration, which is key for the purposes of analysis and policymaking. Later in the document, this point will be addressed in more detail to provide a definitive answer on the migratory attraction of the largest cities and particularly of mega-cities.

B. INTERNAL MIGRATION AND DEVELOPMENT IN LATIN AMERICA AND THE CARIBBEAN: HYPOTHESES AND EVIDENCE

1. Is internal migration on the rise?

Since Ravenstein (1885), the prevailing idea has been that material progress stimulates migration by promoting the expansion of transportation and a reduction in the costs of travel (Aroca, 2004; Greenwood and Hunt, 2003; Cardona and Simmons, 1975).

Although this hypothesis still prevails (Van der Gaag and van Wisen, 2001), the work of Zelinsky (1971) casts some doubts over the predictability of internal migration. These doubts have been strengthened by new arguments such as: (a) development tends to reduce disparities between subnational

areas, thereby eroding the main trigger of internal migration; (b) development brings down the costs of mobility in general, which may result in internal migration being replaced by international migration or daily commuting; (c) development raises family income and facilitates homeownership (which is a strong factor in territorial settlement); (d) current development is conducive to the emergence of virtual spaces that inhibit migration by making it possible to "be there without being physically present"; (e) development is concomitant with urbanization, with the latter leading to the exhaustion of rural-to-urban migration and a subsequent reduction in migratory intensity (Van der Gaag and van Wisen, 2001). Given that the long-term trend of migratory intensity is currently the subject of much debate, evidence is required to settle the matter.

Table 5 shows trends in the proportions of migrants according to the type of migration. Although the levels are high,[9] they are considerably lower than in the United States. In terms of trends, the region seems to have an almost stable stock of internal migrants. Given that these figures are strongly influenced by Brazil and Mexico, figure 4 shows migration between major administrative units in the past five years for individual countries. These data show a downward trend in the internal mobility rate in most countries.

TABLE 5 – PERCENTAGE OF INTERNAL MIGRANTS BY TYPE OF MIGRATION IN LATIN AMERICA AND THE CARIBBEAN, 1990 AND 2000

Census round	*Absolute or life-long migration*		*Recent migration (last 5 years)*	
	Major administrative division (per cent)	*Minor administrative division (per cent)*	*Major administrative division (per cent)*	*Minor administrative division (per cent)*
1990	17.5	34.2	5.1	12.6
2000	17.7	35.2	4.0	8.7

Source: special processing of census microdata: 18 countries in 1990 and 20 in 2000 (not all countries had data for all four types of migration).

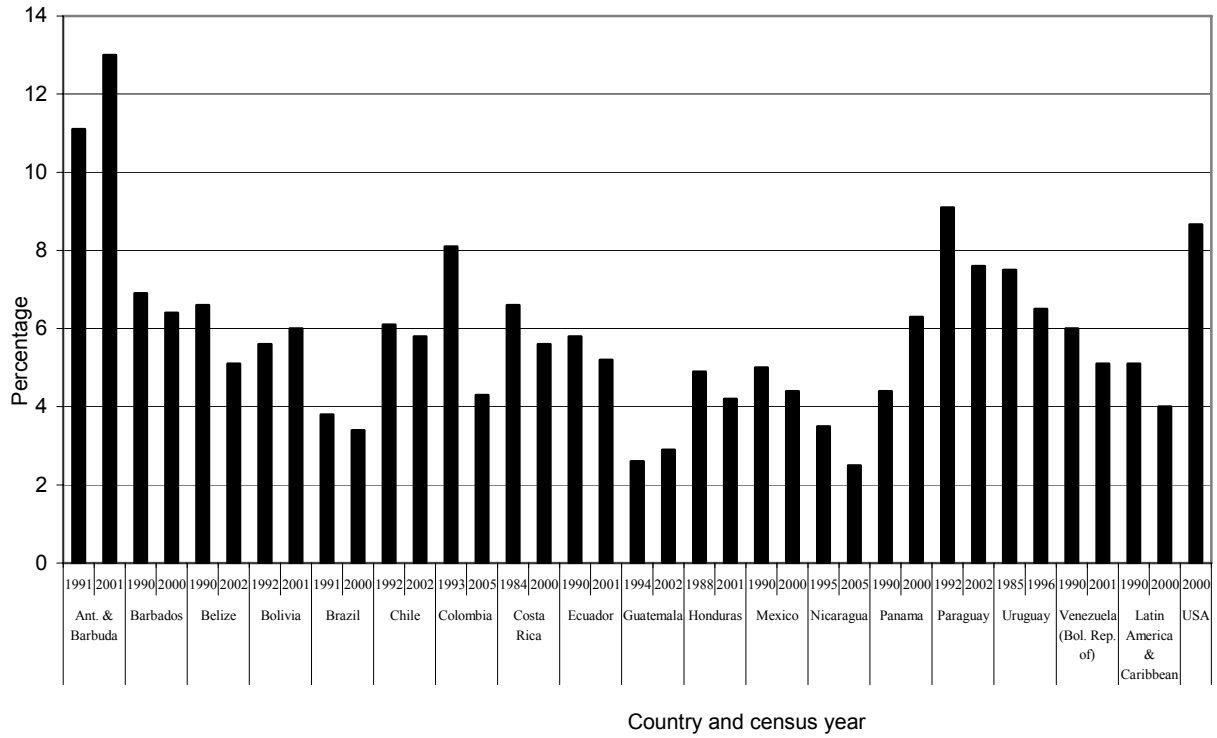
This unexpected downward trend can be explained by the arguments discussed – which will require further research. It can however be assumed that the trend is not due to a reduction in territorial inequalities within countries, as these remain extremely high in the region (ILPES, 2007).

This finding does not imply that there is no link between the level of development and internal mobility. In fact, a cross-section analysis considering Latin American countries only shows that there is a positive and statistically significant relationship between the two; countries that are less developed tend to have considerably lower levels of internal mobility (ECLAC, 2007). Thus, although development may cease to stimulate internal migration once the former reaches a certain threshold, the figures nonetheless generally support the hypothesis that development facilitates mobility within a country's borders.

2. Do internal migratory flows follow the expected pattern from less developed areas to more developed areas?

Territorial inequalities are the main trigger for migration (Lall, Selod and Shalizi, 2006; Lucas, 1997). The search for better opportunities therefore remains the main cause of internal migration. This is the dominant hypothesis in the literature on the direction of migratory flows: movement should take place from areas with less favourable living conditions to those with better living conditions. Although this might sound obvious, the notion of "living conditions" is simple, and actually depends on the way individuals assess the different dimensions of their lives and how these may be able to develop in the location of origin or in alternative destinations.

Figure 4. Latin America and the Caribbean and the United States: recent internal mobility rate (five years prior to census) between major administrative divisions, countries with census rounds 1990 and 2000 available



Source: Economic Commission for Latin America and the Caribbean (ECLAC), *Social Panorama of Latin America, 2006* (LC/G.2351-P/E), Santiago, Chile, 2007; and United States Census Bureau [online] http://factfinder.census.gov/servlet/QTTable?_bm=n&_lang=en&qr_name=DEC_2000_SF3_U_DP2&ds_name=DEC_2000_SF3_U&geo_id=01000US.

Traditionally, individuals and research have given priority to employment, particularly to salaries. However, there are currently many more important dimensions, such as education and housing. In fact, housing (including the accommodation, location and quality of life) is the most relevant factor in intra-urban migration, suburbanization and counter-urbanization (ECLAC, 2007). Increasingly heterogeneous migratory patterns therefore follow a diversification of determining factors, and cast doubt on the usefulness of single and universal theoretical and analytical models to explain migration.

As far as large-scale migration between major administrative units is concerned, differences in socio-economic development (expressed in wage levels and indicators of well-being) still appear to be the main determining factor of migratory flows. Flows would therefore be expected from less developed administrative units (lower wages and living conditions) towards more developed (with higher wages and better living conditions).

The evidence available shows that in most of the region at the subnational level is a positive relationship between the level of development (according to the human development index (HDI) calculated by the national offices of the United Nations Development Programme (UNDP) and the net migration rate (see table 6).

TABLE 6 – SIMPLE LINEAR CORRELATION BETWEEN THE HUMAN DEVELOPMENT INDEX (HDI) AND THE NET RATE OF INTERNAL MIGRATION BY MAJOR ADMINISTRATIVE UNIT IN SELECTED COUNTRIES OF LATIN AMERICA AND THE CARIBBEAN, 2000 ROUND OF CENSUSES

Country, reference year, number of divisions with data, and indicator	*Simple correlation between indicator and rate of net migration (p-value between brackets)*	
Argentina, 2001: 24 units, HDI 1996	0.407	(0.0242)*
Bolivia, 2002: 9 units, HDI 1994	0.619	(0.0378)*
Brazil, 2000: 27 units, HDI 1996	0.451	(0.0091)*
Chile, 2002: 13 units, HDI 1998	-0.01136	(0.5147)
Colombia, 2005: 24 units, HDI, 2000	0.414	(0.0222)*
Cuba, 2002: 14 units, HDI 1996	0.770	(0.0006)*
Ecuador, 2001: 15 units, HDI, 1999	0.650	(0.0044)*
Guatemala, 2002: 22 units, HDI 1995-1996	0.442	(0.01972)*
Honduras, 2001: 18 units, HDI 1996	0.697	(0.0006)*
Mexico, 2000: 32 units, HDI 1995	0.408	(0.0102)*
Nicaragua, 2005: 17 units, HDI 2000	0.055	(0.4170)
Panama, 2000: 12 units, HDI 2000	0.484	(0.0554)
Paraguay, 2002: 18 units, HDI 2000	0.133	(0.29936)
Uruguay, 1996: 19 units, HDI 1991	0.063	(0.60097)
Venezuela, 2001: 23 units, HDI 1996	0.0686	(0.3780)

Source: Migration rates, special processing of microdata from the relevant censuses; socio-economic data, national human development reports and official subnational statistics. P-values from correlations: http://home.clara.net/sisa/signif.htm.
* Significant at the 95 per cent level (p-value<0.05).

However, the correlation is weak, and in many countries, it is not significant, which means that a more detailed examination is required. Diagram 1 shows major administrative units by their "attractiveness"[10] in the 1990 and 2000 census rounds. The quadrants in Diagram 1 show that some units do not follow the general relationship between development and "attractiveness." Several of these units are exceptional due to systematic factors, which make it possible to formulate theoretical predictions and analytical models using special conceptual frameworks. The anomalous major administrative units whose migratory patterns may be explained by factors other than their level of development include: (a) colonization regions; (b) regions with recent economic progress; (c) "metropolitan" regions undergoing suburbanization and/or deconcentration; and (d) regions close to metropolitan areas undergoing suburbanization.

DIAGRAM 1 – CLASSIFICATION OF MAJOR ADMINISTRATIVE UNITS BY INTERNAL MIGRATION STATUS IN CENSUS ROUNDS 1990 AND 2000 IN SELECTED CITIES OF LATIN AMERICA AND THE CARIBBEAN

Antigua and Barbuda

	Population gains Net migration (+) 2001-1996	**Population losses Net migration (-) 2001-1996**
Net migration (+) 1992-1987	St. John's Rural; St. George's; St. Peter's	
Net migration (-) 1992-1987		St. Phillip's; St. Paul's St. Mary's; St. John's City; Barbuda

Barbados

	Population gains Net migration (+) 2000-1995	**Population losses Net migration (-) 2000-1995**
Net migration (+) 1991-1986	St.Peter; St.Philip; Christ Church; St.James	
Net migration (-) 1991-1986	St.George; St.Thomas	St.Michael; St.John; St.Joseph; St.Andrew; St.Lucy

Belize

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1992-1987	Cayo District	Belize District
Net migration (-) 1992-1987	Stann Creek District	Corozal District; Orange Walk District; Toledo District

Bolivia

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1992-1987	Cochabamba; Tarija; Santa Cruz; Pando	Beni
Net migration (-) 1992-1987		Chuquisaca; La Paz; Oruro; Potosí

Brazil

	Population gains Net migration (+) 2000-1995	Population losses Net migration (-) 2000-1995
Net migration (+) 1991-1986	Amazonas; Roraima; Amapá; Tocantins; Espírito Santo; São Paulo; Santa Catarina; Mato Grosso; Goiás; Federal District; Rondônia	Pará; Sergipe; Mato Grosso do Sul
Net migration (-) 1991-1986	Rio Grande do Norte; Minas Gerais; Rio de Janeiro	Acre; Maranhão; Piauí; Ceará; Paraíba; Pernambuco; Alagoas; Bahia; Paraná; Rio Grande do Sul

Chile

	Population gains Net migration (+) 2002-1997	Population losses Net migration (-) 2002-1997
Net migration (+) 1992-1987	Valparaíso; Tarapacá	Atacama; Metropolitan area of Santiago
Net migration (-) 1992-1987	Antofagasta; Coquimbo; Lib. Gral. Bernardo O'Higgins; Los Lagos	Maule; Bío Bio; La Araucanía; Aisén; Magallanes and Antarctic

Colombia[1]

	Population gains Net migration (+) 2005-2000	Population losses Net migration (-) 2005-2000
Net migration (+) 1993-1988	Bogotá; Risaralda; Valle; Casanare; Cundinamarca; Quindío	Bolívar; Atlántico; Guajira; Arauca
Net migration (-) 1993-1988	Antioquia; Santander; Meta	Boyacá; Caldas; Cauca; Córdoba; Chocó; Huila; Magdalena; Nariño; Sucre; Tolima; Amazonas; Caquetá; Cesar; Norte. Santander; Putumayo; San Andrés; Guaviare; Vichada

Costa Rica

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1984-1979	Alajuela; Cartago; Heredia; Limón	
Net migration (-) 1984-1979		San José; Guanacaste; Puntarenas

Cuba

	Population gains Net migration (+) 2002-1997	Population losses Net migration (-) 2002-1997
Net migration (+) 1981-1976	Havana; Havana City; Matanzas; Cienfuegos; Ciego de Ávila; Camagüey; Isla de la Juventud	
Net migration (-) 1981-1976	Sancti Spíritus	Pinar del Río; Villa Clara; Las Tunas; Holguín; Ganma; Santiago de Cuba; Guantánamo

Ecuador[2]

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1990-1985	El Oro; Guayas; Pastaza; Pichincha; Galápagos; Sucumbíos	Morona Santiago; Napo; Zamora Chinchipe
Net migration (-) 1990-1985	Azuay; Cañar	Bolívar; Carchi; Cotopaxi; Chimborazo; Esmeraldas; Imbabura; Loja; Los Rios; Manabí; Tungurahua

DIAGRAM 1 (CONTINUED)

Guatemala

	Population gains Net migration (+) 2002-1997	Population losses Net migration (-) 2002-1997
Net migration (+) 1994-1989	Guatemala; Sacatepéquez; Peten	
Net migration (-) 1994-1989	Chimaltenango; Escuintla	El Progreso; Santa Rosa; Sololá; Totonicapán; Quetzaltenango; Suchitepéquez; Retalhuleu; San Marcos; Huehuetenango; Quiche; Baja Verapaz; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa

Honduras

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1988-1983	Atlántida; Cortés; Francisco Morazán; Islas de la Bahía	Colón; Comayagua; Yoro
Net migration (-) 1988-1983		Copán; Choluteca; El Paraíso; Gracias a Dios; Intibuca; La Paz; Lempira; Ocotepeque; Olancho; Santa Bárbara; Valle

Mexico

	Population gains Net migration (+) 2000-1995	Population losses Net migration (-) 2000-1995
Net migration (+) 1990-1985	Aguascalientes; Baja California; Baja California Sur; Campeche; Colima; Chihuahua; Guanajuato; Jalisco; México; Morelos; Nuevo León; Querétaro de Arteaga; Quintana Roo; Sonora; Tamaulipas, Tlaxcala	
Net migration (-) 1990-1985	Coahuila; Hidalgo; Yucatán	Chiapas; Federal District; Durango; Guerrero; Michoacán; Nayarit; Oaxaca; Puebla; San Luis Potosí; Sinaloa; Tabasco; Veracruz Llave; Zacatecas

Nicaragua

	Population gains Net migration (+) 2005-2000	Population losses Net migration (-) 2005-2000
Net migration (+) 1995-1990	Atlántico Norte; Managua; Río San Juan	Jinotega
Net migration (-) 1995-1990	Masaya; Granada; Carazo; Rivas; Nueva Segovia	Madriz; Estelí; Chinandega; León; Matagalpa; Boaco; Chontales; Atlántico Sur

Panama[3]

	Population gains Net migration (+) 2000-1995	Population losses Net migration (-) 2000-1995
Net migration (+) 1990-1979	Panama	Bocas del Toro; Darién
Net migration (-) 1984-1979		Coclé; Colón; Chiriquí; Herrera; Los Santos; Veraguas

Paraguay

	Population gains Net migration (+) 2002-1997	Population losses Net migration (-) 2002-1997
Net migration (+) 1992-1987	Alto Paraná; Boquerón; Canindeyú; Central	
Net migration (-) 1992-1987	Presidente Hayes	Alto Paraguay; Amambay; Asunción; Caaguazú; Caazapá; Concepción; Cordillera; Guaira; Itapú; Misiones; Ñeembucu; Paraguarí; San Pedro

Uruguay

	Population gains Net migration (+) 1996-1991	Population losses Net migration (-) 1996-1991
Net migration (+) 1985-1980	Canelones	Artigas; Cerro Largo; Montevideo; Rivera; Rocha; Treinta y Tres
Net migration (-) 1985-1980	Maldonado; San José	Colonia; Durazno; Flores; Florida; Lavalleja; Paysandú; Río Negro; Salto; Soriano; Tacuarembó

Venezuela (Bolivarian Republic)[4]

	Population gains Net migration (+) 2001-1996	Population losses Net migration (-) 2001-1996
Net migration (+) 1990-1985	Lara; Anzoategui; Aragua; Barinas; Carabobo; Cojedes; Miranda; Nueva Esparta; Amazonas;	Bolívar
Net migration (-) 1990-1985	Delta Amacuro; Mérida; Monagas; Yaracuy	Apure; Falcon; Guarico; Sucre; Tachira; Trujillo; Zulia; Capital District; Portuguesa

Source: Prepared by the author on the basis of information from the [online] www.eclac.cl/migracion/migracion_interna/ database on Internal Migration in Latin America and the Caribbean (MIALC), special processing of census microdata, online processing of the 2005 census of Colombiahttp://200.21.49.242/cgibin/RpWebEngine.exe/PortalAction?&MODE=MAIN&BASE=CG2005BASICO&MAIN=WebServerMain.inl and data sent in by the National Statistical Office (ONE) of Cuba.

[1] No information available for the major administrative units of Guainia and Vaupes in the census of 1993.

[2] No information available for the major administrative unit of Orellana in the census of 1990.

[3] No information available for the major administrative units (*Comarcas)* of Kuna Yala, Emberá and Comarca Gnobe Bugle in the 1990 census.

[4] No information available for the major administrative units Vargas and Federal Dependencies in the census of 1990.

Until the 1980s, the attraction of colonization regions lay mainly in policies promoting migration to such regions (ECLAC, 2007; CELADE, 1984). Nowadays, however, there are no such policies, probably due to funding restrictions, negative assessments of their results, criticism of their limited consideration of human rights or increased awareness of their adverse effects on the environment. Although in some countries the disappearance of colonization programmes resulted in net emigration from the areas concerned (as in the region of Aysén in the south of Chile and the Beni region in Bolivia (see maps 1 and 2 in Annex)), other areas remained attractive, such as eastern Bolivia, Ecuador and Paraguay, the Brazilian Amazon region and the extreme south of Argentina (map 2). This suggests that an abundance of natural resources (particularly land) and the expectations of fast profit can supersede more traditional pull factors such as average wages and living conditions.

In regions with recent economic progress, wages and living conditions may even be lower than the nationwide average because their initial levels were low. Such regions, however, have high rates of job creation and good prospects that generate expectations of individual and regional advancement. The productive and migratory dynamics of these regions are closely linked to the world economy, as they are usually areas buoyed by the successful role they play on the global markets, either in primary products (fish farming and forestry in the Lake Region Chile), tourism (in the state of Yucatán, Mexico), industry (province of San Luis, Argentina) or remittances (province of Azuay, Ecuador) (see maps in annex). In the future, the economic buoyancy of these major administrative units may result in high salaries and good living conditions, in which case they will cease to be anomalous poles of attraction. However, as their attraction is critically dependent on world markets, their possible future status as "developed" areas could change in the event of world recession for the opposite reason: they could be wealthy regions in crisis and would therefore be sources of emigration.

The other two types of anomalous major administrative units represent two sides of the same process: the suburbanization of cities. The lack of land for housing in central areas means that cities expand horizontally. This is a complex process that can manifest itself in many different ways. Historically in Latin America, it has resulted in the rapid expansion of the outskirts of cities where cheaper or more easily available land has attracted mainly poor migrants from other parts of the country or from within the city. Thus, an effect of saturation-suburbanization has been that many major administrative units that include the main city (City of Buenos Aires in Argentina, Federal District in Mexico, Montevideo in Uruguay, Capital District in the Bolivarian Republic of Venezuela) have registered net emigration, despite their having the best income and living conditions in their respective countries (see maps in annex). That pattern is largely due to an extrinsic factor, namely that those units are relatively small. Although the cities within those major administrative units only accounted for a small part of their total area in the early twentieth century, they became saturated due to the rapid growth of cities during the century, and the urban sprawl spilled out into neighbouring units. This transformed the latter into very strong poles of attraction (see maps), despite their rather low standards of living and income.

As a result, any consideration of migratory patterns associated with metropolitan units must also include other divisions touched by the urban sprawl of the city. On an operational level, this implies carrying out a more disaggregated analysis of migration (for instance at the municipal level) – an exercise that is presented later in the document. More specifically, that exercise will assess whether big cities register emigration even after the effect of suburbanization has been controlled for.

In summary, although better living conditions remain one of the most powerful magnets to migrants, they may be offset by a potential mismatch between those conditions (resulting from a long process), economic buoyancy (more volatile and partly independent from living conditions) and the possibility of enjoying those advantages without living in places in high demand (due to suburbanization).

In addition, the driving forces of production, which operate as part of globalisation and the new economy of services and technology, have the capacity to change the attractiveness of areas according to many diverse and emerging factors.

3. Does internal migration reduce or deepen territorial disparities?

The first impact of migration on origin and destination areas is on total population. Generally speaking, migration tends to promote convergence between regions in terms of demographic growth, as poles of attraction are usually the more developed regions that are also more advanced in terms of demographic transition and therefore have lower natural increase. However, migration also has a qualitative impact. Depending on their characteristics, migrants can alter the characteristics of the population in both origin and destination areas. Migration therefore has a considerable effect on sociodemographic disparities between regions. For instance, if women migrate to areas with high indices of masculinity, subnational sex discrepancies in the population will be reduced.

Given the evidence of positive relationship between development and migratory attraction, and considering the historic selectivity of Latin America's internal migration in terms of age, gender and level of schooling (Rodríguez, 2004a), internal migration should be broadening territorial gaps in population structure by age, sex and level of education. This is because age and sex structures have cumulative disparities as a result of prior migration and the process of economic and social development. More developed regions therefore have a greater proportion of women and higher levels of education. As such areas remain net recipients of mainly female migrants and people with above-average education, migration will deepen territorial disparities in terms of gender and schooling. In terms of age structures, migration could be expected to widen disparities in the burden or upbringing. Since emigration from less developed areas tends to involve young adults, the proportion of children over the total population left behind, which already tends to be higher in such areas as they are at an earlier stage of demographic transition, will increase.

The procedure for empirically assessing this hypothesis was devised by CELADE and has been included in many publications since 2004 (Rodríguez, 2007, 2004a and 2004b; ECLAC, 2007). The main idea is to take the matrix of flow indicators (from the recent migration matrix), compare the marginals[11] and use the difference to verify if migration had an (net and exclusive) impact in reducing or increasing disparities. As it is beyond the scope of this document to study the situation of every major administrative unit, a synthetic indicator was used to show how individual effects impact on territorial disparities. This indicator is the simple correlation coefficient between the net and exclusive effect of migration and the initial level of the variable affected (sex ratio, age structure, level of schooling). If there is a positive correlation between the net and exclusive effect of migration and the initial value of the variable, then migration would be deepening territorial gaps, as divisions with high initial levels of the variable (five years before the census) would have higher increases in the attribute because of migration. If the correlation is negative, on the other hand, migration would be closing territorial gaps. Table 7 shows these correlations for selected countries in the region (according to the availability of data needed to carry out the calculations).

First, in the vast majority of countries migration between major administrative units generally widens territorial disparities in the proportion of children. The prevalence of positive coefficients suggests that those divisions with the highest initial proportion of children (typically the poorest areas) tend to show the highest average increases in that proportion due to migratory exchanges with other units. The underlying mechanism is indirect, as it is the mass exit of young people, rather than the arrival of children, that increases the proportion of children under the age of 15 in such divisions.

TABLE 7 – CORRELATION BETWEEN SELECTED SOCIO-DEMOGRAPHIC VARIABLES AND THEIR VARIATION DUE TO RECENT INTERNAL MIGRATION IN SELECTED COUNTRIES OF LATIN AMERICA AND THE CARIBBEAN, 2000 ROUND OF CENSUSES

	Simple correlation between the initial level of the indicator and the net and exclusive impact of migration on the indicator				
Country	*Average age*	*Percentage of children*	*Percentage of older adults*	*Masculinity ratio*	*Average years of schooling (age 30-59)*
Argentina, 2001	-0.27	0.61	-0.04	0.64	0.02
Bolivia, 2002	0.26	-0.32	0.67	0.17	0.85
Brazil, 2000	-0.05	0	0.47	0.46	-0.02
Chile, 2002	0.08	0.18	0.61	0.78	-0.71
Costa Rica, 2000	-0.19	0.42	0.35	0.27	0.06
Ecuador, 2001	-0.27	-0.13	0.43	0.47	-0.55
Guatemala, 2002	-0.67	0.21	-0.21	0.48	-0.04
Honduras, 2001	-0.32	0.62	0.44	0.43	-0.7
Mexico, 2000	-0.17	0.29	0.5	0.19	-0.22
Panama, 2000	-0.34	-0.24	0.23	0.87	0.31
Paraguay, 2002	-0.11	0.26	0.17	0.84	-0.38
Dominican Republic, 2002	-0.43	0.8	0.2	0.92	-0.16
Venezuela (Bolivarian Republic of), 2001	0.19	0.49	0.46	0.36	0.14

Source: Prepared by the author on the basis of information from the database on Internal Migration in Latin America and the Caribbean (MIALC) and procedures as described in the body of the text.

NOTE: coefficients that are significant to a significance level of 95 per cent are highlighted in bold.

Migration between major administrative units also accentuates disparities in the territorial distribution of the population by sex. This distribution has been shaped by migratory flows, particularly those from rural to urban areas, and has the following basic imbalance: a majority of women in the most urbanized major administrative units that have traditionally been poles of attraction. According to the ratios included in table 7 (most of which are significant at the 95 per cent level), recent migration has widened this gap: the proportion of men has increased in units with initially higher male/female ratios due to the net effect of migration.

Lastly, the ratios relating to education are less conclusive. Although the mainly negative coefficients suggest that migration helps reduce territorial disparities in terms of education, these are only significant at the 95 per cent level in three cases, and one case has a positive ratio. In any event, the evidence does not suggest that migration may contribute to a more balanced territorial distribution of the population by education.

4. Does emigration from poor areas worsen the situation?

Emigration regions with chronic poverty tend to be territorially grouped together in one or more vast socio-economically disadvantaged subnational areas (see maps in annex). Typical examples include the northwest of Argentina, the northeast of Brazil, Bolivia's "Altiplano," south-central Chile, western Cuba and the south of Mexico.

Table 8 shows six countries where the depressed regions are relatively easy to identify. Results are broken down by political and administrative unit within the regions of net emigration according to the most recent census (i.e., most units in those areas). Migration systematically has an adverse effect on the age structure, as it tends to raise the proportion of children and older adults at the expense of the working-age

population. As a result, emigration increases the demographic dependence of the population of such depressed regions, which aggravates their already difficult situation even more. In addition, in the large majority of units studied, migration tends to reduce the average level of schooling, thereby affecting the limited human capital of those areas.

While emigration may provide an escape to those migrating, it worsens the situation in the regions themselves. This has a negative effect on those who remain, thereby turning the region into a territorial poverty trap.

5. Is the rural exodus an ongoing phenomenon?

Although the paper has given a tentative answer to this question on the basis of advancing urbanization, this section focuses specifically on the trends of rural-to-urban migration. In the 2000 round of censuses, only four countries in the region (Brazil, Nicaragua, Panama and Paraguay) included questions that allow for direct estimate of rural-to-urban migration and therefore identify the four potential flows between the two areas. Table 9 summarises those results: with the exception of Nicaragua (where the rural-to-urban flow was by far the strongest),[12] migration between urban areas was the predominant flow. That was to be expected given the region's high levels of urbanization.

The figures also show that there are no counter-urbanization processes under way, as there is still a net transfer or population from the countryside to the city.[13] Any flows from the city to the countryside are mainly associated with processes of suburbanization (Guzmán et al., 2006) and urbanization (Ferras, 2007), which means that they do not fit in with the hypothesis of a "return to the countryside."

Migration between rural areas tends to constitute the least significant flow. This is partly due to advancing urbanization, the decline of colonization programmes and the depletion of the agricultural land area. Nonetheless, this flow could be underestimated due to the seasonal nature of many flows that are not captured by censuses. Whatever the level of such flows, this form of migration deserves special attention because of the severe impact it can have on the environment, particularly in terms of movements towards the agricultural frontier or settlement areas (Reboratti, 1990; Pinto da Cunha, 2007).

Given that the direct estimates relate to only four of the region's countries and that the results appear inconsistent in two cases, the application of indirect estimates offers a more reliable overview of the net balance of rural-to-urban migration.[14] The figures in table 10 are based on indirect method ("intercensal survival ratios") and lead to the following conclusions. First, all countries in the region continue to register net rural emigration. Second, this migration is no longer the main source of growth of the urban population, as its share fell from 36.6 per cent in the 1980s to 33.7 per cent of total urban growth in the 1990s.[15] Third, the situation is highly uneven among countries: predictably, the significance of rural-to-urban migration for urban population growth is higher in less urbanized countries. Fourth, in terms of the rural population itself, the net transfer from the countryside to the city remains high (see figure 1). What is more, countries such as Brazil still register what could be termed a mass exodus, as the flows involve a relatively high proportion of the country's total rural population.

TABLE 8 – MAJOR ADMINISTRATIVE UNITS IN HISTORICALLY DISADVANTAGED AREAS OF NET EMIGRATION, BY EFFECT OF INTERNAL MIGRATION ON THE AGE STRUCTURE AND LEVEL OF SCHOOLING OF THE POPULATION IN SELECTED COUNTRIES

North of Argentina (NOA)					*Altiplano of Bolivia*					*Southern Central Chile*				
Major administrative unit of net emigration	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*	*Major administrative unit of net emigration*	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*	*Major administrative unit of net emigration*	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*
Salta	-0.91	0.69	0.7	-0.082	Chuquisaca	-6.27	0.76	1.73	1.724	Del Maule	-0.42	1.73	1.22	0.19
Jujuy	-2.09	1.3	1.05	-0.735	La Paz	-3.11	0.14	0.2	-0.393	Bio Bio	-2.21	1.15	1.18	-0.46
Tucumán	-0.27	0.04	0.29	-0.006	Oruro	-8.88	2.38	2.94	-2.268	Araucania	-0.48	1.66	1.19	0.25
Santiago del Estero	-1.4	0.87	0.71	-0.143	Potosí	-14.76	1.67	3.34	-2.168					
Northeast of Brazil					*Sierra region (highlands) of Ecuador*					*Southern Mexico*				
Major administrative unit of net emigration	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*	*Major administrative unit of net emigration*	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*	*Major administrative unit of net emigration*	*Net rate of migration (per thousand)*	*Proportion of children*	*Proportion of older adults*	*Schooling of heads of household*
Maranhão	-6.88	0.77	2.52	-0.248	Carchi	-13.13	2.91	2.27	-1.9833	Oaxaca	-4.24	0.79	1.68	0.039
Piauí	-4.06	1.32	1.83	-0.657	Imbabura	-1.89	1.08	0.85	0.23049	Guerrero	-6.42	0.36	2.14	-0.149
Ceará	-0.72	0.47	0.57	0.599	Cotopaxi	-5.13	1.40	0.99	-0.2953	Chiapas	-2.85	0.69	0.99	-0.268
Paraíba	-3.92	0.82	1.86	-0.173	Tungurahua	-1.79	0.94	0.20	-0.2927	Puebla	-1.14	0.28	0.37	0.068
Pernambuco	-3.21	0.49	1.14	-0.072	Bolivar	-15.16	3.67	2.36	-3.0228	Veracruz	-6.89	1.66	2.98	-0.971
Alagoas	-5.70	0.4	2.61	-0.033	Chimborazo	-9.01	1.91	2.56	0.15052					
Sergipe	-0.61	0.31	1.13	-0.063	Loja	-9.30	2.47	2.30	-0.5514					
Bahia	-4.50	0.42	1.95	0.081										

Source: Prepared by the author on the basis of information from the [online] www.eclac.cl/migracion/migracion_interna/ database on Internal Migration in Latin America and the Caribbean (MIALC) and procedures as described in the body of the text.

TABLE 9 – DIRECT ESTIMATES OF RECENT MIGRATION BETWEEN URBAN AND RURAL AREAS FOR POPULATION AGES 5 AND ABOVE, 2000 ROUND OF CENSUSES

Country and census	*Current area of residence*	*Area of residence 5 years earlier*		
		No migration between minor administrative units	*Urban*	*Rural*
Brazil, 2000	Urban	111 027 460	10 775 021	3 244 288
	Rural	24 965 713	2 168 599	1 161 891
Nicaragua, 2005	Urban	2 109 103	67 567	338 008
	Rural	1 744 706	119 443	64 210
Panama, 2000	Urban	1 297 825	152 089	74 836
	Rural	832 551	40 798	29 741
Paraguay, 2002	Urban	2 175 943	248 014	31 361
	Rural	1 734 786	91 592	53 867

Source: Prepared by the author, on the basis of special processing of census microdata.

NOTE: as in all tables included in this document, there are obvious filters including children under the age of 5 for recent migration; exclusion of those born or living in other countries five years earlier in the analysis of absolute and recent migration, respectively; and exclusion of cases of no reply or outlier replies to base questions (usual place of residence, birth and residence five years previously) in the interest of data quality. In this table, some countries capture rural-to-urban migration within minor administrative divisions (Brazil, Paraguay), while others do not (Nicaragua, Panama), which means that any comparison between them should be made cautiously.

TABLE 10 – NET RURAL-TO-URBAN MIGRATION AND URBAN POPULATION GROWTH AMONG THE POPULATION AGED 10 AND ABOVE

Countries	*Net rural-to-urban migration*		*Growth of urban population aged 10 and over*		*Relative significance of rural-to-urban migration to urban growth*	
	1980-1990	*1990-2000*	*1980-1990*	*1990-2000*	*1980-1990*	*1990-2000*
Argentina	1 248 867	829 981	4 146 455	3 414 868	30.1	24.3
Bolivia	565 718	341 525	882 210	1 174 625	64.1	29.1
Brazil	9 167 628	9 483 867	22 868 322	26 856 555	40.1	35.3
Chile	146 535	382 623	1 447 011	1 939 951	10.1	19.7
Colombia	-	-	-	-	-	-
Costa Rica	82 656	338 002	194 507	717 006	42.5	47.1
Cuba	735 083	370 110	1 525 671	918 531	48.2	40.3
Ecuador	647 934	612 251	1 341 021	1 598 897	48.3	38.3
El Salvador	294 277	-	535 196	-	55.0	-
Guatemala	226 021	824 486	525 724	1 384 850	43.0	59.5
Honduras	258 003	303 742	501 918	685 610	51.4	44.3
Mexico	3 997 266	4 183 486	12 108 257	13 103 802	33.0	31.9
Nicaragua	139 920	-	484 649	-	28.9	-
Panama	113 677	234 038	292 298	432 624	38.9	54.1
Paraguay	280 103	296 914	504 441	652 302	55.5	45.5
Peru	1 001 406	-	2 990 661	-	33.5	-
Dominican Republic	218 172	553 575	709 784	1 096 408	30.7	50.5
Uruguay	83 300	34 446	233 238	132 306	35.7	26.0
Venezuela (Bolivarian Republic of)	735 042	847 392	3 171 190	4 235 917	23.2	20.0
Total	19 941 608	19 636 438	54 462 553	58 344 252	36.6	33.7

Source: Prepared by the author, using indirect technique (intercensal survival ratios).

6. Cities and their migratory attraction: concentrated deconcentration?

Regarding the deconcentration of urban systems in the region, what follows is a more detailed analysis of the three largest cities in 10 selected countries of the region. The distinction between indigenous and non-indigenous population is used to identify specific migratory patterns for each group.

The results in Table 11 demonstrate that the biggest cities remain attractive, as most continue to register net immigration. In countries such as Bolivia, Ecuador, Honduras, Panama and Paraguay (almost all of which have an urban percentage below the regional average), the biggest city (or the two most populated) are still major poles of attraction.[16] However, one in every three cities registers net emigration, which suggests that this situation (unheard of before the late 1980s in the region) could be spreading among the main cities of the region.

Most of the region's mega-cities in particular (cities with 5 million or more inhabitants) show net emigration, many since the 1980s. This change is due to diseconomies of scale and the shift of urban investment to other areas (UNFPA, 2007; Montgomery, 2004; Henderson, 2000). Other factors include difficulties of governance and the proliferation of urban problems such as lack of public safety, traffic congestion and pollution. Overall, these cities continue to receive strong inflows of immigrants; what has changed is that they have lost much of their retentive capacity.

As this is directly related to the hypothesis of "concentrated deconcentration," whereby people could be emigrating to nearby zones as part of a process of suburbanization, city sprawl or city-regions (Diniz, 2007), flows from mega-cities were divided into the categories short-distance migration or long-distance migration (Table 11). The main conclusion reached was that "concentrated deconcentration" was only operating in the mega-cities of Brazil, as net emigration from Greater São Paulo and Greater Rio de Janeiro was indeed exclusively due to exchanges with other municipalities within the same state, while both agglomerations continued to gain population from migratory exchanges with other states. In all other countries, displacing cities posted net emigration in terms of nearby or faraway migration or just the latter, which suggests an effective but unclear deconcentration. In several cities that remain poles of attraction, the pattern of migratory exchange fits in with the hypothesis of concentrated deconcentration, and seems to correspond to processes of suburbanization. This is the case of Guatemala City, Quito, San Pedro Sula and Heredia.

Lastly, migration trends tend to be similar for indigenous and non-indigenous groups, which suggests that the push and pull factors of cities have no ethnic bias. However, a difference based on ethnic origin can be perceived in many cities: La Paz and Cochabamba (which is a sign of the current polarisation of Bolivia), Tegucigalpa, Mexico City, Guadalajara and Asunción. The Bolivian and Mexican cities offer particularly striking examples as they are losing non-indigenous population while gaining indigenous population. This obviously contributes to an increase in the proportion of indigenous people in these cities, but perhaps more importantly indigenous peoples are entering cities that are no longer attractive to non-indigenous people. The reasons for this, and its implications, should be the subject of further investigation.

C. POLICY IMPLICATIONS

The diversity of current internal migration trends opens a wide range of policies, programmes and measures available to deal with the issue. This situation also calls for greater knowledge, precision and judgment among policymakers, who must decide how to intervene based on the type of migration they are attempting to influence. Any such strategy should adhere to the principle of respecting the right to migrate within a country in the best possible conditions, on the one hand, with the struggle prevention of discrimination that leads to poverty traps, on the other.

The four pillars of the strategies to manage internal migration are: incentives for individuals and companies, geographical allocation of infrastructure and public services, use of instruments of territorial land-use planning and economic regeneration, and knowledge and management of the unforeseen migratory effects of various social policies.

Illustrative examples of the above are urban regeneration and resettlement programmes in central areas. To attract migrants into city centres, decision-makers and experts have at their disposal a vast repertoire of economic, social and administrative instruments (subsidies, service location and amendment of land-use regulations). There is, however, a negative side to this advantage, as these instruments were not designed to influence intra-urban migration, but to organize the city and optimize its functioning (which remain as their high-priority strategic objectives). If the migration forces are very strong, using these instruments to counteract them may generate imbalances that will eventually result in costs for the city and its inhabitants, such as rising land prices, overcrowding, congestion, urban sprawl, residential segregation, etc. As is often the case, having policy instruments is one thing, implementing them with no negative side-effects quite another.

While specific policies to halt advancing urbanization or rural-to-urban migration have proved unsuccessful, not to mention ill-advised and plain wrong according to some experts (UNFPA, 2007), many countries would nonetheless like to redirect migratory flows between cities. According to recent studies (ILPES, 2007; UNFPA, 2007; Cohen, 2006; Guzmán et al., 2007; Davis and Henderson, 2003), the authorities of countries that consider the population to be overly concentrated in the main city favour a solid, dense and diversified urban network as being more conducive to national development. However, there is an ongoing debate on the effectiveness of programmes implemented to reduce such concentration. The seemingly natural idea of promoting some cities to the detriment (if only by omission) of others must pass several tests: it must benefit national development, it must be consistent with or at least not contradict national and global market-based economics, to be acceptable to all local stakeholders, and to respect individual rights. There are clearly many limitations to the discretionary nature of public action in this domain.

Lastly, it is worth highlighting those public policies that are formulated without consideration for the mobility of the population. These include housing and transportation policies, which have direct consequences on changes of residence, particularly within cities or between cities and their surrounding areas. These effects should clearly be taken into account when formulating such policies. Going one step further, they could even be devised to have a certain impact on migration and mobility, without neglecting their main objectives of providing good-quality connections and living environments for the population.

TABLE 11 – INTERNAL MIGRATION IN THE THREE MAIN METROPOLITAN AREAS IN SELECTED COUNTRIES OF LATIN AMERICA, 1990 AND 2000 CENSUS ROUNDS

Country and year	*Metropolitan area*[a]	*Indigenous*				*Non-indigenous*				*Total*		
		Net migration	*Rate (per 1000)*	*Net short-distance migration*	*Net long-distance migration*	*Net migration*	*Rate (per 1000)*	*Net short-distance migration*	*Net long-distance migration*	*Net migration*	*Rate (per 1000)*	*Net short-distance migration*
Bolivia, 2001	La Paz	12 212	2.9	23 961	-11 749	-6 978	-3.8	3 140	-10 118	5 234	27 101	-21 867
	Santa Cruz	24 279	17.9	-338	24 617	21 532	7.0	2 110	19 422	45 811	1 772	44 039
	Cochabamba	752	0.6	-1 159	1 911	-2 528	-3.0	-1 242	-1 286	-1 776	-2 401	625
Brazil, 2000	São Paulo	-164	-1.1	-747	583	-231 657	-2.9	-339 707	108 050	-231 821	-340 454	108 633
	Rio de Janeiro	435	3.1	-175	610	-29 854	-0.6	-49 505	19 651	-29 419	-49 681	20 262
	B. Horizonte	311	4.3	89	222	61 886	3.4	42 691	19 195	62 197	42 780	19 417
Chile, 2002	Santiago	-411	-0.5	-947	536	-49 306	-2.1	-30 945	-18 361	-49 717	-31 892	-17 825
	Valparaiso	231	5.4	24	207	8 927	2.5	1 361	7 566	9 158	1 385	7 773
	Concepción	-387	-5.4	-46	-341	-7 438	-2.5	711	-8 149	-7 825	665	-8 490
Costa Rica, 2000	San José	-78	-2.6	-13	-65	-13 849	-2.8	229	-14 078	-13 927	216	-14 143
	Heredia	6	2.1	5	1	4 442	5.4	-2 265	6 707	4 448	-2 260	6 708
	Cartago	28	36.8	8	20	2 874	3.9	644	2 230	2 902	652	2 250
Ecuador, 2001	Quito	5 005	28.6	-592	5 597	18 198	3.0	-29 157	47 355	23 203	-29 749	52 952
	Guayaquil	3 068	23.9	31	3 037	41 068	4.3	11 609	29 459	44 136	11 640	32 496
	Cuenca	714	49.1	147	567	11 322	9.4	2 968	8 354	12 036	3 115	8 921
Guatemala, 2002	Guatemala City	10 666	14.4	-3 028	13 694	489	0.1	-28 459	28 948	11 155	-31 487	42 642
	Quetzalten	1 007	3.8	681	326	98	0.4	216	-118	1 105	897	208
	Escuintla	-152	-6.7	-9	-143	-2 556	-5.2	-561	-1 995	-2 708	-570	-2 138
Honduras, 2001	Tegucigalpa	-219	-12.7	-32	-187	11 671	3.2	1 218	10 453	11 452	1 186	10 266
	San Pedro Sula	181	3.7	-42	223	6 708	3.1	-11 439	18 147	6 889	-11 481	18 370
	La Ceiba	258	6.7	-10	268	1 089	2.1	203	886	1 347	193	1 154
Mexico, 2000	Mexico City	1 137	1.7	1 226	-89	-72 063	-1.0	17 596	-89 659	-70 926	18 822	-89 748
	Guadalajara	41	1.1	-46	87	-14 719	-1.0	-8 256	-6 463	-14 678	-8 302	-6 376
	Monterrey	1 965	52.9	-2	1 967	40 656	3.0	-148	40 804	42 621	-150	42 771
Panama, 2000	Panama City	8 101	67.7	161	7 940	74 220	14.5	5 979	68 241	82 321	6 140	76 181
	Colón	270	17.3	8	262	1 499	2.1	2 105	-606	1 769	2 113	-344
	David	651	62.2	287	364	266	0.5	5 402	-5 136	917	5 689	-4 772
Paraguay, 2002	Asunción	-219	-12.7	-32	-187	11 671	3.2	1 218	10 453	11 452	1 186	10 266
	C.del Este	88	200.0	11	77	-2 257	-2.4	-1 861	-396	-2 169	-1 850	-319
	Encarnación	4	20.0	-2	6	-3 592	-8.7	-1 213	-2 379	-3 588	-1 215	-2 373

Source: prepared by the author, on the basis of special processing of census microdata.

[a] For a definition of metropolitan area, see the DEPUALC database [online] **www.eclac.cl/celade/depualc/**.

[b] Population aged five and above, resident in the country five years before the census and with valid replied to questions about usual place of residence and place of residence five years previous

NOTES

[1] The term Latin America and the Caribbean refers to the 42 countries and territories identified by ECLAC as making up the region. The term Latin America refers to the 20 countries identified by ECLAC as making up the subregion (17 on the mainland and three Caribbean island territories: Cuba, Dominican Republic and Haiti). For further information, see ECLAC (2005a) or Guzmán et al. (2006).

[2] Argentina, Venezuela, Bolivia, Brazil, Chile, Ecuador, Guatemala, Mexico and Uruguay, which combined represent 75 per cent of the region's population in 2000.

[3] Simple correlation of 0.81159487 (p-value = 0.000007, according to http://home.clara.net/sisa/signif.htm).

[4] Mega-cities are cities of 10 million or more inhabitants. In 2005, while the population of Latin America and the Caribbean represented 8.6 per cent of the world population, the region accounted for almost 30 per cent of the world's mega-cities (United Nations, 2006).

[5] The categories are: (a) "millionaire" cities (1 million or more inhabitants); (b) large intermediate cities (between 500,000 and 1 million inhabitants); (c) medium-sized intermediate cities (between 50,000 and 500,000 inhabitants); (d) small intermediate cities (between 20,000 and 50,000 inhabitants; and (e) small urban areas (with between 2,000 and 20,000 inhabitants). Countries considered in the table are, again: Argentina, Bolivarian Republic of Venezuela, Bolivia, Brazil, Chile, Ecuador, Guatemala, Mexico and Uruguay

[6] These cities can therefore be identified and monitored over time using longitudinal analyses. Although this type of analysis has been carried out for specific countries (CELADE, 2007), this will not be done here as such a regionwide vision goes beyond the scope of this document.

[7] The source for all calculations is the database on spatial distribution and urbanization in Latin America and the Caribbean (DEPUALC) (www.eclac.cl/celade/depualc). A reduced, or shorter version of this database was published by CELADE, 2005. Some other calculations included in this document are based on detailed country archives that are not published or available online.

[8] The author recognizes the limitations of comparing indicators of the "level" of migration between countries (Bell et al., 2005; Xu-Doeve, 2005; van der Gaag and van Wissen, 2001) and therefore urges caution when using or disseminating such results.

[9] The net migration rate was based on replies to the question about administrative unit of residence in the five years before the census. The categories are: (a) attractive (positive net migration in both censuses); (b) displacing (negative net migration in both censures); (c) rising (negative net migration in the first census and positive in the second); (d) falling (positive net migration in the first census and negative in the second).

[10] One of the marginals corresponds to the attribute at the moment of the census (i.e. with the effect of actual migration) and the other marginal corresponds to the attribute itself (with the territorial distribution it would have if migration had not occurred in the reference period). This is a comparison between a currently observed scenario and a counterfactual one). Key to the procedure is the constancy of the attribute over time (as in variables such as sex, for instance) or variation common to the entire population (as is the case with age).

[11] There is good reason to conclude that the flow was overestimated in the census of Nicaragua, as it does not tally with other sources such as the National Survey on Living Standards of 2001, or with the moderate pace of urbanization between 1995 and 2005

[12] The exception is Paraguay, where the question used suggests that the countryside gained over 60,000 people through internal migration in the period 1997-2002. These results have, however, been rejected by the very agency that carried out the census (Sosa, 2007).

[13] These estimates are orders of magnitude and not precise figures, as they are based on procedures that use fairly weak assumptions. They merely provide the net rural-to-urban migration balance by age and sex. These results tend to be overestimates, as they take migration to include the reclassification of areas (usually the upgrading of rural areas as urban ones as a result of population growth).

[14] These percentages are compatible with other studies (United Nations, 2001). This finding does not rule out rural-to-urban migration being the driving force of urbanization given the greater natural increase in the countryside (ECLAC, 2007 and 2005a).

[15] In the last two cases, the primacy index may be falling (see figure 1), while the concentration of the urban system in the two main cities may be rising.

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THE CHANGING NATURE OF URBAN AND RURAL AREAS IN THE UNITED KINGDOM AND OTHER EUROPEAN COUNTRIES

Anthony Champion, Newcastle University, United Kingdom

The main focus of this paper is on urban/rural patterns of population change and migration since the 1980s. Particular attention is given to the results of new research on the United Kingdom, but the main findings of selected studies of other parts of Europe are also reviewed and discussed. The paper begins by putting the European scene into global context using the United Nations' data.

A. European Urbanization in Context

This section overviews the European scene in a global context, using the estimates and projections from the 2005 edition of the United Nations' *World Urbanization Prospects*. In 2000 the aggregate population of Europe's 47 countries totalled 728 million, which was 73 million or 11 per cent higher than the figure for 1970. The projections for 2030 give a total population of 698 million, indicating a fall of 30 million or 4.2 per cent from the 2000 level. By contrast, global population rose by 65 per cent between 1970 and 2000 and is projected to grow by a further 35 per cent by 2030. As a result, Europe's share of world population has shrunk markedly, reducing from 17.7 per cent in 1970 to 12.0 per cent in 2000 and projected to fall to 8.5 per cent in 2030.

In terms of urban/rural split on the basis of the definitions used by the United Nations, the overall situation in Europe is one of urban growth and rural decline. In 1970-2000 the continent's urban population grew by 111 million (a 27 per cent increase), while its rural population contracted by 39 million (a 16 per cent fall). The projection for the 30 years to 2030 gives equivalent figures of a 24 million increase (up 4.7 per cent) for urban and a 55 million contraction (down 27 per cent) for rural. Thus, while rural population decrease is accelerating, the bigger change is the slowdown in urban population growth. In terms of global share, Europe's share of urban population is projected to be 11.1 per cent in 2030, down from 18.4 per cent in 2000 and 31 per cent in 1970. Its share of the world's rural population shrinks somewhat more slowly (10.4 per cent in 1970, 6.4 per cent in 2000 and a projected 4.6 per cent in 2030).

The combination of urban growth and rural decline produces a continuing rise in Europe's overall level of urbanization. Though its strongest absolute and relative increases took place in the 1950s and 1960s (with an annual average urbanization rate in excess of 1 per cent taking its level from 50.5 per cent in 1950 to 62.6 per cent in 1970), the proportion of its population living in urban areas reached 69.3 per cent in 1985 and 71.7 per cent in 2000 and is projected to rise further to 73.9 per cent in 2015 and 78.3 per cent in 2030. Driven by the reclassification of territory from rural to urban status and (usually) by higher urban than rural population growth for the areas that have not changed status, this is the norm across the continent.

There remain substantial differences between the four regions of Europe recognized by the United Nations, but these are diminishing as urbanization levels rise above the three-quarters mark. Northern Europe (comprising the Nordic and Baltic states together with the British Isles) continues in the vanguard of urbanization, with an urban population share of 83.4 per cent in 2000, up from 73.1 per cent in 1970 and projected to reach 87.4 per cent in 2030. In second place, Western Europe had reached 76.2 per cent in 2000, up from 71.6 per cent urban in 1970 with 82.6 per cent projected for 2030. The equivalent 1970, 2000 and 2030 levels for Southern Europe (including Spain, Portugal, Italy, Greece and the countries of former Yugoslavia) are 57.6 per cent, 65.4 per cent and 74.4 per cent, while those for

Eastern Europe (which includes the whole of the Russian Federation) are 56.2 per cent, 68.3 per cent and 73.7 per cent. In terms of individual countries, the highest levels in 2000 (ignoring countries with less than 100,000 inhabitants) were for Belgium (97.1 per cent), Malta (93.4 per cent), Iceland (92.3 per cent), United Kingdom (89.4 per cent) and Denmark (85.1 per cent). On the other hand, a part of the relatively small contrasts between countries arise from differences in urban/rural definition as opposed to 'real' contrasts.

In this situation, it is perhaps not surprising that nowadays rather little interest is being shown across most of Europe in the precise levels of urbanization or in the now quite low rates of urbanization as measured in terms of the percentage change in the level. This is compounded by the erosion of differences between urban and rural territory in terms of economic structures, social composition and quality of physical infrastructure such as roads, power and other utilities. The relevance of the traditional rural/urban dichotomy has also been weakened by the blurring of distinctions at the edge of individual urban areas, as improvements in personal mobility have allowed people to move out of these agglomerations into the surrounding countryside without losing access to the jobs and services located in them. For further details of these changes and their implications for studying the geography of settlement, see Hugo and others (2004), Champion and Hugo (2004) and Champion (2007).

While there remains an interest in settlement size, it is not so much for separating out which parts of a national territory can be considered urban as opposed to rural but, instead, for examining the distribution of population across the full span of settlement sizes ranging from the largest conurbations through to the small town, village and hamlet. This is primarily because of the differences in the number and diversity of people, jobs, services and other amenities found at different levels of the settlement-size hierarchy, which are generally much greater than between urban and rural aggregates. On the other hand, even more important for the opportunities available to residents in a mobile society is the geographical context within which the individual settlements are situated, this being influenced by the overall "intensity" of settlement in the wider area and by distance to larger urban centres (see, for instance, Coombes, 2004). This accounts for the increasing use of functional criteria to define settlement systems and for the strong focus on urban/rural relations and networking in more recent European spatial planning (European Commission, 1999).

B. The Case of the United Kingdom

The United Kingdom provides a particularly good example of the way in which attitudes and approaches have developed, owing to the early date at which it urbanized. Following the "physical agglomeration" definition recommended by the United Nations from the outset of its data collection in this area, Law (1967) revealed that, even by the first census in 1801, fully one-third of the population of England and Wales was in urban areas. By 1851 the proportion had exceeded half and by 1901 it had grown to 78 per cent, considerably above the European aggregate figure now (see above). Over the following century, during which the level rose by just 11 per cent points, there has been ample time for developing more meaningful ways of measuring urbanization. In this section we look first at the latest information on settlement size and then look at population trends since 1990 on the basis of an urban/rural classification of local authority districts.

1. Population by settlement size

We start by examining the full range of settlement sizes based on the "urban area" principle, where "rural" is the residual and its definition is flexible depending on what settlement size cut-off is used. Table 1 shows the distribution of the 2001, 1991 and 1981 Census populations of Great Britain (i.e. all United Kingdom except for Northern Ireland) by settlement size. The British urban system's considerable stability on this criterion is clearly seen, especially for the lowest, most consistent cut-off of

2,000 residents, where the 88 per cent living in settlements larger than this is very stable across all three censuses. Similar stability is found if one takes a higher settlement size to separate urban from rural. The government department responsible for rural affairs in England (DEFRA) takes 10,000 residents as its primary cut-off, which continues to translate into just over one-fifth of the national population. This form of presentation thus allows users to select the size-based definitions of "urban" and "rural" that best fit their requirements, something that is especially useful if trying to make comparisons with other countries that also use settlement size as their criterion. On the other hand, one should not make intercensal comparisons for the totality of settlements (i.e. any size) because the ultimate cut-off point has varied between censuses.

TABLE 1 – POPULATION OF GREAT BRITAIN, 2001, 1991 AND 1981, BY POPULATION SIZE OF SETTLEMENT

Size group at relevant census	*2001 population*	*Per cent 2001 population*	*Per cent 2001 cumulative*	*Per cent 1991 cumulative*	*Per cent 1981 cumulative*
1 000 000 and above	15 475 010	27.1	27.1	24.9	25.6
500 000 – 999 999	3 554 356	6.2	33.3	32.5	33.1
200 000 – 499 999	7 332 922	12.8	46.2	45.2	45.4
100 000 – 199 999	5 402 465	9.5	55.6	53.4	52.5
50 000 – 99 999	4 361 740	7.6	63.3	61.7	62.2
20 000 – 49 999	5 451 565	9.5	72.8	71.3	71.8
10 000 – 19 999	3 365 573	5.9	78.7	78.1	78.6
5 000 – 9 999	2 746 740	4.8	83.5	83.3	83.5
2 000 – 4 999	2 728 752	4.8	88.3	88.3	88.6
1 500 – 2 000	721 342	1.3	89.6	nd	nd
1 000 – 1 499	845 587	1.5	91.0	nd	nd
Under 1 000	1 067 490	1.9	92.9	89.6	89.8
Other settlement	4 050 396	7.1	100.0	100.0	100.0
Great Britain	57 103 938	100.0	N/A	N/A	N/A

Source: 1981, 1991 and 2001 Censuses, Key Statistics for Urban Areas. Crown copyright data.
NOTE: nd = no data is readily available for separating out these size groups in the 1981 and 1991 Censuses.

Before proceeding, however, a word of caution is necessary. As the data in Table 1 are based on published Census data, it is important to recognise that there have been changes between censuses that make it unwise to compare the proportions above each size threshold. In particular, the effect of under-enumeration in 1991 is believed to have been much greater in 1991 than in 1981 and also than in 2001 (when allowance was made of this), with this being primarily a feature of the larger cities. Secondly, the definition of usual residence changed between the 1991 and 2001 Censuses, such that students in 2001 were counted at their term-time rather than at their vacation address, having the effect of shifting this group up the urban hierarchy away from their family homes to the larger towns and cities that contain the majority of colleges and universities. As a result of both these changes, the increase in the shares of population accounted for the largest size groups between 1991 and 2001 shown in Table 1 can be expected to be largely due to statistical artefact, as their 1991 share was deflated by under-enumeration and their 2001 share was inflated (by comparison with 1991) by the net shift in students.

The results of attempting to harmonize population statistics over time should give a more accurate impression of the way in which the settlement system is evolving. Estimates for the 1991 and 2001 populations of the urban areas of England and Wales, made by Norman (2007), have been aggregated to size groups in Table 2. Showing 1991-2001 population change for urban areas grouped on the basis of their estimated size in 1991, this reveals a general shift of population down the urban size hierarchy. On this basis, urban areas with between 0.5 and 5 million residents in 1991 experienced population decline in aggregate over the following decade, while the rate rises fairly systematically with falling settlement size until reaching its peak of 6.6 per cent for urban areas with under 1,000 residents in 1991. Even the territory that still lay outside the officially defined urban areas in 2001 is estimated to have averaged 5.1 per cent growth, not far short of the rates for the smaller urban places. The one glaring exception to this

general "counter-urbanization" pattern is provided by the London urban area, which is the only place in the largest size category, with its 6.9 per cent estimated growth for the decade exceeding that of all the others.

TABLE 2 – ESTIMATED POPULATION CHANGE, 1991-2001, ENGLAND AND WALES, FOR 2001 CENSUS URBAN AREAS GROUPED BY ESTIMATED POPULATION SIZE IN 1991

Size of 2001 urban area (UA) in 1991	*Change (thousands)*			*Change (per cent)*		
	Overall	*Natural*	*Migration*	*Overall*	*Natural*	*Migration*
5 000 000 and over	544.0	435.3	108.7	6.91	5.53	1.38
1 000 000 – 4 999 999	-75.3	163.6	-238.9	-1.23	2.67	-3.90
500 000 – 999 999	-68.2	35.9	-104.1	-1.88	0.99	-2.86
200 000 – 499 999	72.1	103.1	-31.0	1.05	1.51	-0.45
100 000 – 199 999	141.7	106.4	35.2	3.08	2.31	0.77
50 000 – 99 999	123.6	70.6	53.1	3.04	1.74	1.31
20 000 – 49 999	167.6	55.5	112.1	3.97	1.32	2.66
10 000 – 19 999	149.4	2.3	147.1	4.96	0.08	4.88
5 000 – 9 999	118.4	-2.3	120.7	5.59	-0.11	5.70
2 000 – 4 999	113.0	-10.7	123.6	4.99	-0.47	5.46
1 500 – 2 000	30.9	-4.0	34.9	5.36	-0.69	6.05
1 000 – 1 499	38.9	-3.3	42.3	5.98	-0.51	6.49
Under 1 000	65.3	-9.0	74.3	6.60	-0.91	7.51
Outside UA	190.7	-24.7	215.4	5.06	-0.66	5.72
England & Wales	1 611.9	918.6	693.3	3.18	1.81	1.37

Source: calculated from data provided by Norman (2007).

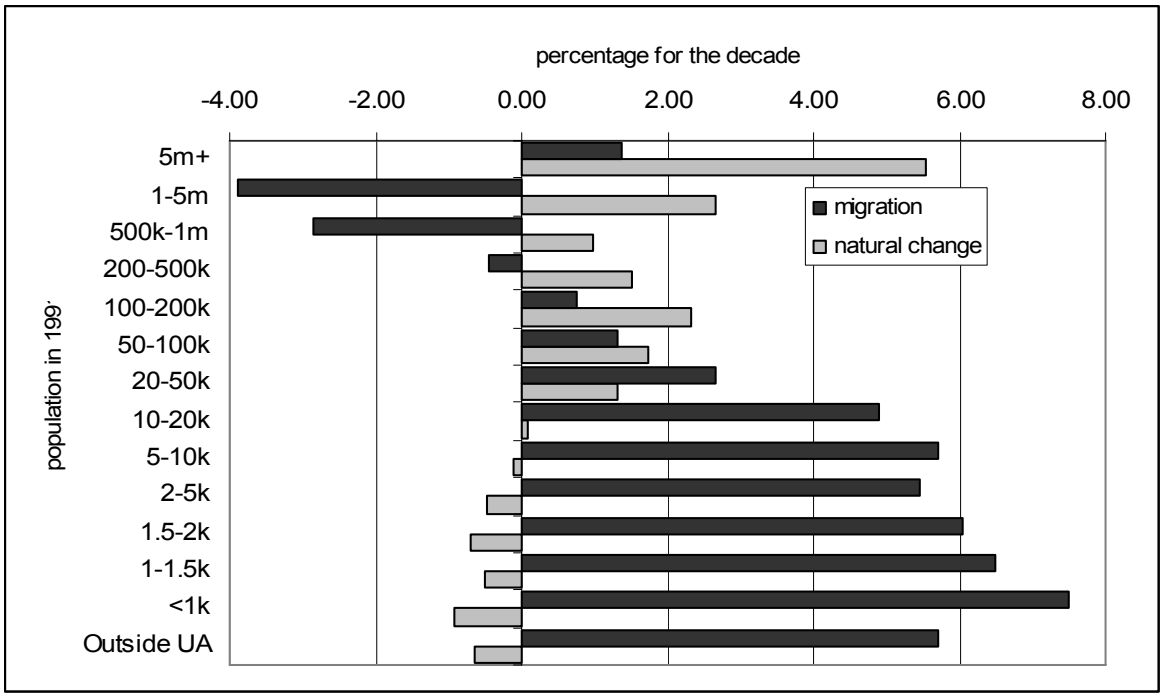
Table 2 also shows a breakdown into the two primary components of this population change, which are also plotted in Figure I. The clearest feature revealed by the latter is the fundamental importance of the migration component in producing the population growth differentials across the majority of the size hierarchy. In fact, the lower part of the hierarchy is dominated by migratory growth ranging from 4.9 per cent for urban areas with between 10 and 20 thousand residents in 1991 to 7.5 per cent for those with under 1,000 then. Above this, migratory growth falls off steeply with rising size, apart from the case of London. In terms of natural change, the general pattern is the opposite, with places of below 20,000 residents recording natural decrease or having births and deaths almost in balance and with natural increase for the urban areas larger than this. In this case, London conforms to the general pattern of natural change increasing with size of place, but its 5.5 per cent growth through this component is quite exceptional compared to the other larger places. Indeed, the London urban area (which is a more extensive area than that administered by the Greater London Authority) accounts for fully 47 per cent of England and Wales's total natural increase of 919,000 (see Table 2).

Part of the explanation for London's strong showing on natural change and its out-of-line performance for migration lies within its attractiveness for international migration, with the latter mainly focused on young adults and on groups with higher levels of fertility than the native British. The role of international migration cannot be explored fully for the settlement system as portrayed above, because the relevant data are not available at the small-area scale. For this purpose, we need to turn to an urban/rural classification based on local authority areas or "districts." Such higher-level typologies can also have the advantage of combining the individual urban areas with their surrounding areas that help to make up the local labour market areas and other spaces of daily activity and movement. Furthermore, being based on annual population estimates, one is not restricted to census years and can update beyond 2001.

2. Population by urban/rural district type

Out of the several available classifications of local authorities, the most appropriate for exploring the urban/rural dimension is the DEFRA "district classification" which has six main categories based on a combination of size of urban area and proportion of people living in rural settlements (where "rural"

Figure 1. Estimated population change due to natural change and migration, 1991-2001, England and Wales, for 2001 Census urban areas grouped by estimated population size in 1991



Source: see Table 2.

refers to urban areas of up to 10,000 residents plus towns of up to 30,000 that act as rural service centres). Various permutations are possible, like separating out the London urban area from the other Major Urban districts and pairing the six categories to give just three: Rural (local authorities with at least 50 per cent of people living in rural settlements), Urban (local authorities that best fit urban areas with at least 250,000 residents) and Mixed (the rest). The classification is restricted to England, but the latter accounts for five-sixths of the United Kingdom population. On this basis, rural local authorities accounted for 11.5 million (or 23.3 per cent) of England's 49.5 million residents in 2001, Mixed 26.7 per cent and urban 50.0 per cent.

Table 3 shows population change on these bases for the five-year period 2001-2006, splitting down overall change into the natural change, international migration and within-United Kingdom migration. For England as a whole, international migration was the main generator of population growth over this period, with natural change contributing only two-fifths and with net out-migration to the rest of the United Kingdom. Looking across the three broad types of districts, very clear gradients are evident for all measures. Overall population change displays the same "counter-urbanization" relationship seen for 1991-2001 in Table 2, with growth rising between Urban, Mixed and Rural categories, and now this is seen to be driven entirely by the within-United Kingdom migration exchanges. By contrast, both natural change and immigration are positively related to urban status, with the urban type growing particularly strongly because of the latter.

On the basis of the seven-way split of districts (see the lower panels in Table 3), the distinctiveness of the London urban area is immediately apparent. In terms of overall population change, London does not fit with the general "counter-urbanization" relationship found across the other types, as annual average growth rises from 0.29 per cent for the other major urban areas to 0.87 per cent for the

TABLE 3 – POPULATION CHANGE, 2001-2006, ENGLAND, BY URBAN/RURAL DISTRICT TYPE

Urban/rural classification of LA districts (see text)	*Population 2001*	*Overall change 2001-2006*		*Natural change*	*International migration*	*Within-United Kingdom migration*
	thousands	*thousands*	*Per cent/year*	*Per cent/year*	*Per cent/year*	*Per cent/year*
England	49 449.7	1 313.2	0.53	0.21	0.36	-0.04
Urban	24 715.3	478.5	0.39	0.35	0.57	-0.54
Mixed	13 219.0	391.9	0.59	0.19	0.24	0.16
Rural	11 515.5	442.9	0.77	-0.08	0.05	0.79
London	8 541.9	215.0	0.50	0.69	0.97	-1.17
Other Major Urban	8 865.3	127.8	0.29	0.22	0.37	-0.31
Large Urban	7 308.1	135.7	0.37	0.11	0.35	-0.09
Other Urban	6 774.9	178.3	0.53	0.27	0.33	-0.08
Significant Rural	6 444.0	213.5	0.66	0.11	0.15	0.41
Rural-50	5 771.5	192.8	0.67	-0.05	0.03	0.69
Rural-80	5 744.0	250.0	0.87	-0.10	0.06	0.90

Source: calculated from annual population estimates and components of change data published by the Office for National Statistics, revised August 2007. Crown Copyright data.

local authorities where at least 80 per cent of people live in rural settlements. This is in spite of London's phenomenally high rate of migration loss to the rest of the United Kingdom, much out of line even with the general negative relationship with urban status for this. London is clearly far more attractive to international migrants than even the other urban types, while again its rate of natural increase is outstanding.

This raises the question as to what are the longer-term trends affecting the urban/rural dimension of population redistribution. The available data allow overall change and components of change to be traced back to 1991 on an annual basis, though for this longer period it is not possible to separate out the effect of international migration. A summary of overall change for three five-year periods from 1991 is shown in Figure 2. For the majority of the seven categories, as for England as a whole, overall growth was strongest in the latest period and the rate rose between each of the three periods shown. For London the rate peaked in 1996-2001, while for both the other Major Urban and the Large Urban categories it dropped back then before moving sharply upwards.

In terms of trends in the components of change, these new analyses show that the rates for 2001-2006 described above generally represent an uplift from those for the previous five-year period for both natural change and migration. Migration (Figure 4) is clearly the main driver of trends in overall population (Figure 2), with a progressive increase in rates from 1991-1996 for the four less urban district types, paralleling national experience. It is also migration that drives the peaking of London's overall growth in 1996-2001, while for the other Major Urban type and also for the Large Urban type the 1996-2001 rate was marginally below that of the early 1990s. For natural change (Figure 3), it is only London

that displays a progressive increase across the three decades. For the next four types, there is a U-shaped pattern with the uplift between the two later periods being preceded by a drop from 1991-1996, while the rates for the two most rural types have fallen across the three periods.

Figure 2. Total annual average rate of population change, 1991-1996, 1996-2001, 2001-2006, England and seven district types

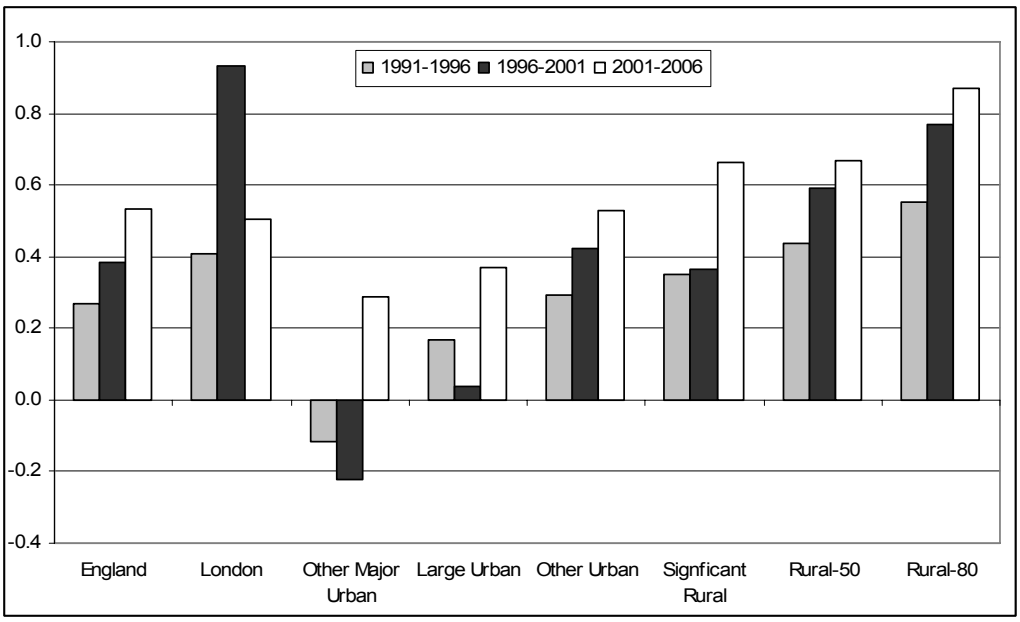


Figure 3. Annual average of natural increase, 1991-1996, 1996-2001, 2001-2006, England and seven district types

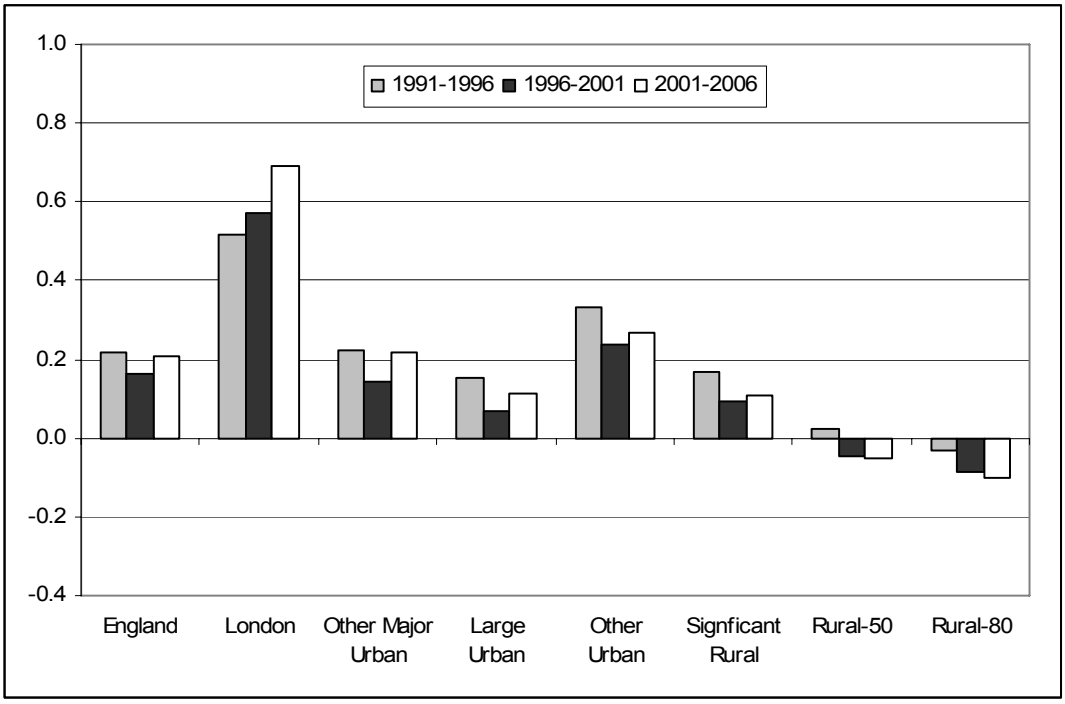
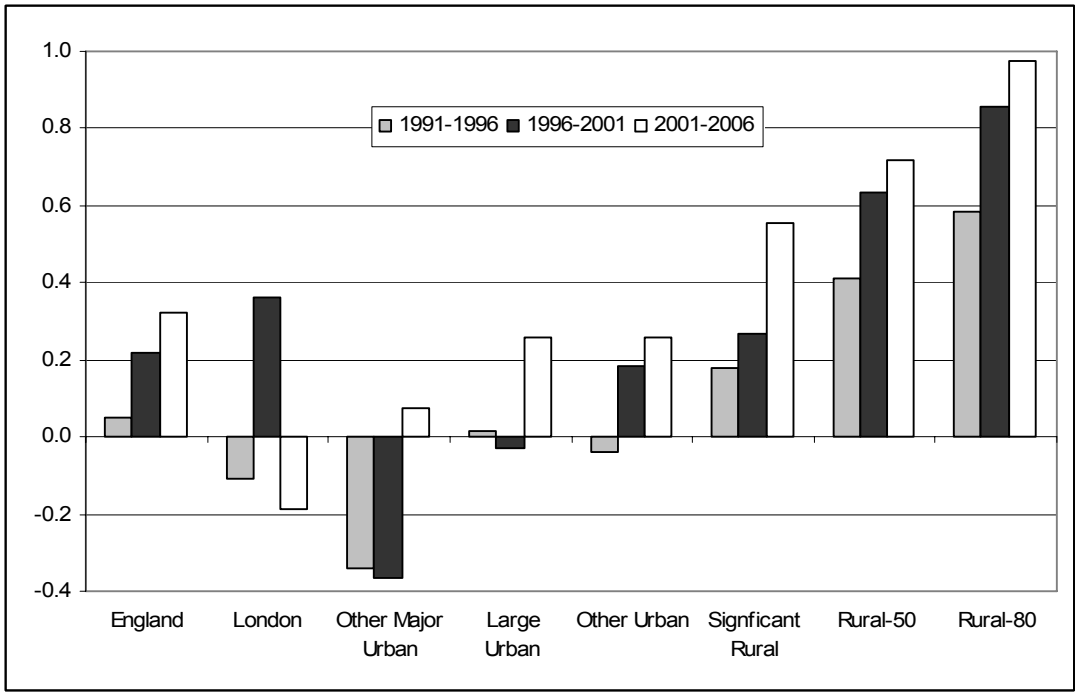


Figure 4. Annual average rate of migration, 1991-1996, 1996-2001, 2001-2006, England and seven district types

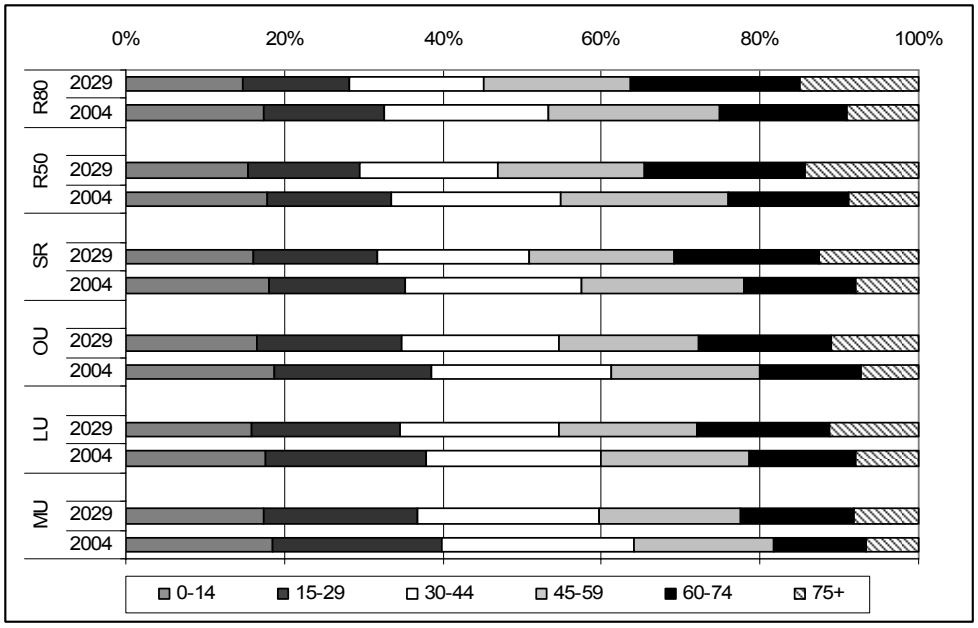


The steepening negative gradient between degree of "urban-ness" and natural change rate is primarily related to the increasing disparity in age composition between urban and rural areas, which in its turn is reinforced by the age profile of migration. Based on data from the latest official projections, Figure 5 not only reveals the rather regular increase in the proportion of residents aged 60 and over down the urban/rural scale existing in 2004 but also shows the marked widening of the difference over the following 25 years, assuming current migration patterns and fertility and life expectancy trends continue. By 2029 it is projected that over one-third of people living in the rural-80 districts will be 60 and over, compared to less than one-quarter of those in major urban areas.

The role of migration in producing these age differentials has been explored by Champion and Shepherd (2006). Interestingly, while there is some net migration of people aged 60 and over from more urban to more rural areas, its contribution is much smaller than that of three other factors. The most important one is the urban exodus or "counter-urbanization" of people aged 30-44 and, to a lesser extent, those aged 45-59, who then remain there and age in place. Secondly, more rural areas are major net losers of school leavers (with over 50 per cent net decline of birth cohorts between ages 16 and 24 recorded by more remote rural communities), who make for cities of 100,000 residents or more that offer further and higher education places and a greater range of job opportunities. Thirdly, as already mentioned, this rejuvenation of large-city populations is reinforced by these places acting as the main destinations of working-age migrants from outside the United Kingdom.

These migration patterns – notably the concentration of net immigration on the larger cities and the urban exodus that is predominantly born in the United Kingdom and white – are also serving to increase urban/rural differentials in racial and ethnic composition. The London urban area now accounts for almost half of all England's non-white population, almost three times its share of all people. By contrast, the parts of England lying outside the 56 largest urban areas are home to barely one-eighth of all non-white people, three times less than their 42 per cent share of national population (Champion, 2006).

Figure 5. Age composition of England's population in 2004 (estimated) and 2029 (projected), by urban/rural district type



Source: calculated from 2004-based Subnational Population Projections for England, Office for National Statistics. Crown copyright data.

Thus, while most of the differences between city and countryside in economic structure, occupational composition and quality of life have been diminishing over time, urban/rural gradients are steepening for some key demographic characteristics like age and ethnicity.

C. The Wider European Scene

This section looks more widely across Europe. As the resources available for this report do not permit an examination of each country, the focus here is primarily on a selection of English-language studies that attempt to review the situation over large parts of Europe. These have been chosen to represent the main areas of interest that research has addressed since the start of the twenty-first century. The first reflects the concern as to the future of Europe's larger cities, asking whether there seems to have been any significant degree of "resurgence" in the fortunes of these cities since the emergence of "counter-urbanization" in parts of Europe in the 1970s. Next, the results of some national studies of urban system change are examined in order to detect change over time in population concentration and deconcentration trends. The third set of studies looks at evidence on the existence and progress of urban sprawl in different parts of Europe, with primary emphasis on more localized patterns of development within cities and their regions.

1. Resurgent cities?

According to Storper and Manville (2006, p. 1269), "For almost as long as we have had cities, we have predictions of their decline and, for almost as long … we have had prophecies of resurgence." Recent years have seen the latter in the ascendancy, with cities being identified as sites of renewed economic dynamism and engines of national prosperity (OECD, 2001; Parkinson and others, 2006). This view of cities has been endorsed at national and European policy levels to the point where it has been described as "a new conventional wisdom" (Buck and others, 2005). Yet there has tended to be more

urban myth and policy hubris in the debate than there is hard evidence (Cheshire, 2006). Hence the value of an ambitious study by Turok and Mykhnenko (2007) to chart the population-change trajectories of 310 urban agglomerations with at least 200,000 residents in 36 European countries over five-year periods since 1960, these accounting for over one-third of these countries' aggregate population.

The headline results of the Turok and Mykhnenko study are that the number of growing cities has been falling steadily since the 1960s. Nearly three times as many cities were growing in the late 1960s compared to the late 1990s, by when there were more cities in decline than growing. The picture looks little different if the population change rates of cities are standardised to the change rates of their countries at each period, so as to allow for the long-term downward shift in national growth produced mainly by falling birth rates. The number of cities that were growing faster than their national rates fell from 241 in 1960-65 to 128 in 1995-2000, with those experiencing relative decline rising from 69 to 182. The only positive sign at this aggregate level was evidence of a slight recovery in 2000-2005, when 145 cities were growing faster than their national populations, but it is rather early to assess whether this modest rebound will continue.

In terms of the cities' individual trajectories measured in terms of the direction of population change, Turok and Mykhnenko (2007) were able to allocate 291 of the 310 (94 per cent) cities into one of nine types. Three of these represented different types of "resurgence" involving a change from decline to growth: 12 cities that had experienced resurgence just in the final period 2000-2005, a further seven since the end of the 1980s, and 23 turning around between the 1970s and 1980s. In all, therefore, only one in seven cities saw an absolute turnaround, with over half these events occurring as long ago as the 1980s. On the other hand, a total of 94 cities were found to have registered continuous growth over the study period, making this the largest single type of trajectory. Meanwhile, in terms of the four declining types, five cities were characterised by continuous population loss since the 1960s, eight by loss since the 1980s, 75 by loss since the 1990s and 41 by loss just in the last five-year period. The remaining 26 cities, mainly East European, had grown in the 1980s, declined in the 1990s and then returned to growth after 2000.

The study also found a major difference in the general trend over time between Western and Eastern Europe. The latter were, in aggregate, characterised by very strong growth in the 1960s and early 1970s, somewhat slower growth the following decade, and then absolute decline since the mid 1990s. By contrast, the trajectory of Western Europe's cities is seen as much less dramatic, with a lower average growth rate in the 1960s, followed by an earlier slowdown than in Eastern Europe but then with a period of aggregate recovery in the late 1980s and another since 2000. Perhaps the starkest difference between East and West is the fact that in 2000-2005 no less than 78 per cent of the latter's cities were growing then while 82 per cent of the East European cities were in decline.

Taking the long term view, therefore, the overall verdict is that city fortunes have waned over the last three decades. This is in relation to their past trajectories and also relative to smaller urban and rural areas. In the shorter term, several indicators suggest something of a recovery since the late 1990s, which was the weakest period for European cities overall, partly because they were dragged down by the Eastern cities. While it is too soon to say whether this uplift will be any more enduring than the temporary one in the early 1990s, one potentially important development identified by Turok and Mykhnenko (2007) is that, on average, the larger cities are now performing somewhat better than the smaller ones, reversing the negative relationship between size and growth that had pertained all through the study period till the mid 1990s.

2. National analyses of urban system change

Studies of individual countries are much more common than cross-national investigations and, though they can differ markedly in the way in which urbanization is defined and measured, they can help

to build up a broad picture of the changes taking place. This is especially the case where such studies have had a degree of central co-ordination, as for a journal special issue or a book. This section focuses primarily on the findings of two such projects, namely a set of studies that aimed to test the "differential urbanization" model (Kontuly and Geyer, 2003a) and studies of urbanization and migration published in an *International Handbook of Urban Systems* (Geyer, 2002). In both these cases, the emphasis is on trends of urban concentration and deconcentration analysed for functional urban regions rather than physically-defined agglomerations.

The differential urbanization model posits a cycle of urban system development that progresses through a temporal sequence of three primary stages defined on the basis of the relative growth of three size groups of cities (with growth preferably measured in terms of net migration rate rather than overall population change). On this basis, "urbanization" is said to be occurring when the large cities are, in aggregate, growing faster than both the medium-sized and the small ones, while "polarization reversal" occurs when the medium-sized cities outpace the others and "counterurbanization" is when the small cities are in the ascendancy. In their journal special issue, Kontuly and Geyer (2003b) summarise the results of nine national case studies, six of which are for European countries (as defined by the United Nations to include Russia and exclude Turkey).

Taking these six countries in order of progress made through the stages of the model up to the 1990s, Finland emerges as the most advanced. Though urbanization began fairly late here compared to other European countries, progress was rapid, with the migration differentials signalling polarization reversal by 1955-1965 and counterurbanization by 1965-1975. Then after a number of years in which net migration rates for all three urban size classes were roughly equal, a second cycle of urbanization emerged in 1990-1998.

Focusing on the period since 1950, the United Kingdom was found, on this basis to have been in the counterurbanization stage throughout, with no second cycle evident at least up to the end of the study period in 1991. Western Germany, like Finland, advanced rapidly through all three stages between 1950 and 1987, but then reverted to polarization reversal. Estonia spent four decades in the urbanization stage before leaping forward to counterurbanization in the 1990s. Italy switched from urbanization to polarization reversal around 1971, while Russia reached this point around 1989.

Europe accounts for eight of the national case studies in Geyer (2002): the United Kingdom, France, Germany, the Netherlands and Italy as representatives of "Western Europe," and Finland, Poland and Romania as examples of "Nordic and Central Europe." Taking these in reverse order and focusing on those not covered by Kontuly and Geyer (2003b), Romania has progressed through an entire cycle of urban evolution during the twentieth century, beginning with a prime city phase centred around the capital city, followed by a shift in importance to the regional centres, then to the intermediate and small towns, and most recently to a revitalising countryside, marked by a decrease in urban population since 1996 (Ianoş, 2002). In the Polish case (Rykiel and Jażdżewska, 2002), there has been no period in the past half-century when prime cities dominated the urban system, but the predominant pattern of migration has been up the urban hierarchy, taking advantage of the much superior living conditions in the more urban areas. After 1980, however, economic crises and social unrest caused a switch in migration destinations from the large and medium-sized cities to smaller cities and towns and by the 1990s industrial restructuring and the expansion of the private housing market were being accompanied by an increase in urban-to-rural migration.

In Western Europe, the case of the Netherlands is most notable for the development of a polycentric urban structure in the centre-west part (Randstad) of the country that has been concentrating population at the national level (Nijkamp and Goede, 2002). Finally, three main tendencies are clear from Pumain's (2002) treatment of France. First is the high intensity of the urbanization process in the two

decades to 1975, this by comparison with both previous trends and neighbouring countries. Second is the persistence of concentration trends at the scale of daily urban systems, on which basis the level of urbanization had risen to 77 per cent by 1999, up from 61 per cent in 1968 and 69 per cent in 1982 (and compared to 73 per cent in 1999 on an agglomeration-based definition). Third is the deconcentration of population at the local level, which has meant that the population growth rate for the functionally-defined urban regions has for the last three decades been around twice the one measured on the agglomeration basis.

3. Urban sprawl

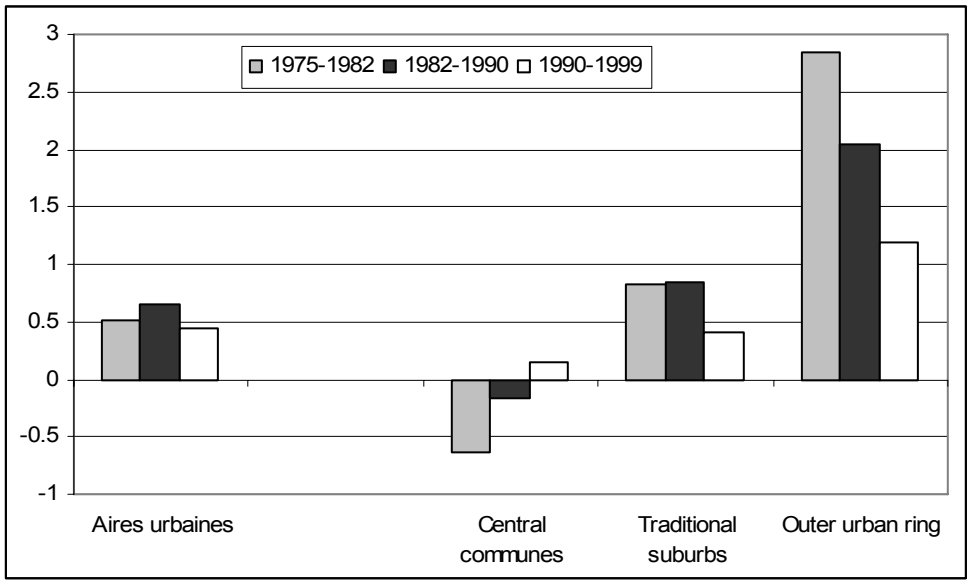
In contrast to the Anglo-American world, in continental Europe sprawl is not traditionally associated with urbanization. A longer history of pre-industrial urbanization, generally less intense forms of industrialization and rather different views about the status of rural land ownership among the elites all tended to maintain the preference for city life and secure greater investment in infrastructure and amenities for the city than for the countryside. While this may be a gross oversimplification of the European scene, there is no question that the attraction of the high-density apartment lifestyle has waned considerably in recent years, with the construction of single-family dwellings, the growing attachment to the private car and the switch of industry to horizontal factory layouts and road haulage all contributing to an explosion of physical development around urban nodes and further afield. It has also led to an explosion of academic and policy interest that includes books on urban sprawl in Europe (Couch and others, 2007) and in Western Europe and the United States of America (Richardson and Bae, 2004), national case studies like Guérois and Pumain (2002) on urban sprawl in France and Haag (2002) on sprawling cities in Germany, and a number of investigations funded by the European Union – or EU, as it has been mentioned earlier – including SCATTER, SELMA and several projects under the ESPON programme. Here this literature is drawn on selectively to attempt a summary account of this development, leaving space for an assessment of its implications for defining and measuring urbanization in Europe in the twenty-first century (see next section).

Given its "real predilection for urban centres and urban values" (Guérois and Pumain, 2002, p. 14), France forms a particularly good example of the extent and nature of recent changes. Even more impressive than the rising population share of the functionally-defined daily urban systems, noted in the previous sub-section, is their rapidly rising spatial coverage. As defined at each population census, the land covered by what are rather confusingly called "aires urbaines" increased more than five-fold in barely 30 years, rising from 32,733 km2 to 100,218 in 1982 and reaching almost 176,000 in 1999. Generally, the number of urban centres used as cores for defining these areas has risen, but not hugely, up from 319 in 1968 to a peak of 361 in 1990. The main change has been the expansion of the daily urban system around each core, which has increasingly led to the merging of these systems, such that the total number of nodes actually dropped to 354 in 1999 (see Guérois and Pumain, 2002, p. 36, Figure 7).

While the expansion of these daily urban systems in France can be linked to increasing journey distances for work and services by long-term residents of these "peri-urban areas," it has also been associated with the deconcentration of residential populations from their cores. Since 1975, the patterning of population growth within these systems has remained very consistent, such that the further from the centre, the higher the average growth rate. For example, in the intercensal period 1990-1999 and using the zones as defined at the start of this period, the annual rate for the outer rings averaged a gain of 1.19 per cent, compared with 0.41 per cent for the traditional suburbs (*banlieus*) and 0.15 per cent for the central communes. Figure 6 confirms that this pattern also existed in the two previous intercensal periods. On the other hand, it is also clear from this chart that the scale of the differential across the three zones has contracted considerably over time and especially since 1990. As part of this, a particularly impressive feature is the recovery of the central communes from substantial decline to modest growth over the period studied, with their improvement since 1990 moving against the trend for the "aires urbaines" in aggregate.

According to Guérois and Pumain (2002, p. 26), this slowing down of urban sprawl can be linked to central cities ceasing to lose population, which though beginning before 1990 became much more common afterwards.

Figure 6. Mean annual population growth rate, 1975-1999, for France's *aires urbaines* and three constituent zones (1990 definition)



Source: drawn from data presented by Guérois and Pumain (2002, p. 26, Table 3).

The expansion of daily urban systems and residential deconcentration within them are also associated with shifts in jobs and services and with the emergence of a more polycentric urban morphology in France. For instance, between 1990 and 1999 the traditional share of employment in the suburbs rose from 29.4 to 30.7 per cent and that of the outer urban rings was up from 8.7 to 9.1 per cent (Guérois and Pumain, 2002, p. 31, Table 4). The transformation of the functional spatial structure towards more complex patterns is coming about through the combination of absorption of previously existing secondary urban poles (including the effects of system mergers, see above) and the establishment of new nodes of economic activity, most notably located close to motorway junctions and airports. Nevertheless, as yet no secondary peripheral nodes have posed a real threat to the old city centre, "the concept of competing fringe cities has not been imitated from the US" (Guérois and Pumain, 2002, p. 38).

The picture of urban sprawl more widely across Europe is documented in the book edited by Couch and others (2007). In particular, a sample of 45 cities drawn from 18 countries are classified using the European Union's Urban Audit estimates of the rate of 1991-2001 population growth of their conurbations (defined on the basis of "larger urban zones," LUZ) and the change in the share of total LUZ population accounted for by the LUZ's core city over the same period (see Reckien and Karecha, 2007, p. 46, Table 2.4). "Sprawl," defined in terms of a fall in the core's proportion of the LUZ population, was found to be extremely common, accounting for 37 cases, leaving only eight cases of "containment," where the core was growing faster than the LUZ. The largest single group comprised the 25 cases that were sprawling and growing at the same time, this group being particularly well represented in Belgium, Netherlands, Austria and Germany. In second place, 12 cities had experienced a combination of sprawl and decline, these mainly located in Eastern Europe though the list also includes two English cities and two Italian ones. Six of the 45 cities registered growth with containment and are to be found in Denmark,

Sweden, Greece and Cyprus, while just two were classified as "decline with containment": Campobasso in Italy and Kalamata in Greece.

Drawing on in-depth case studies of seven of the 45 cities as well as a review of the wider literature, Leontidou and Couch (2007) conclude that there exists a triplet of broad regional contrasts in the nature of sprawl in Europe. In their own words (p. 256, emphasis as in the original):

> 1. Cultures of urbanism in **Southern** Europe have created compact cities in combination with *infrastructure-related* urban sprawl after long periods of popular suburbanization as a means of survival.
>
> 2. Anti-urbanism in **Northern** Europe created *lifestyle-related* urban sprawl, by the elites and middle classes wishing to escape urban squalor by moving to the countryside.
>
> 3. *State-induced* sprawl in **Eastern** Europe has *deconstructed* the compact city/pastoral landscape antithesis through the development of post-suburban landscapes which are usually not residential after the transition in the 1990s.

They acknowledge, however, that most European cities fall between these archetypes. Moreover, the fundamental North/South cultural dichotomy has been altering since the post-socialist transition and also through the move towards urban competition and the entrepreneurial city that has led to the coincidence of re-urbanization and urban sprawl. The "Mediterraneanization" of the North is seen as one of the most important changes in European urban culture of recent decades, raising the possibility of urban convergence (Leontidou and Couch, 2007, p. 263).

With the general prevalence of sprawl across European cities indicated by the full sample of 45 cities, it is not surprising that the EU has been giving much attention to this issue in recent years. As with Couch and others (2007), a small number of city case studies provided the core of its SCATTER project on "Sprawling Cities and Transport: From Evaluation to Recommendations" (see Gayda and others, 2005). Examining data on up to 20 years of change in the internal distribution of population and employment for all these cities plus income, housing and commuting for some of them, the SCATTER project concluded that the cities could be clustered into three groups with distinctive deconcentration patterns. Milan and Bristol were found to be characterised by continuing and rather strong spatial deconcentration, with the former seeing centrifugal movement over increasing distances and with redistribution in the Bristol urban region having a more polycentric pattern. For Brussels and Stuttgart, the deconcentration had been more moderate and appeared to have disappeared, apart from the latter still having a low level of outward shift of population by the end of the study period but no longer one of jobs. For Helsinki and Rennes, by contrast, the dominant pattern was one of spatial concentration of activities, though there was also evidence of some scatteration, this being produced partly by these cities' in-migrants settling not only in their urban centres but also in their outer urban rings.

The EU project on "Spatial Deconcentration of Economic Land Use and Quality of Life in European Metropolitan Areas" (SELMA, 2004) also used the case study approach, selecting a pair of larger and smaller cities from each of 7 countries (6 in Europe plus Israel). The emphasis here was primarily on the changing distribution of jobs within the 14 city regions. Employment change in the two Dutch cases was found to be led by producer services exiting historic cores to form suburban concentrations along major motorways. The data from Britain also reveals faster outer growth, but more for population than for jobs. In Denmark employment deconcentration has been taking a more dispersed pattern rather than focusing on the suburban nodes served by rail, though a back-to-the-city can also be observed in the case of Copenhagen. In Spain and Italy metropolitan areas have so far retained a strong monocentric pattern for employment, but central city population has stagnated or begun to decline in the

Italian cases. Finally, in the Czech Republic, profound changes have occurred since 1990, with early investments being directed at the commercialization of city centres but being followed soon afterwards by suburbanization pressures. Here, unusually, the employment shifts have preceded the residential ones, with the movement of middle-class families into low-density neighbourhoods starting only recently.

The ESPON programme includes a review of urban sprawl in the context of a wider examination of urban-rural relations (Bengs and Schmidt-Thomé, 2006). This study observed that the often rather fine balance between centripetal and centrifugal forces leads to different types of sprawl and identified four profiles (p. 231). Firstly, when observed at the regional scale, urban sprawl is characterised by the emergence of secondary urban centres. A second type involves infill, as scattered and low-density housing development locate between urban centres or transport corridors. Third is sprawl that is generated by the part of the population that has no other choice but to relocate because of the increasing costs of life in urban centres. Finally, sprawl can manifest itself in the erection of service and business centres outside the compact city boundaries, which will then tend to attract housing development, setting the ground for further dispersal. Bengs and Schmidt-Thomé (2006) go on to look at policy responses under the heading "urban containment," focusing on interventions in the development and property markets of France, Germany, Italy and the United Kingdom.

D. Implications for Studying Urban and Rural Areas

It is primarily the lateral extension of urban nodes, commonly referred to as "sprawl" as noted above, that raises issues for the definition and measurement of urbanization in Europe, though the challenge is magnified by the way in which adjacent settlements tend to merge into each other in more heavily populated areas and also by the general increase in individual personal mobility that facilitates these tendencies. The latter also means that, even where individual urban areas remain physically discrete from one another (as, for instance, has largely been achieved in the United Kingdom since 1947 through strict controls on the location of new building), they can still be rather intimately linked to each other by regular – even daily – flows of people, goods and services. Trends in urban development patterns have therefore not just made the task of urban/rural definition more difficult, but at the same time they have challenged the underlying rationale for doing this.

In their ESPON 1.1.2 project report, Bengs and Schmidt-Thomé (2006) raise these issues in no uncertain terms: "Currently, it is not so easy to argue in favour of the traditional split between the two spheres of urban and rural Europe. … A clear-cut visual divide has simply gone, being replaced by *rurbanization*, a process where the physical environment loses qualities that were traditionally associated with urban or rural settings. In most countries, urban centres have long since lost their particular privileges and there is no longer a clear difference in administrative status between town and countryside, or it is blurred (…) What is left? Is the urban-rural divide totally anachronistic?" (p. 12, emphasis as in original)

This leads them to the central question that their study was designed to address, namely: "Is it possible and sensible to make a distinction between urban and rural areas in Europe?" (Bengs and Schmidt-Thomé, 2006, p. 12). It is also the question that was tackled at global scale by the IUSSP Working Group on Urbanization (Champion and Hugo, 2004) and indeed has been the subject of much discussion over the 60 years since the United Nations made its initial recommendations on measuring urbanization and even before that (see Champion, 2004, and Zlotnik, 2004, for further details).

The conclusion reached by the ESPON 1.1.2 report on urban-rural relations in Europe is that something along these lines is still worthwhile; otherwise, it would have been a rather short report (which it is not!). But the basis selected for the empirical work in that study is not in terms of physically defined units, but rather in terms of classifying larger regional zones (NUTS3). On the other hand, it is suggested

(Bengs and Schmidt-Thomé, 2006, p. 19) that the same approach is flexible enough to be applied at a variety of scales that could include ones as fine-grained as NUTS5 (which equates to the electoral ward in the United Kingdom and can be thought of as residential quarters in large cities, though combining several settlements in a sparsely populated area).

The ESPON 1.1.2 urban/rural classification is based on two main dimensions that are then operationalised using a number of indicators. One dimension is the "degree of urban influence," for which two factors were taken into account: population density (whether the NUTS3 region had a population density above or below the European average of 107 persons per square km) and status of the leading urban centre of the region (whether or not this centre had been labelled a "Metropolitan European Growth Area" or MEGA, as defined by the ESPON 1.1.1 project). If a region satisfied either or both of these criteria, then it was classified as being of high urban influence, otherwise as of low urban influence. The other dimension, "degree of human intervention," was determined by the relative shares of three types of land cover (artificial surfaces, agricultural areas and residual land) as given by the Coordination of Information on the Environment (CORINE) data set. Using a set of rules based on whether the shares of these were above or below the European average, regions were classified three ways into high, medium and low human intervention types, which when cross-tabulated against the twofold urban-influence dimension produced a six-way classification of NUTS3 units across the 29 European countries covered by the study (the then current EU25, the two more recent accession states of Bulgaria and Romania, and Norway and Switzerland).

By way of example, Table 4 presents some headline results from this work, based on data for 28 of the 29 countries (comparable data was not fully available for Norway).

Bengs and Schmidt-Thomé (2006, p. 173) then discuss what this population change data reveal for trends towards concentration and deconcentration for the whole of Europe and for the former socialist countries (EU10+2) compared with the rest. In general, the regions of high urban influence are characterised by stronger growth than those of low influence, whether or not standardizing for degree of human intervention. Within each of the two urban influence classes, however, there is somewhat more variation as to which of the three human intervention classes is the strongest growing. The "high" class has the highest growth rate for the low urban influence regions (i.e. type 4) of the EU15+1, whereas it is the "low class" that is in this position for the high urban influence regions of the EU10+2. Otherwise, however, it is the medium human influence regions that score highest, as is also the case for the Europe-wide patterns for both high and low urban influence regions. The report therefore concludes that in the EU15+1 there seems to have been a slight decentralization in the three regional types with high urban influence, but centralization for the three regional types of low urban influence. The results for the EU10+2 are interpreted as evidence of "a kind of suburbanization" (Bengs and Schmidt-Thomé, 2006, p. 173).

This ESPON 1.1.2 classification was seen as replacing a typology of rural-urban spatial patterns produced by Moriconi-Ébrard and Eurostat (Pumain, 2004, p. 244, Figure 12.2). This identified six main regional types of settlement, as follows: regions dominated by a large metropolis, polycentric regions with high urban and rural densities, polycentric regions with high urban densities, rural areas under metropolitan influence, rural areas with small and medium-sized towns, and remote rural areas. As such, it represents a now rather common approach to classifying territory at scales higher than individual parcels of land. In section C above, we have seen the example of England's DEFRA urban/rural district typology that first identifies the areas covered by the larger cities and then allocates the remaining districts to categories by reference to the proportion of people living in rural places. A parallel approach

TABLE 4 – SELECTED INDICATORS FOR A SIX-WAY URBAN/RURAL TYPOLOGY OF EUROPE

Regional classification			*Number of NUTS3 regions*	*Population density 1999 (persons per square km)*	*Population change 1995-1999*		
Type code	*Degree of urban influence*	*Degree of human intervention*			*EU25+3*	*EU15+1*	*EU10+2*
1	High	High	691	330	0.84	1.10	-0.78
2	High	Medium	52	127	1.06	1.54	0.30
3	High	Low	34	139	1.01	1.02	0.39
4	Low	High	131	81	-0.18	2.21	-1.15
5	Low	Medium	184	55	0.64	0.78	0.24
6	Low	Low	201	29	0.08	0.28	-0.88
All 6 types			1 293	114	0.68	1.04	-0.64

Source: Bengs and Schmidt-Thomé, 2006, Table 3.6. See text for countries covered.

to settlement classification in England, adopted by DEFRA's urban equivalent (now called Department of Communities and Local Government, DCLG) for its State of the Cities 2005 Report (Parkinson and others, 2006), gives greater emphasis to city size, grouping 56 cities into four categories (London, Mets, Large Cities, Small Cities) as well as recognising two further categories (Large Towns, Small Towns and Rural).

Clearly, settlement size is still regarded as an important basis for differentiating territory, but this is primarily for the upper end of the urban hierarchy, with a wider range of criteria being used for smaller settlements and more rural regions. The justification for the latter approach is well articulated by Coombes (2004), whose examination of recent trends in a number of countries suggested three main dimensions of settlement systems: the size of settlements, the intensity or concentration of settlements, and accessibility to services and other facilities. These three, it is claimed, are not substitutable for one another and, indeed, it is likely that their degree of non-conformity will be greater in regions that do not contain larger cities. Some settlements will score higher (can this still be termed "more urban?") on one of these criterion than another. Hence the value of a classification like that of ESPON 1.1.2 that involves more than one dimension.

Finally, however, there is also the issue of what territorial units are used as the building blocks for these territorial classifications. Many of the latter are hampered by needing to use rather large statistical recording units that are primarily determined by administrative structures. The ESPON 1.1.2 urban/rural typology described above is based on (NUTS3) regions which do not provide a very good fit to the geography of the urban system. Meanwhile, both the DEFRA and DCLG classifications for England are primarily based on cities defined as physical "agglomerations" and ignore the fact that these constitute only part of the whole city because green-belt and other planning interventions have imposed a zone that further development of that city has had to leap-frog. In some other countries, it would seem to be physical urban sprawl that provides the main challenge for identifying what constitutes the entirety of a city. Hence the increasing popularity of the "metropolitan region" concept (see, for instance, OECD, 2006), where this is defined not in the United Nations' sense of physical agglomeration or the related concept of "conurbation" but instead is defined in terms of the city's functional region and measured through daily or quite regular spatial interaction like commuting.

In conclusion, in the task of classifying territory for the purposes of studying urbanization and population redistribution across settlement systems, perhaps the most appropriate way forward is a two-level approach that captures both the type of settlement that people live in and also the broader regional context. This is by no means a new suggestion. Indeed, it was advocated by John Grauman of the United

Nations almost 40 years ago (United Nations, 1969, p. 3): “A fourfold classification, separating ‘urban’ and ‘rural’ areas both within and outside the larger regions of urban dominance, might provide a more relevant framework of analysis” than what was currently being used. This idea was then endorsed by the United Nations (1973, p. 12), as follows: “Looking in to the future (…) one can incline to the view that a fourfold classification may eventually serve most practical purposes the best. It may become necessary to distinguish urbanized and non-urbanized areas (…) both within the metropolitan regions and outside such regions, resulting in four categories such as metropolitan urbanized, metropolitan rural, non-metropolitan urbanized, and non-metropolitan rural populations.” That anticipated future would seem to have arrived, judging by the wealth of evidence now assembled on new forms of urbanization (including Champion and Hugo, 2004, and National Research Council, 2003). Moreover, four decades on, there is the possibility of much greater sophistication in developing indicators for applying at both the local and regional levels of such a classification.

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LINKS BETWEEN RURAL AND URBAN DE VELOPMENT IN AFRICA AND ASIA

Cecilia Tacoli, International Institute for Environment and Development, United Kingdom

A. INTRODUCTION

The relation between rural and urban development is a traditional concern of development economics. While there is an established correlation between GDP growth and the share contributed to it by industry and services (and the proportion of the workforce employed in them), it is less clear how policies can drive the transformation of agricultural national economic bases into industrialised ones. Development paradigms have shifted since the 1960s, usually as the prescribed policies failed to achieve their aims, and so have views on whether economic growth should be driven by investment in industry or in agriculture. But the overarching dualistic approach, whereby traditional agriculture needs to give way to the supposedly more efficient agri-business production system and to modern, urban-based industrial and services sectors, remains pervasive.

In many instances and contexts, however, successful rural development stimulates and supports urban development, and urban development is often a key impetus to rural development, especially where the latter is based on relatively equal access to resources – which, in most cases, means small and medium size farming rather than agri-business production. This complementary relationship also occurs at the household level: for both poor and wealthier groups, either rural or urban-based, the diversification (and multiple location) of income sources and asset base is an increasingly widespread strategy to reduce vulnerability and, in the most positive instances, move out of poverty and accumulate assets. It is thus perhaps more accurate to think of "development" as a blurring of the rural-urban divide, rather than an unambiguous transition.

The growing understanding of the multi-dimensional nature of poverty and of the complex strategies people adopt to construct their livelihoods has promoted renewed interest in the links between urban development and rural development in recent years. Hence the notion that people and households may engage in a number of different activities and move between different locations has gained wider currency – although on the whole, policy efforts to recognize and accommodate it have been insufficient at the very least.

Despite the strong correlation between levels of urbanization and less agriculture-based economies, in many low- and middle-income nations, rural-urban migration is seen as the main source of urban poverty and therefore a problem that needs to be controlled. In most cases, however, urban growth (rather than urbanization) is more likely to be the real challenge, and one that needs to be addressed in ways that include the poor. The emphasis on rural-urban migration also tends to eclipse the importance of other forms of mobility that play a significant role in households' strategies and local economic development.

There are other long-held policy assumptions that are challenged by a closer look at the links between urban and rural development. In the agricultural sector, it is widely held that export production is the most profitable option, and that large commercial farms are more efficient in gaining access to international markets. The case studies reviewed in this paper suggest instead that in a wide range of contexts, domestic urban markets are the key driver of increased agricultural productivity, and that this is better achieved by the more flexible family farms, provided they are well connected to local trade networks and supported by non-farm income sources.

Finally, policies that promote the development of industries in rural areas often fail to recognize that in most cases, these are effectively located in large villages or in peri-urban areas. This in itself is not a problem. What is a problem, however, is that the lack of urban status means that local authorities are not equipped with the necessary technical capacity, financial base and decision-making power to address the environmental, economic and social issues that arise in these densely populated settlements with high concentrations of small scale, often home-based enterprises that compete with residential and agricultural uses of natural resources, especially land and water.

More broadly, local Governments and local governance systems are an often overlooked but essential component of successful development. The links between rural and urban areas, people and enterprises are shaped by location-specific conditions - geographic, ecological, socio-cultural and political - which are fundamentally diverse, not only between and within regions, but also within national boundaries. Hence, while rural-urban linkages are crucial for poverty reduction and sustainable and equitable economic growth, they are best supported by policies grounded in a careful understanding of the local context. This level of detail, however, is hardly provided by national data and other regionally aggregated data, making it very difficult for local policymakers and administrators to access the basic information they need to operate fairly and effectively.

The rest of this paper draws on the growing body of micro-level empirical research in Africa and Asia to describe the interrelations between urbanization, mobility and local economic patterns, and discuss how policies can be more responsive to these complex and constantly evolving transformations.

B. Urbanization Patterns in Africa and Asia

Africa and Asia are the regions where levels of urbanization have increased most rapidly between 1950 and 2000: from 14.7 to 36.2 per cent in Africa, and from 16.8 to 37.1 in Asia (Satterthwaite, 2007). However, these aggregated data hide significant differences between and within both the African and the Asian regions. They also hide recent changes – in several African countries, there have been no recent censuses, and figures on urbanization are often based on projections of data collected in the 1970s and 1980s, when socio-economic and demographic trends were very different from current ones. In other cases, for example China and Vietnam, household registration systems tie people to specific locations – but not necessarily to where they actually live – making large numbers of migrants invisible. There are also substantial differences in the ways in which each nation defines an urban centre, and this affects primarily smaller towns (Satterthwaite and Tacoli, 2003). These definitions may change over time: in China, it has been estimated that the country's level of urbanization in 1999 would have been 23.9 per cent if the pre-1982 definition of urban centres had been used; 73 per cent according to the 1982 definition; and 30.9 per cent using the 1990 definition (Liu and Zhang, 2003).

This section does not attempt to give detailed analyses, let alone compare urbanization in Asia and Africa; the aim is more simply to provide a broad backdrop to the next sections. There are of course several exceptions to the trends described below for the African and Asian regions. There are also factors not included here which are likely to have important impacts on urbanization and economic growth. One of them is certainly the HIV/AIDS epidemic, for which data is still sketchy. The impacts of climate change and environmental stress, both as an increase in extreme weather events and as gradual changes in rainfall patterns and sea level rises, for example, will also affect population movements, levels of urbanization and the location and shape of urban centres (Tacoli, 2007). And especially – but not only – in the African region, conflict and civil strife sadly continue to displace large numbers of people.

1. Africa: slower than expected urbanization

Like other regions, urbanization in sub-Saharan Africa is closely related to political changes, which have a profound impact on population distribution. But from positive perceptions in the wake of several nations' independence in the 1960s, urbanization in Africa has come to be considered as a problem: cities are described as part of the cause and a major symptom of the continent's economic and social crises (World Bank, 2000). Despite the general consensus on the positive impact of urbanization on social and economic development, there is a relatively widespread view that throughout the 1990s Africa's urbanization occurred without economic growth (Fay and Opal, 2000). But the limited number of countries for which urbanization can be quantified with any accuracy suggests that perhaps the most important issue in discussing urbanization patterns in sub-Saharan Africa is the lack of reliable data. Indeed, the limited data suggests a different picture of falling urbanization levels during the 1990s.

Economic decline in Africa has deeply affected migration patterns. In Côte d'Ivoire between 1988 and 1992, net migration was higher in the rural areas than in urban centres (Beauchemin and Bocquier, 2004). In Zambia, levels of urbanization actually fell from 40 per cent in the 1980 census to 36 per cent in the 2000 census, and all the Copperbelt towns but one, Ndola, experienced net out-migration (Potts, 2006). These negative impacts are also often much localized, especially in areas with limited diversification of the economic base. In Ghana's cocoa-producing Central Region, the collapse of international prices for this commodity in the 1980s triggered out-migration from small towns. Between 1970 and 1984, the proportion of urban population in the Central Region fell from 28.5 to 26.5 per cent, although national rates of urbanization continued to grow (Songsore, 2000).

One of the consequences of economic decline has been the narrowing of the rural-urban income gap (Jamal and Weeks, 1993) and more generally of rural-urban inequality in access to basic services, as urban centres were often worse affected by structural reforms. However, while urbanization levels have slowed, urban growth rates have remained high in many countries because of the high rate of natural growth (Beauchemin and Bocquier, 2004). And while African nations' economic base is often seen as predominantly agricultural, on aggregate agriculture's share of GDP is lower than that of services. The service sector is dominated by small and micro-enterprises, often operating with minimal capital, low skills and very limited value adding – in short, what is often referred to as the informal sector (Kessides, 2005).

2. Asia: export-led industrialisation and peri-urbanization

In contrast to sub-Saharan Africa, Asia contains some of the most dynamic economies in the world, as well as some of the largest ones. Another difference with the African continent is that its high rates of economic growth have been driven in several cases by export-oriented manufacturing. Location, in the form of proximity to ports and trade nodes, is extremely important for this industry, resulting in high levels of spatial concentration. This, combined with widening rural-urban income gaps, is a key driver of rural-urban migration. In 2000, China's southern Guangdong province, one of the main industrial hubs, had less than 7 per cent of the national population, but 27 per cent of the total registered inter-provincial migrant population (Liang and Ma, 2004).

Export-led industrialisation is also a key driver of physical patterns of urban expansion that can be found in many areas of rapid economic growth, especially in Southeast Asia but also around large and economically successful cities in India (Benjamin, 2000). The emergence of extended metropolitan regions in urban peripheries and in corridors between cities is typically unplanned and often results in a lack of integration between infrastructure provision and population. Neither core urban centres nor their surrounding peri-urban regions provide adequate basic services to their populations. The complex mix of agriculture, cottage industry and residential use (and often waste dumping and extraction of construction

materials) and the lack of institutional frameworks often contribute to high levels of pollution and environmental degradation (McGranahan et al., 2004; McGranahan and Tacoli, 2006).

An essential element of these processes of peri-urbanization is the mobility of the local population. In China, research in the Jiangsu province in the mid-1980s showed that daily commuters from surrounding rural settlements accounted for up to 43 per cent of the daytime population of local small towns (Kirkby and Shen, 2000). In India, in 1987-1988 some four per cent of the urban workforce consisted of rural-based commuters, a proportion that is likely to have increased since then (Dyson and Visaria, 2005).

In very general terms, Africa (or better, some nations and regions within the African continent) and (parts of) Asia represent different trajectories of socio-economic transformations. It would seem reasonable to expect these differences to affect other aspects of change. But this is not necessarily the case for migration patterns, as described in the next section.

C. Migration and Mobility

For many Governments in Africa and Asia, migration has become a key policy issue. And it is seen mostly as a problem, rather than part of the solution. Across much of the African continent, it is assumed that it is poverty that forces poor people to migrate, rather than migration being a potential route out of poverty. A review of Poverty Reduction Strategy Papers (PRSPs) across Africa shows that migration is seen predominantly in negative terms, as placing pressure on urban areas, promoting the spread of crime and HIV/AIDS, stimulating land degradation and reinforcing both urban and rural poverty. Perhaps unsurprisingly, policy responses mentioned in the documents are geared primarily to reduce or prevent rural-urban migration (Black et al., 2006).

What is surprising, however, is that such negative views come from a region where migration has long been a characteristic of the better off and, indeed, of many African elites (ibid). It is also surprising in view of the fact that Africa's urbanization levels are much lower than expected, and some areas are actually experiencing de-urbanization processes, as described earlier in this paper. What this underlines is how deeply the lack of reliable data can affect policy, often resulting in initiatives that are essentially anti-poor (Tacoli et al., 2007).

African Governments are not alone in holding negative views of migration. The proportion of low-income countries with policies to lower migration to urban centres, especially the larger ones, has risen from 51 per cent in 1996 to 73 per cent in 2005 (United Nations, 2006). Where household registration in specific locations – rural or urban – is used, such as in China and Vietnam, it has not reduced rural-urban migration, but rather increased the vulnerability of migrants by curtailing their access to basic services and worker rights (McGranahan and Tacoli, 2006). In West Africa, where there are no strict measures to control migration, there is no evidence that migrants to the cities are disadvantaged in access to housing and employment compared to non-migrants (Beauchemin and Bocquier, 2004).

But attempts to limit urban growth by controlling migration are misjudged for two other reasons: first, because migration flows are logical responses to changing economic opportunities and their spatial location; and second, because most urban population growth (not urbanization levels) is the result of natural increase rather than net rural to urban migration.

1. Circular and temporary migration

Perhaps the most striking finding from recent research on mobility in both Africa and Asia is the extent and growth of circular and temporary migration. This type of movement is typically overlooked by

national statistics but is a key element of the livelihoods of households in both rural and urban settlements. To a large extent, it overlaps with the diversification of income sources and is an important part of the links between urban and rural development, as described later in this paper. Temporary movement can also be essential to maintain an asset base – and a safety net - spread across different locations. Where access to land depends on rights allocated by the state or local authorities, temporary movement ensures that those rights are not lost (Findley, 1998; Ping and Pieke, 2003).

In Southeast Asia, urban growth and the expansion of manufacturing, especially for export, are the main drivers of temporary migration. Relatively good road networks, transport links and communications have also greatly aided mobility (Rigg, 2003). In Vietnam's Red River Delta, it is relatively common for farmers to move to Hanoi to work in the construction sector for a few months every year (Hoang et al., 2005). In Thailand, it is estimated that one-third of all internal migration consists of temporary movement to Bangkok and its metropolitan region during the dry season, when labour demand for agricultural work decreases (Guest, 1998). In China in 1999, according to the Department of Public Security Management, 59.4 per cent of registered temporary migrants had lived in their current place for between one month and one year, 14.5 per cent for less than one month and only 26.1 per cent for over one year (Zhu, 2003). Research in the major migrant destinations, the manufacturing and construction hubs of Guangdong, Beijing and Jiangsu, suggests that only between 15 and 30 per cent of migrant workers intend to settle permanently in their current workplaces (ibid).

In India, an estimated 20 million people migrate temporarily each year. It is also estimated that over 60 per cent of this movement is between rural areas, with the majority migrating from drought-prone regions to areas of irrigated agriculture (Deshingkar, 2005). However, recent research suggests that as a consequence of agricultural mechanisation, migration is increasingly towards urban centres and non-farm occupations: in northern Bihar, this type of movement has grown from three per cent of the total in 1983 to roughly 24 per cent in 2000 (ibid).

In Africa, circular migration is the predominant form of movement in many nations and regions. In drought-prone areas, as in Asia, there is a long tradition of temporary migration as a coping strategy (Black, 2001; Findley, 1998). While limited infrastructure and transport links often increase the costs of movement and force migrants to stay away for longer periods of time, economic insecurity and poor living conditions in many urban centres reinforce the long-term linkages of migrants with their home areas.

Migrants not only routinely return to the resident household and consider it as their main place of domicile, but they also invest in rural assets such as land and livestock as a safety net (Krüger, 1998; Smit, 1998). This has certainly facilitated return migration processes documented in many countries in the 1990s (Jamal and Weeks, 1993; Potts and Mutambirwa, 1998). But the sheer scale of circular migration in Africa is often underestimated, as data do not easily reflect it. Drawing on census and sample census data, Potts shows that in Malawi in 1976-1977 urban-rural migration was the equivalent of 61 per cent of rural-urban movement, and in Botswana for 1980-1981 it was 76 per cent (Potts, 2006).

2. Remittances as part of multi-local, multi-activities households

The overall increases in circular and temporary migration suggest that migration is part of wider household strategies that involve multi-activity – including farm and non-farm income sources – over multiple locations. Migrant members contribute to their households' welfare and return on a regular basis. A study of rural-urban linkages in Mali, Nigeria and Tanzania suggests that about 50 per cent of rural households in the study areas have at least one migrant member, with peaks of up to 80 per cent in drought-prone areas of the Sahel (Bah et al., 2003). Remittances are shown to be a growing proportion of rural households' incomes; however, in absolute terms they have declined since the 1990s, due to the

overall economic decline in many African nations. The same research shows that a growing proportion of migrants are young, single women moving independently. As the sign of profound socio-cultural transformations, even in the most traditional areas, it has become acceptable for women to migrate independently – provided they send remittances to their family (ibid). This echoes similar trends in Asia (Rigg, 2003). Indeed, daughters' remittances throughout the world tend to be sent more regularly, and to constitute a larger proportion of their incomes than sons'. However, this rarely increases their decision-making on how to use the money, and may reduce their disposable incomes to the extent of increasing their vulnerability while away – for example by forcing them to live in cheap, unsafe accommodations.

In Asia too, internal remittances contribute substantially to rural household budgets. In China, a survey from the Ministry of Agriculture suggested in 2004 that remittances were about to overtake earnings from agriculture (Deshingkar, 2005). In provinces with high levels of out-migration, money earned through migration accounts for 30-40 per cent of rural households incomes (Wang, 2004). In India, remittances account for about one-third of annual incomes of poor and landless households, while in Bangladesh, the Coalition for the Urban Poor estimated that migrants in Dhaka send up to 60 per cent of their incomes to relatives at home (Deshingkar, 2006). These figures are staggering, and although they should be treated with some caution because of the difficulties in obtaining reliable and comparable information, they certainly suggest that migration and income diversification are not just important but crucial for a growing number of rural households.

It is important to note that multi-local, multi-activity households are not only the poor. In fact, they are more likely to be characteristic of better-off groups, and in many cases the poorest households are those that are unable to diversify and mobilise their labour in order to make the most of opportunities (Bah et al., 2003; Baker, 1995; Hoang, Dang and Tacoli, 2005; Hoang et al., forthcoming).

Coming back to policy responses to migration, it is often assumed that rural development is key in reducing rural-urban movement. However, rural development is often meant purely as an increase in agricultural production. A study of India's large Watershed Development Programmes shows that migration increases as the result of both failure and success of the projects. The latter gives local residents the financial and educational resources to migrate to better destinations (Deshingkar, 2004).

Research in Burkina Faso provides a broader picture. Factors that tend to reduce migration to the country's two cities, Ouagadougou and Bobo Dioulasso, include the presence of non-farm employment opportunities and markets in home areas (Beauchemin and Schoumaker, 2005). It is worth noting that both are usually located in large villages or small towns, which clearly play a crucial role in the economic development of their surrounding rural areas.

D. Development Planning and Rural-Urban Linkages

Virtually all national policies have an impact on the form and the spatial distribution of economic activities and investment. As a consequence, they also have a huge impact on the nature of both rural and urban development, and on the links between them. And, increasingly, so does the internationalization of trade and production.

Regional planning and spatial development strategies more closely address the links between rural and urban development, but, as should be expected, they are shaped by the predominant paradigms of economic development at any given time. In the 1960s, they were designed to achieve economic growth by stimulating industrial development through public investment in designated centres or growth poles. These strategies had no rural development component and, unsurprisingly, the expected trickle-down effect to the growth poles' surrounding rural regions did not materialize, while the beneficiaries

were essentially already privileged groups and large urban centers (Douglass, 1998; Hardoy and Satterthwaite, 1986).

In the 1970s, urbanization came to be seen as a parasitic process leading to underdevelopment and the neglect of agriculture. The policy response was the implementation of Integrated Rural Development Programmes focusing on agricultural change with little, if any, attention to the role of urban centres in the rural economy (Escobar, 1995). Later, structural adjustment programmes involved some sort of renewed interest in rural-urban linkages, but predominantly as market linkages connecting agricultural producers to mainly export markets. Yet again, these policies did not prove to have any serious impact on rural poverty. In most African countries, access to international markets has not resulted in increased agricultural productivity (Kessides, 2005). The role of the state in providing access to inputs, credit, markets and basic infrastructure all but disappeared in the 1980s and 1990s, while private investment in the agricultural sector has been limited to large commercial farming, often generously subsidized (Toulmin and Guèye, 2003), leaving the majority of small-scale African and Asian farmers unable to access global markets.

Overall, a key concern is the ongoing and deep divide between rural and urban planners, despite that fact that rural-urban linkages are the reality for households in both towns and villages. The 2008 World Development Report "Agriculture for Development" (World Bank, 2007), is a good example of how the role of urban centres in rural development continues to be ignored. Even references to the importance of rural non-farm employment fail to mention that, in most cases, this means work in small-scale enterprises based in small towns or large "urbanizing" villages.

1. Agricultural growth and rural development are not the same

Most development policy and practice equates agriculture with rural development. Since the majority of the world's poor live in rural areas, it seems logical that growth in that sector will reduce poverty (World Bank, 2007). This view, however, neglects the importance of non-farm incomes and mobility for what is probably the majority of the world's rural population. The diversification of income sources, often including remittances from migrant members, is not only critical for rural households' well-being, as described above, but has significant implications for agricultural production itself. In Botswana, low-income urban households maintain livestock and farms in their own areas. In Gaborone alone, this includes some 50 per cent of all low-income urban households; perhaps more surprisingly, about one-third had moved to the city more than 20 years earlier (Krüger, 1998). While investments in rural assets are essentially a safety net for the urban poor, they are shared with and looked after by family members, and contribute to the local economy.

In Africa's drylands, farmers' small investments in technologies and products are very often funded by non-farm incomes and remittances (Tiffen, 2003). In Vietnam's Red River Delta, farmers' seasonal migration to work in Hanoi's construction sector finances agricultural intensification and diversification into higher-value products (Hoang, Dang, and Tacoli, 2005). It is also generally assumed that technological innovation is just a matter of public investment and farmers' training. Evidence shows instead that farmers that are more prepared to innovate – and face the potential risks this entails – are those that can rely on non-farm incomes as a safety net (Hoang, Dinh, and Nguyen, forthcoming).

Another issue that regularly appears in agriculture-based rural development planning is the need to better connect farmers to new dynamic markets. In many cases, this means international markets. However, there is evidence that domestic urban markets are a much better option for farmers, as they tend to be more stable. In Vietnam, up to 2001, around 80 per cent of the export value of the country's fresh fruit came from China. Since China's accession to the World Trade Organization, tighter regulations on fresh fruit imports and more favourable tariffs on imports from Thailand have negatively and rather

abruptly affected Vietnam's mostly small-scale fruit producers. Currently, China accounts for just 40-50 per cent of Vietnam's fruit export value. In terms of quantity, fruit production has more than doubled in a decade, from three million tons in 1995 to over six million tons in 2005; of this, only 10-15 is for export. What has changed dramatically is the level of domestic consumption of fruit, which has doubled in the last decade in both rural and urban areas but with higher per capita expenditure in the urban centres. These changes in dietary and food expenditure patterns are closely linked to the rapid improvement of the living standards of Vietnamese households (Hoang, Dinh, and Nguyen, forthcoming).

It is not only in countries experiencing rapid economic growth and higher household incomes that urban markets are a better option for farmers. In West Africa, urban centres are the largest and fastest growing market for food producers. Over 80 per cent of the total agricultural production is consumed within the region (Club du Sahel, 2000). Growing demand has resulted in a more diverse production, from basic grains to maize, cowpeas, sesame and fresh vegetables, and substantial increases in per capita production (Tiffen, 2003; Toulmin and Guèye, 2003).

The examples from West Africa and Vietnam also show that small-scale farmers rely on a relatively well-developed network of local traders. Traders are rarely mentioned in agricultural policies, which instead regularly refer to the much less specific "access to markets." But for the majority of small farmers, local traders are the main links with markets. Although they are often perceived as exploitative, traders provide vital links for small and diversified production flows that are not sufficiently profitable to attract large-scale trading organizations (Pedersen, 2000).

In many African nations, traders also have an important function as providers of credit. In West Africa, wholesale traders are usually women who tend to establish personal relations with both producers and retailers. In this way, financial exchanges are embedded in wider social relations that provide the basic rules of trust needed in commercial transactions. The major problem confronting most of these traders is limited financial liquidity, which makes them and, as a result, their creditors, vulnerable to market losses. This is compounded by poor physical infrastructure and lack of storage and processing facilities (Bah et al., 2003).

Recent research in Vietnam's Mekong Delta highlights the role of traders as agents of rural development (Hoang, Dinh, and Nguyen, forthcoming). In this fruit production area, mobile traders collect produce at the farm gate and channel it to larger market nodes where it is matched to specific market segments depending on its grade. Grading and packaging are carried out locally, providing non-farm employment to local residents and people from the surrounding rural area. In turn, this concentration of activities creates further demand for services such as hairdressing, cafés and restaurants, transport and porting. About 70 per cent of local household incomes originate from trade and services, and less that 20 per cent from agriculture. The key elements of these "virtuous circles" of rural-urban development are: good communications and transport links, which enable traders to maintain extensive networks throughout the country; a good local infrastructure that allows the collection of fruit even from relatively remote areas; equitable access to land, so that the benefits of access to markets accrue to a broad base of local residents; and, last but not least, non-farm employment opportunities, both local and in the region's cities. These provide cash for investment in farm diversification and intensification and, for the poorest households with limited labour and land, local income-generating opportunities outside the agricultural sector.

2. Rural industrialisation

Promoting rural industries to absorb surplus labour while reducing migratory pressures on cities has long been an aim of many national Governments, especially in Asia. In China, township and village enterprises (TVEs) grew enormously between 1978 and 1994, when their share of the gross national

industrial output went from 9 to 42 per cent, and their contribution to the total state revenue from 4 to 22 per cent (Kirkby, Bradbury, and Shen, 2000). By 1997, the rural TVE sector in China employed nearly 30 per cent of the rural labour force.

In Thailand, since the 1980s processes of rural industrialisation have involved both the growth of local enterprises and the rural relocation of export-manufacturing factories (Rigg, 2003). In Vietnam, rural and peri-urban craft and industrial villages (CVIs) are estimated to account for 41 per cent of total GDP and employ 64 per cent of the industrial workforce (Douglass et al., 2002). The overall majority are household enterprises (83 per cent of the sector's contribution to GDP and 58 per cent of the workers), the rest are domestically owned small and medium-sized enterprises. Both categories are linked to domestic urban markets as well as international markets, and are located primarily in high-density rural and peri-urban areas such as the Red River Delta (Douglass et al., 2002; Hoang, Dang, and Tacoli, 2005).

A large proportion of rural enterprises are located in sizeable settlements with strong non-agricultural economic bases and which would be classified as urban centres in most other countries. In many cases, these enterprises are not linked to the local agricultural base, and may be in competition with farmers for access to land and water. In China, although TVEs are often portrayed as examples of rural industrialisation in remote rural areas, the most successful ones were established in peri-urban areas, outside built-up areas but often in the proximity, if not within, the administrative boundaries of urban centres (Webster and Muller, 2002). Trade liberalisation has affected small rural enterprises everywhere: in India especially, household enterprises have lost out to competition from imports, and the share of the rural non-farm sector in total non-farm net domestic product decreased from about 35 per cent in 1981 to under 32 per cent in 2001 (Mukherjee and Zhang, 2007). In China, those that have survived increasingly concentrate in the high-growth eastern provinces where 90 per cent of foreign direct investment goes – and, in so doing, contribute to the growing regional inequalities that are at the root of China's internal migration.

Another growing challenge of rural industrialisation is that local administrations usually do not have the revenue and the capacity to address the environmental impacts of the enterprises' activities. In the mid-1980s, it was estimated that one-third of China's gas emissions, one-sixth of solid waste production and one-sixth of water pollution were generated by TVEs (Kirkby et al., 2000). Stricter environmental regulations introduced in the 1990s resulted in the national Government ordering the closure of tens of thousands of TVEs engaged in highly polluting activities (Webster and Muller, 2002). In Vietnam, the urbanizing villages of the Red River Delta face similar problems. Increasingly, the survival of rural manufacturing enterprises is linked to their capacity to relocate to industrial estates with pollution control facilities – but this requires capital, and is clearly not an option for most household enterprises.

E. CONCLUSIONS

The central argument of this paper is that the ongoing economic, social and demographic transformations in most parts of Africa and Asia are best understood as processes based on a complementary relationship between rural and urban development – and a blurring of the rural-urban divide - rather than relatively clear-cut transitions. The main implication for policy is the need to support local governance systems that can reflect and respond to these changes and to the new, emerging challenges that these changes present.

Local governance systems can play a key role in determining the nature of rural-urban development, especially in ensuring that it does not result in the social and economic exclusion of vulnerable and marginalized groups. In part, this depends on whether national institutional frameworks allow for local decision-making. Small and intermediate urban centres have traditionally been the focus of

regional development strategies, but many growing agricultural market nodes and small-scale manufacturing settlements are still classed as "rural," and therefore often lack the levels of technical competence and financial resources that are at least on paper associated with urban status (Tacoli, 2006).

Crucially, the governance of rural-urban development is a balancing act between supporting the high levels of mobility and occupational diversification that are so important for many households and communities, and ensuring that their potentially negative impacts are minimized.

High levels of mobility and remittances are generally positive, not only for households with migrant members. Remittances can have a crucial impact on the economy of small towns, for example through investment in housing and, where migrant hometown associations are active, in the construction of public facilities such as schools, religious centres, water points (Okali et al., 2001). New employment opportunities in construction, services and sometimes agriculture, in turn, often attract in-migrants. But there can also be negative impacts for non-migrants and for the wider settlement – for example, increases in land value and unregulated residential construction encroaching on farmland and increasing environmental risks (Bah et al., 2003; Serageldin et al., 2005). Governance systems in the context of growing mobility will need to respond to the needs and priorities of these different groups to avoid social and economic polarisation between migrants and non-migrants.

With regard to occupational diversification, the main challenge is to protect natural resources, especially land and water, from industrial pollutants while also ensuring that non-farm employment is available locally to those groups that need it most, especially the poor and vulnerable. Small-scale and household enterprises are their main employers, and also the ones that find it most difficult to comply with environmental regulations that are not tailored to the size of their operations and capital (Hoang, Dang, and Tacoli, 2005).

Both these challenges are intrinsically linked to long-term trends in Africa and Asia, and are likely to become more urgent in the foreseeable future. Whether they will be addressed in ways that support development that is environmentally, socially and economically sustainable will depend largely on local governance that is inclusive, accountable, effective and supported by national Governments.

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SOCIAL AND ENVIRONMENTAL ASPECTS OF PERI-URBAN GROWTH IN LATIN AMERICAN MEGA-CITIES

Haroldo da Gama Torres, Centro Brasileiro de Análise e Planejamento, Brazil

A. INTRODUCTION

Latin America has been through a significant urban transformation in the last decades. Modest economic growth, high population expansion and massive rural-urban migration resulted in a scenario of urban crisis across the region, with spreading shantytowns, ill-regulated land use, low sanitary conditions and increased poverty. Major metropolitan areas, such as Mexico City, Caracas, Bogota, Rio de Janeiro, Lima and São Paulo, are challenged by violence, poverty, and environmental problems.

General urbanization and economic trends have contributed to making poverty an urban issue. While the poor population has been decreasing in global terms, there is significant evidence that the share of the population living with less than one dollar a day declined in rural areas but increased in urban ones during 1993-2002 period (Ravallion, Chen and Sangraula, 2007). According to the same sources, this problem is clearly more acute in Latin America, when compared to Eastern Europe, Asia and Africa.

Although population growth rates have been steadily declining in Latin America, according to recent United Nations Population Fund (2007) estimates, urban areas will gain additional 166 million inhabitants in a 30-year period (2000-2030), by the end of which its urban population should total 610 million. Such figures indicate almost all population growth in Latin America will take place in urban areas, and within a region that is already significantly urbanized – these same estimates forecast an urban population growth rate of 1.4 per cent a year between 2000 and 2030. Similar forecasts have been produced by other sources (Montgomery, Stren, Cohen and Holly, 2003).

Even those cities in Latin America that present an overall low population growth rate may undergo substantial changes in its population from an intra-urban perspective. Some of them, such as Mexico City and São Paulo, are losing population in their most important central areas, while distant suburbs still experience strong demographic increases (Salas, 1994; Torres, Alves and Oliveira, 2007). This urban dynamic may become a major challenge for environmental and social policy management, especially in a context of inadequate information systems on urban expansion. Although we do not have comprehensive data to support this trend, peri-urban areas in large and medium cities are likely to have the bulk of Latin American population growth in the coming years, a phenomenon that is also happening across different Asian and African metropolises (Asian Development Bank, 1997).

Peri-urban growth – also referred to as suburban expansion – is not exclusive to Latin America, but rather a challenge to most countries in the developing world. As opposed to the upscale suburbanization of developed countries (Duany, Zyberk and Speck, 2000), most peri-urban growth in Latin America results from massive rural land reclamation by migrants trying to settle in poor tenements. Such areas are not only typically ill-regulated and distant from key employment hubs, but also present appalling sanitation conditions and significant environmental problems, including deforestation and pollution of rivers and streams. Metropolitan fragmentation – a characteristic of many metro areas, which lack planning coordination and proper funding for their peri-urban municipalities – adds to the already unacceptable living conditions of the newly arrived.

In view of this unfortunately common scenario, the aim of this paper is to stress the importance of peri-urban growth for the contemporary development agenda. Concern for peri-urban expansion should

be in the core of most initiatives conducted in large urban areas of Latin America, ranging from poverty alleviation to environmental sustainability. Although sometimes understood as part of the slum problem (United Nations Human Settlement Program, 2006), it is important to notice that peri-urban expansion differs from it in some of its key features, particularly in regard to the social isolation and environmental degradation experienced by its dwellers, as well as the limited information city officials have about it.

In the first section of this paper, we discuss some of the conceptual issues in place regarding urban phenomena. Next, we describe the most important urban demographic trends in the region, as well as their consequences for the urban environment. The third section presents some of the most important economic and institutional factors that influence such trends, while the fourth outlines some of the outcomes from the perspective of public policies – particularly zoning, housing and transportation – with special focus on the problem of land use and its connection to environment and migration. Finally, we stress the key issue of deficient information on peri-urban expansion, and how international cooperation could help improve this situation.

B. Conceptual Issues

Providing a precise definition of urban areas inhabited by the poorest social groups is a rather complex task, since a myriad of different concepts are often employed to describe similar – yet not fully equal – situations. Particular neighborhoods inhabited by poor dwellers are described in Latin America – as slums, shantytowns, illegal settlements, ghetto or segregated areas, among others. When considering those same poor areas, but taking into account their particular spatial dimension, a range of other terms are used in the literature to refer to the same phenomenon – namely peri-urban, suburban, periphery, exurban and urban fringe.

One of the most popular (and generic) categories in the field is slum. Slums are regarded as those "settlements in urban areas in which more than 50 per cent of their inhabitants live in inadequate housing and lack basic services" (United Nations Human Settlement Program, 2006, p. 19). In order to assess slum conditions, those authors look at the existence of one in five important housing conditions: durable housing, sufficient floor space, access to treated water, access to sanitation and secured tenure. This definition is quite useful because the slum population can be measured with general census or household survey data. However, it does not consider particular legal aspects related to land property, which makes the slum concept less useful if the approach aims at supporting targeted public interventions.

Some authors prefer more specific denominations, such as shantytowns and illegal settlements. Shantytowns are located in invaded land, while illegal settlements are urban areas legally bought by urban dwellers, but whose development is not fully recognized by the city Government (Lim, 1995). In this sense, shantytowns refer to a very straightforward dimension related to the invasion of private or public land, a practice that is quite common in countries in which the legal system has difficulty to enforce property rights. Public areas such as squares, parks and even streets are also frequently invaded, especially when the urban infrastructure is not fully in place. The second form of illegality – referred to as illegal settlements (Lim, 1995) – indicates the general disrespect of zoning and building norms, particularly by private developers, who then sell low cost lots or housing units to recent migrants or ill-educated people unaware of urban regulations. This overall disregard for zoning and building norms is often associated to excessive red tape or even corruption from government officials (Werna, Blue and Goldstein, 1998).

We believe that the general concept of slum adopted by the UN-Habitat (United Nations Human Settlement Program, 2006) is less useful for more in-depth policy analysis because shantytowns and illegal settlement issues must be addressed differently by general urban polices. In the first case, policies must consider the issue of land tenure, while in the second they should address the issue of unattained

urban regulations. Significant infrastructure problems (such as lack of sanitation) happen both in shantytowns and illegal settlements due to the limited income of the population and the significant difficulties faced by state agencies to provide services in illegally registered and "invaded" land.

There are different dimensions of illegality regarding housing and urban settlements in urban areas of most Latin American countries. The irregularity of land use somehow "justifies" the non-provision of social services (Torres, 2002a). It seems more difficult to find proper site location for social equipment in irregular or illegal land. Sometimes the State refrains from investing in such areas due to the risk of having public investment appropriated by their private owners. Lawsuits against public administrators that do not comply with the complex set of standard procedures may also happen in regard to land use regulations.

General estimates of the population living in shantytowns and informal settlements in developing countries vary from 30 per cent in large Latin American cities to 80 per cent in African ones (Schteingart, 1989; Lim, 1995). Estimates for such a population based on the slum concept are also quite similar. The slum population of Latin America and the Caribbean reached 31 per cent of the total urban population in 2005, according to UN-Habitat estimates (2006).

Most shantytowns, illegal settlements or slums are located in peri-urban regions. However, neither slums nor shantytowns are spatial concepts – a dimension that is critical to allow us to better qualify poor urban neighborhoods. In order to address such spatial dimension, we have adopted here the category of peri-urban, although other expressions such as periphery or suburban could also be adopted. Although there is no precise definition of peri-urban areas, there is some common understanding that they are located in-between consolidated urban regions and rural ones. They typically have lower demographic density, worse sanitation indicators, poorer urban infrastructure, and mixed land use (Asian Development Bank, 1997). In Latin America, those areas also tend to be occupied by low-income families (Roberts and Wilson, 2008), even though wealthier enclosed neighborhoods are also spreading across some peri-urban parts (Sabatini, 2004). [1]

It is important to note that peri-urban conditions differ from slums in significant ways. Slum location may have significant impact in the living conditions of its dwellers, and not necessarily all slums are peri-urban. When in peri-urban areas, slums tend to be less consolidated, with worse sanitation conditions, and more of an unknown territory to both the government and the general public, while those close to affluent areas present better general socioeconomic conditions and access to jobs (Marques and Torres, 2005). Finally, housing in peri-urban areas, whether slums or more affluent sites, are more prone to environmental and sanitation problems.

In most cases, peri-urban areas may also be considered segregated. Spatial segregation is an important sociological concept that expresses the degree of social and spatial separation between different social groups, such as black and white or rich and poor (Massey and Denton, 1993; Mingione, 1999). In spite of the important international intellectual tradition and growing acceptance of this concept in public policy debates in Latin America, we will not address it in this paper because not all segregated areas can be regarded as peri-urban. Thus, our perspective is that peri-urban areas include a special type of segregation – they are located in the urban fringes, home for minorities and low-income families, distant from the main employment centers, with critical infrastructure shortages and environmental problems.

Finally, in spite of its imprecision, it should be noted that the peri-urban concept addresses important dimensions of urban poverty – particularly in relation to their spatial distribution, patterns of segregation, environmental and infrastructure conditions. Peri-urban population and its spatial distribution can be assessed through the usage of intra-urban disaggregated census data. We further discuss this issue below.

C. Peri-urban Demographic Facts in Latin America

Latin America – already a highly urbanized region – should continue to expand the size of its urban population in the near feature (United Nations Population Fund, 2007). As discussed in the previous section, regardless of the conceptual debate around the definition of peri-urban zones, when we consider recent demographic dynamics of cities such as Buenos Aires, Mexico City, Lima and São Paulo, it seems clear that an important share of the future Latin American demographic growth will occur in poor suburbs or peri-urban areas (Roberts and Wilson, 2008; Torres, Alves and Oliveira, 2007). This section focuses on these issues.

1. Latin America's overall urban trends

Latin America is the most urbanized region of the developing world – in 2007, urbanization reached 78 per cent of its total population, according to the United Nations Population Fund (2007). This estimate, however, takes into account the urban-rural definition of each country, which can vary significantly. When we take only those cities with more than 100 thousand inhabitants, their population reached almost 280 million people in 2004, or approximately 49 per cent of the region's total (Table 1).

Argentina, Chile, Mexico, Colombia and Brazil have the largest share of their population (over 50 per cent) living in cities with more than 100 thousand inhabitants. Caribbean countries such as Guatemala, Haiti, Honduras, Costa Rica, Panama and Nicaragua, on the other hand, present lower levels of urban concentration – an indication that the intense urbanization process in Latin America is not homogeneous at all. While the urbanization of larger countries is very advanced and concentrated in big cities, smaller countries, especially those located along the Caribbean, present quite a different trend. This evidence also suggests that the traditional rural development strategies proposed by many international advocates will probably have less impact on the largest Latin American countries from now on.

In spite of the critical importance of these issues for the urban agenda of most countries, it should be noted that small cities tend not to suffer much from the peri-urban dimension we want to highlight here. Although there may be variations in terms of housing conditions within a small town, peri-urban growth becomes a more challenging problem when cities start to scale up. Mayors in small towns are usually capable of resorting to their personal networks to gather the required information on service coverage and inequalities among areas, as well as become aware of key neighborhood demands. In such towns, when accelerated growth is not an issue and the basic sanitation system is already in place, the demand for new urban infrastructure is often quite manageable. Most streets have already been built and paved, and there is no need for major highways or huge urban facilities. Broadly speaking, this kind of city is capable of reasonably managing a moderate level of urban expansion. However, although sensible for the majority of small towns in many Latin American countries (i.e. Southern Brazil, Argentina, Chile), such an argument is not applicable to severely poor areas and/or fast growing frontiers.

City size also varies significantly among Latin American cities with more than 100 thousand inhabitants. Approximately 47 per cent of such cities have a population ranging between 100 and 200 thousand inhabitants, but account for only 14 per cent of the total population of urban areas with more than 100 thousand inhabitants in the region (Table 2). Inversely, a small number of cities (4 per cent) with more than one million inhabitants concentrate the bulk of the population of medium and large urban areas (48 per cent). As a result, although peri-urban problems are also a phenomenon of cities with less than 200 thousand inhabitants, for the moment they tend to be more concentrated on large and very large

municipalities and metropolitan areas. It is nevertheless important to notice that the urban population is growing faster in medium than in large cities. [2]

TABLE 1 – POPULATION AND NUMBER OF CITIES WITH MORE THAN 100,000 INHABITANTS PER COUNTRY. LATIN AMERICA AND THE CARIBBEAN, 2004

Countries	*Population*	*Per cent of the national population*
Argentina	24 108 757	61.0
Bolivia	4 101 163	43.2
Brazil	96 443 516	50.4
Chile	9 739 310	58.7
Colombia	25 213 312	53.6
Costa Rica	942 318	20.9
Cuba	4 518 675	40.0
Dominican Republic	3 780 299	41.5
Ecuador	5 785 071	42.5
El Salvador	2 634 320	37.1
Guatemala	2 131 313	16.1
Haiti	1 724 414	19.6
Honduras	1 514 988	20.2
Jamaica	866 983	32.1
Mexico	62 568 921	57.1
Nicaragua	1 522 416	26.7
Panamá	815 953	24.7
Paraguay	2 715 981	42.4
Peru	13 374 268	46.4
Puerto Rico	1 377 573	34.4
Uruguay	1 382 778	39.5
Venezuela	11 143 305	40.2
Total	278 405 634	48.8

Source: UN Statistics Division, 2004. http://unstats.un.org/unsd/demographic/sconcerns/densurb/default.htm
NOTE – 1. Excluding Bahamas, Guyana and Suriname
2. In the case of Argentina and Mexico, we used data for metropolitan areas

TABLE 2 – POPULATION AND NUMBER OF CITIES WITH MORE THAN 100,000 INHABITANTS ACCORDING TO TYPE OF CITY, LATIN AMERICA AND THE CARIBBEAN, 2004

Type of city	*Distribution of cities*		*Distribution of the population*	
	Number	Per cent	Population	Per cent
100 000 to 199 999	277	46.8	38 252 949	13.7
200 000 to 299 999	112	18.9	27 753 610	10.0
300 000 to 499 999	96	16.2	36 892 683	13.3
500 000 to 999 999	62	10.5	43 088 574	15.5
1 000 000 and more	45	7.6	132 417 818	47,6
Total	592	100.0	278 405 634	100.0

Source: UN Statistics Division, 2004. http://unstats.un.org/unsd/demographic/sconcerns/densurb/default.htm
NOTE – 1) Excluding Bahamas, Guyana and Suriname
2) In the case of Argentina and Mexico we used data for metropolitan areas

2. Peri-urban demographics

Even when we consider only the most important Latin American metropolitan areas, two major reasons make it difficult to estimate their peri-urban population. The first problem regards the precise definition of what peri-urban really is – there is no consensual indicator employed, and several terms are used in the literature to refer to the same phenomenon (see section 1).

The second challenge regarding peri-urban population estimates refers to the scale of the spatial unit of analysis. Torres (2002b), for instance, tried to define peri-urban as the municipalities, other than state capitals, of Brazil's most important metropolitan areas. That paper indicated that 43 per cent of the metropolitan population in Brazil lived in such cities in 2000, which have grown faster in the recent past, are poorer and, more often than not, lack basic sanitation.

However, using city limits to define peri-urban boundaries clearly provides a very rough definition of the phenomenon, and probably substantially underestimates its population, since this kind of area also exists within capital cities. Only an analysis in terms of districts or census tracts for a significant number of metropolitan areas can provide a more appropriate description of the peri-urban population and its distribution. Unfortunately, we do not have the resources to perform such an analysis for most Latin American cities.

In spite of the difficulties to precisely measure the size of the peri-urban population in Latin America, a significant number of both quantitative and qualitative case studies indicate that peri-urban expansion is a key issue for Latin America's development agenda (Stein and others, 1992; Roberts, 1994; Arriagada and Rodrigues, 2003; Marques and Torres, 2005; Roberts and Wilson, 2008).

The lion's share of Latin American population growth in the near future is most likely to occur in peri-urban areas, particularly due to their fast expansion within urban areas that already present considerable demographic increments. The peri-urban problem is also quite evident for any observer of the metropolitan scene in the region.

3. Peri-urban expansion consequences

Many large Latin American municipalities were already overwhelmed by their traditional roles of providing urban infrastructure, health and education services, land use control, garbage collection and housing. The number and complexity of services provided by municipalities are also growing due to the "worldwide movement to decentralize" (World Bank, 2003, p. 89).[3]

Overall urban expansion and the increase in the number of automobiles also require dramatic investments in transportation infrastructure (highways, tunnels, etc.). As a consequence, the competition for resources between different regions of the city, as well as between different branches of the government, may cause traditional social policies to struggle for funding.

Although policy decentralization is an important issue per se, in our view, the scale of the city is particularly important for peri-urban regions. In larger urban areas, peri-urban growth is less visible because the key sources of information on urban expansion are either real estate records employed for fiscal and tax purposes or other administrative records. Since such records do not include irregular or invaded areas, a significant share of peri-urban dwellers – most of them living in shantytowns and illegal settlements – becomes "invisible" for important urban public policies. [4]

This lack of visibility – among other reasons – produces significant consequences for the coverage and quality of social services in poorer areas. When present, services are of inferior quality, which means distant schools, high absenteeism for doctors and teachers allocated to work in such districts, and a

significant social abyss between service providers and their customers (World Bank, 2003, p. 22). However, invisibility is only one of the many peri-urban issues. The following are also worth mentioning:

a. A significant share of the peri-urban expansion can be explained by shantytowns and illegal settlements growing in the urban fringes of Latin American cities. Torres, Alves and Oliveira (2007) estimated that illegal occupation accounted for 43 per cent of the population living in peri-urban areas of the city of São Paulo in 2000, which induces further population growth and deforestation. In other Latin American cities, governments have had enormous difficulties to regulate this process, with the exception of Santiago, in Chile, where urban expansion is more organized;[5]

b. The persistent horizontal growth of Latin American cities requires a continuous extension of the network of public services to peri-urban areas, even when the infrastructure already in place in central areas is not used to its full potential;

c. Generally speaking, peri-urban dwellers are poorer and less educated than the average inhabitant of metropolitan areas, and live far from the most important job hubs. They have worse access to social services, and are served by crowded schools and precarious health care facilities;

d. This urban sprawl also has significant consequences in terms of transportation. In both developed and developing countries, peri-urban housing means longer journeys, increased demand for transportation investments, increased urban congestion and intense air pollution (Duany, Zyberk and Speck, 2000);

e. Poor peri-urban areas are also characterized by lack of sanitation and the consequent pollution of rivers and streams, as well as deforestation and destruction of the natural landscapes that still surround metropolitan areas.

It is quite clear that the concentration of social, environmental and legal problems in peri-urban areas make them ill-suited for population growth, where it nevertheless tends to occur at an accelerated pace. In the following section we discuss the reasons behind the current peri-urban expansion trends.

D. Why is Peri-urban Expansion Happening?

Lessons from different Latin American cities indicate that peri-urban growth is not necessarily a consequence of overall population growth. Even when the growth rate is low, many large Latin American cities still present significant peri-urban expansion (Salas, 1994; Torres, 2007). The dynamics that determine peri-urban growth in Latin America are quite complex, and involve a number of dimensions – from land regulation and taxation to infrastructure and housing policies. Private companies also play a significant role in this situation, since they influence both the offer of housing space and the price of land. As a result, people settle farther away even when vacant areas in more affluent parts of the city are still available.

It is essential to notice that the land market is a major force shaping peri-urban expansion, since it restricts the set of housing possibilities for families based on their available income. In cities whose population includes a substantial share of poor families, the Government and/or private companies must develop housing units that cater to their needs, so as to prevent them from finding alternative housing solutions on their own. Needless to say such alternative solutions almost always go directly against city

planning guidelines and the general legal framework, not to mention architectural good practices. In many Latin American cities, such as Caracas, Bogota, São Paulo and Tegucigalpa (Pearce-Oroz, 2001), a large number of poor families has moved to unsuitable, risk areas, where their lives are constantly threatened by environmental hazards such as floods or landslides.

In addition to the scarcity of resources for a massive Government housing police, the reasons for the unavailability of proper housing for the poor in Latin American countries is also related to economical and institutional dimensions that significantly shape housing markets and the offer of housing units (World Bank, 2003). Among such dimensions, the following should be highlighted:

a. Credit is a major problem. Macroeconomic instability narrowed credit options in many Latin American countries through the 1980s and 1990s. While it is generally understood that funding for housing projects is a key issue regarding peri-urban improvement, it should be noted that shantytowns are already a reality in many Latin American countries. Land regularization initiatives would therefore be a less expensive way of dealing with those settlements, through which urban infrastructure and property rights could be provided to families that have occupied a plot of land for a longer period. Although those programs have grown in importance in the last decade (Ward, 2006), land regularization projects have suffered many setbacks in the region due to inadequate legislation and delays in the course of the inevitable judicial procedures (Fernandes, 2007).

b. The offer of private credit is not only constrained by interest rates but also by the legal framework vis-à-vis evictions and repossession of property used as collateral. Such legislation strongly influences banking behavior in providing credit for property acquisition. Without proper legislation, most of the credit for housing in many Latin American countries is provided by government organizations alone, which are by definition limited by fiscal constraints. However, even in well developed housing markets, part of the offer must rely on public subsidies to serve the poorest groups of the population;

c. General property rights and land tenure legislation also influence the likelihood of land regularization policies. Very costly judicial processes – which often take many years to come to a conclusion – discourage low-income dwellers to defend their rights through the justice system. Again, red tape and corruption are not uncommon in this area;

d. Urban zoning and building norms tend to artificially influence land availability and price. Zoning restrictions that forbid vertical building, for instance, render important central areas with often low population density and ample infrastructure a very expensive housing option. This kind of building norm, albeit producing highly desirable neighborhoods, such as Vitacura in Santiago, Polanco in Mexico City and Jardins in São Paulo, also induces the horizontal spread of the rest of the city, leading to inevitable peri-urban settlements.

Different institutional reforms are in place in Latin America regarding its housing markets, but whether they will be able to produce significant change in the near future remains to be seen. Most likely, Latin America will still have to deal with peri-urban unregulated growth for quite a significant time. In the following section, we discuss some policies that may help in this regard.

E. PERI-URBAN GROWTH AND PUBLIC POLICIES

While it would be impossible to present here a comprehensive discussion on all urban policies and their relation to peri-urban expansion, the paper would like to briefly discuss how three different policies – namely, zoning, transportation and housing – could influence such an expansion and lead to a more sustainable use of space in the concrete territories and institutional contexts of the complex Latin American metropolitan areas.

1. Parks, zoning and building norms

The development of parks and conservation areas, the establishment of zoning guidelines and the introduction of building norms are among the most important urban environmental policies. These policies benefit from the wonderful traditions of the urban and environmental planning that had in Olmsted (1870) one of their first and most representative thinker and practitioner, and are clearly connected to the possibility of developing large cities with significant life quality in the developed world (Platt, 1994). By definition, these policies are tailored to coordinate a more sustainable use of the urban space.

However, such policies are not clear-cut. On the one hand, very restrictive zoning and building norms turn land scarcer, increasing its price. If such a price effect can be affordable in richer areas, this is not necessarily true for poorer ones. Most likely, restrictive zoning in one area of a metropolis will induce or redirect migration to other places of the metro region. On the other hand, when restrictive zoning is not well enforced, it may produce other complex, unintended consequences in terms of intra-urban demographic responses from local dwellers (Henderson, 2004). For instance, in São Paulo, the law ensuring protection of water source areas – that in the 1970s restricted the occupation of almost all the Southern Region of the Metropolitan Area – has contributed to the extensive occupation of such protected areas by poor households due to lack of enforcement (Torres, 2007).

Frequently, the price effect of the zoning policy is addressed by the taxation of land. Some policymakers try to implement progressive land taxation in order to capture part of the value that landowners get as a result of the increased valuation of their properties in more preserved areas. However, fighting for a progressive taxation in a context of politically powerful landlords is far from simple, and may also have cross-border unforeseen consequences in the fragmented political landscape of many Latin American metropolitan areas. Different municipalities within the same region may tax differently, producing considerable difficulties regarding property taxation. Most important, in order to work properly, zoning policies require certain preconditions not necessarily present in developing countries – for instance, the stability of the judicial system and the enforcement of property rights, urban norms and regulations (North, 1990).

In summary, the background of ill-regulated land use seems to significantly erode the possibilities of traditional urban environmental policies in large cities of developing countries. It may be true that were those rules enforced, they would discourage migration and peri-urban growth, since the costs of housing would increase significantly for newcomers. However, the huge cultural and institutional transformation that such enforcement demands makes it quite a remote possibility in the short term.

Although increased stability of the judicial system and law enforcement are highly desirable long-term institutional goals – with clearly positive environmental impacts – it could be useful to reflect on what can be done while it does not come to pass:

a. Laws and regulations should be simpler in order to stimulate and help their enforcement, curb corruption and reduce overall transaction costs and – probably – the price of land (World Bank, 1999);

b. The level of standards should be proportional to the institutional capacity of enforcing them. Attained moderate standards are much better than higher but hardly reachable ones; [6]

c. It is important to promote the coordination of land use legislation across different municipalities within the same metropolitan areas, so as to prevent unintended cross-border effects;

d. The resources and conditions required to maintain parks and conservation areas should also follow the creation of those areas. In case such resources are not available, those areas may easily be invaded.

Although such propositions may seem quite frustrating for those who have an advocacy perspective on urban environment, one may not ignore the effective conditions of policymaking in Latin American countries. The enforcement of laws, regulations and norms should not be taken for granted. In such a context, peri-urban expansion contributes to an endless process of irregular land-use and environment degradation.

2. Transportation

The environmental impacts of transportation technologies are clearly understood at different levels, from global warming to heavy traffic jams and urban pollution (Elsom, 1992). However, transportation policies are also connected to other different urban environmental elements, including the shape of the city and the occurrence of settlements in distant areas and more remote suburbs.

Most of the tradeoffs between densification and sprawl can be framed in terms of long-term transportation strategies (Duany, Zyberk and Speck, 2000). On the one hand, high urban density – often regarded as a negative environmental characteristic of some urban areas – favors mass transportation systems such as the subway, which significantly reduce traffic jams and air pollution. Highway building, on the other hand, strongly stimulates urban sprawl (and lower density), with high environmental costs in terms of pollution, extending land occupation and increasing the costs of other public policies.

Although part of the modern environmental planning criticizes high urban density in quite logical technical grounds (Platt, 1994; Spirn, 1985; Roseland, 1997), it should be noted that low density seems to be a kind of luxury that most developing metropolises are not ready to afford. This happens because population density can produce considerable economies of scale for different public policies, including education, urban infrastructure, sanitation and public health (Martine, 2006).

Population density also reduces air pollution and precarious land occupation in the far suburbs. Such a counterintuitive perspective on environmental planning is not built upon any previous notion of what a city should be, but rather on what the already messy developing country metropolises are. In such places, land occupation is not well organized at all, and resources are dramatically limited.

It is nevertheless very difficult to influence transportation policies in the long term, regardless of their key role for the overall metropolitan planning, and their obvious impact on urban density. It mobilizes a complex set of individual and business interests, including developers, the construction industry, the auto industry, retailers, and landowners, as well as the middle and upper classes that demand more urban space and environmental quality.

In brief, it is quite clear that transportation policies – particularly mass transportation – can strongly influence the sustainable use of urban space, stimulating or refraining peri-urban expansion in the long run. The challenge lies in conceiving a positive arrangement of political forces that will allow long-term transportation planning to counterweight urban sprawl, and lead to a more appropriate use of urban space, social equipment and urban infrastructure.

3. Housing policy

Housing policy is yet another dimension clearly connected to the sustainable use of space in urban areas. Such policy – trying to provide affordable housing for poor people – can engender important transformations in the city landscape, as well as influence intra-urban migration movements. Although the meaning of the so-called "housing deficit" is still the subject of some debate, the unattained housing demand is unquestionably very high in Latin America (Arriagada, 2000). Of course, poor peri-urban areas have to be considered among the most important priorities to be addressed by such policies.

Effective housing policies are very important not only because of their straightforward social impact, but also due to the series of positive outcomes on health, employment, and land regularization. But to account for their demographic and environmental consequences, these policies should also consider other general elements:

a. Broadly speaking, housing policies seem to reduce urban environmental degradation because they increase overall sanitation and housing conditions, as well as regularize invaded public areas. However, depending on the engineering of the project and its institutional framework, it may produce important local environmental impacts in terms of land use and migration;

b. Most likely, small scale projects will produce lower environmental impacts and more easily ensure the integration of the population within the metropolis. Whenever possible, new housing should also be close to existing social equipment, employment, and urban infrastructure to reduce both the living costs for the population and the overall costs for the government (i.e., building of new schools, roads). On the other hand, well located, smaller projects tend to be quite expensive due to their limited economies of scale and the price of the land;

c. The execution of housing policies should be local to ensure consistency with the policy on land use. When this is not the case, national and state governments should also coordinate their investments locally in order to reduce possible unintended environmental and/or migration impacts;

d. The lack of resources should not be considered a definitive impediment for housing policies. If it is true that housing is a very costly social policy, it is also true that alternative policies must be considered. For instance, land regularization and credit for small home improvements (i.e., self-construction) may be regarded as important and less costly alternatives.

It is important to take into account that – due to the low average family income in some metropolitan areas – such policies must also be partially subsidized to ensure that those who really need support will be targeted. This element, as well as the huge size of the housing deficit, should discourage large scale housing policies, especially in a context of strong pressure for fiscal stability and budgetary control. Inaction, however, quite often translates into continuous peri-urban expansion, and the problems thereof.

With the exception of Chile, in most Latin American countries affordable housing for the poor is a distant reality. With expensive housing solutions and very few public housing programs, poor families settle wherever they can (as opposed to where they choose) – which often means shantytowns and illegal settlements located in peri-urban and/or risk areas. The fact that peri-urban land tends to be less expensive and government controls and regulations weaker makes it a more likely location for such settlements. In recent years, significant land price increases in some city centers further enhanced such trend (Torres and Gonçalves, 2007).

In other words, the need for a comprehensive housing policy in Latin American metropolitan areas seems quite obvious when considering the peri-urban phenomenon. Santiago has pioneered actions in this respect, albeit with mixed results (Sabatini, 2004). This policy, however, should be developed without increasing the already significant migration movements and environmental impacts for those areas. Although only briefly presented here, these elements point to the need for national funding and local execution. Attention to the local conditions of urban infrastructure and social services, as well as to land use regulation, is essential to effect real improvement in the sustainability of land use.

F. Peri-Urban Information Deficit

A major issue regarding peri-urban areas is that the people who decide where and how to provide their public services do not live there. In fact, neither do they necessarily belong to the same ethnic group, nor do they understand local social codes, language, behavior, and values. As a consequence, the lower income population from peri-urban areas may become victims of the prejudices sustained by high- and middle-class public managers, who do not perceive them as preferential subjects for public policies. This hypothesis seems to be more appropriate to specific policies, such as sanitation and urban infrastructure, as well as apply to the regions in which "the inheritance of an institutional culture biased towards inequalities" still persists (Werna, 2000).

In large urban regions, information systems are the best way of providing the lenses through which different areas and social groups are going to be seen, conceived and represented in the policy arena. However, as previously mentioned, many peri-urban areas are not properly registered by government records, making them less visible for public policies. Real estate databases, for instance, which are generally used for fiscal purposes, sometimes become the only consistent source of information to be employed by many Latin American city governments. In such cases, since they do not pay land taxes, residents of invaded areas "do not exist" in the city information system.

Other administrative data – dependent upon information systems on land, education, health, sanitation, etc. – are similarly biased by the particular conditions of data production, or by its institutional features. Four key elements lead to this situation:

a. The institutional features of different social policies influence the production of administrative data. For example, forms and reports are often an additional burden to school principals that have to manage crowded schools with limited staff, equipment and training. The same is true for the many crowded medical facilities or public offices. As a general rule, this kind of administrative data is of worse quality in peri-urban areas;

b. Even when a public database is capable of gathering information on peri-urban dwellers, significant amounts of data are likely to be missing from their individual records. Address records tend to be worse because people often misreport it either due to their own low schooling level and/or because the "street" is new (in an invaded area, perhaps) and a zip code has yet to be defined for it;[7]

c. Administrative data production is fragmented between different government branches and levels. Each department and secretariat may have its unique perspective regarding information systems and geographic units for service planning and provision. The education department, for instance, does not necessarily cross its information with other departments, and many times even the geographic units through which data is organized are not compatible. The result is massive miscommunication – while one particular branch of the government may be aware of a certain recent settlement, this information is not necessarily available for the government as a whole;

d. In Latin America, traditional demographic databases – especially birth records – tend also to underestimate the poorest population, making them invisible for several public policies, and even more so in peri-urban settlements.

As a consequence, census data are particularly important because they comprise the only truly universal database not dependent on one particular public policy, and as such can provide precious information about the people and the areas specific policies are unable to cover. In other words, censuses – especially when they are organized in census tracts and geographic information systems (GIS) – must be regarded as remarkable tools for supporting social policies at the local level. Even though this may seem quite obvious, evidence strikingly shows that such handling of information is not at all present at the local level in some of the most important Latin American metropolitan areas, particularly when it requires more disaggregated formats or the help of GIS tools to be usefully employed.[8]

Ongoing peri-urban expansion is therefore happening within an environment that lacks adequate information systems and informed data analyses. In order to significantly reduce inequality in service access, analyses on the most important socio-demographic urban trends must nevertheless be based on highly disaggregated information, more frequently rendered available by GIS and satellite images. In view of that, local managers in Latin America need urgent support to implement information systems capable of coping with the new demand for local disaggregated information.

Systems of this kind allow analysts to reflect on one of the most complex issues of urban administration – the dilemma of "where to act" (Torres, 2002a). Territorially disaggregated information enables analysts to identify both those areas with greater distortions between supply and demand and those that present cumulative negative social indicators, or that are segregated in terms of residence, such as peri-urban expansions.

This problem has been traditionally addressed through political representatives and/or social movements. In this model of demand management, those areas (and groups) that succeed in having their request heard sooner by public authorities become the recipients of public investment. The distribution impact of such a dynamic is obviously strong: those less informed and organized usually have fewer chances of expressing their needs and of reaching different government levels.

With widespread information and more accurate socioeconomic indicators, the general public, government officials and the poor themselves can have access to public policy demands regardless of whether they have been successfully voiced or not – for instance, through public information systems such as the Internet. By doing so, they may help prioritize those policies in a more informed way. Unfortunately, those systems are far from available. As to census data, it tends to become outdated rather quickly, particularly in regard to fast growing areas.

Those social policies indicators needed the most at the local level are generally well known and established in the different social policy fields – i.e., school enrolment (education), sewage coverage (sanitation), infant mortality (health). Teams in each one of these fields are generally aware of those indicators and eventually assess some aspects of their respective policy by using them. This kind of data is rarely available in a disaggregated format, though.

Local social policy managers of peri-urban areas need additional elements of an information systems agenda. Above all, they need to understand the demographic trends that are reshaping the area of influence of the social equipment they oversee. Poor peri-urban settlements and shantytowns are areas that typically present fast demographic expansion. Having detailed information on population growth and distribution at the local level for developing metropolises is therefore essential to provide for people's needs – for instance, health care facilities, or primary schools. This information is however often unavailable, particularly during inter-census periods.[9]

The gap between two censuses is in fact a major problem regarding accurate information. The lack of data on urban areas under strong demographic pressure experienced by local governments may not only be due to poor administrative processes – after all, public policies have not reached such areas yet – but also be a consequence of an information gap, particularly if it occurs in between two censuses. In some cases, demographic projections for small areas can be used to estimate how fast a neighborhood is growing, but these are not very reliable because they tend to be based only on the major components of the demographic dynamics (fertility, mortality and migration). For such projections to be more accurate, they need to be built upon some hypotheses about particular urban trends that depend on major public and private investments, such as new roads and large housing developments.

In our view, the best approach to address this situation would be developing early warning indicators, as opposed to generating complex projections for small areas, which demand non-existent local expertise. Such indicators can help local policymakers anticipate situations that otherwise may run completely out of control for both the public administration and the society as a whole (Banerjee, 1996).[10]

There is a lot of data being produced daily in a metropolitan area – traffic flows, new housing approvals, garbage collection, areas with delay or default in utilities payment, and civil records, to name but a few – which may be processed and handled as early warning indicators of urban processes that are happening in connection to demographic growth, change in land use, and decay of specific areas.

Analysts may also resort to aerial photographs and satellite images to detect transformations in peri-urban areas (Angel, Sheppard and Civco, 2005). Recent improvements in image quality and new technologies for data handling, such as the so-called "object-based GIS," are opening new roads in this

field, with significant potential in terms of helping governments identify previously undetected urban expansions, as well as produce qualitative information regarding housing density and building patterns (Ehlers, Michel, Bohmann, and Tomowski, 2006).

Such technologies unfortunately remain quite alien for most city governments. Satellite images are costly, and the technology involved is neither simple nor readily available. International organizations could substantially help Latin American governments by supporting them to put in place the technology and satellite images required to allow different cities in developing countries to identify more recent urban expansions.

In a recent field work, for instance, we found municipal officials of a large Latin American city using "Google Earth" website with the purpose of identifying public building coordinates and assessing general urban expansion trends. Albeit quite helpful, the images are not always updated, and unable to provide information on changes over time.

In order to cope with this demand, some organizations are trying to produce data and indicators in regional intra-urban scales. There is a movement towards the development and use of "poverty mapping," which would allow better policy targeting and rapid food security initiatives (United Nations Environment Program, 1998; CIESIN, 2006). At the same time, public agents, international bodies and professional groups from several countries are focusing on building indicators through GIS tools to act as a basis for regional and urban public policies. Despite these laudable initiatives, there is still an important gap to be fulfilled, particularly when we look at the problem from the point of view of local administrations.

In summary, in order to tackle peri-urban issues, the quality of government information systems and their data on low income settlements must substantially increase. Peri-urban shantytowns and illegal settlements are an uncomfortable reality that many public officers, backed by lousy information systems, insist to ignore. In order to start addressing these issues, it is essential to reduce the existing information gap.

G. CONCLUSION

The image of a "planet of slums" has daunted the imagination of important observers of the international urban scene (Davis, 2006). According to this vision, growing world urbanization would be followed in developing countries by a massive spread of peri-urban slums and shantytowns, within areas fraught with unemployment, violence and despair. Such an apocalyptic perspective raises at least one critical question: is this really a necessary outcome for Latin American cities?

Not quite. Although the idea of an urban crisis seems to be a fact for many Latin American urban areas, there are also some important signs of hope. It is worth mentioning the strong urbanization initiatives in peri-urban Bogota, which have significantly reduced crime and social insecurity; the comprehensive housing program the Chilean government has been implementing since the 1990s; the significant increase in housing solutions provided to low-income families by private companies in Mexico; and the impressive change in Brazilian legal procedures regarding land regularization and property rights (Fernandes, 2007). All these initiatives address different key issues in terms of urban conditions, and are evidence that the region is indeed moving forward.

Significant improvements in peri-urban conditions will most likely depend on a set of coordinated initiatives. In the case of housing programs, for instance, although government funding is essential, particularly for the poorest social groups, unleashing the potential of private markets is also required to

provide housing for low-medium income families – a move that is already in place in Chile and Mexico. In order to follow suit, other Latin American countries will also have to review their legal frameworks to enable property to be reclaimed and used as collateral, which Brazil has just started to do. Different urbanization initiatives may also help provide accessibility, security and better environmental conditions that can significantly transform the living conditions of numerous families.

While the challenge is enormous, the signs of change can already be perceived: a combination of three other socioeconomic dimensions is currently contributing to Latin American urban transformation. First, the region has been experiencing the best economic conditions ever to take place within one generation, with significant reduction in income inequalities (CEPAL, 2007). Although these may quickly reverse, as the experience of the past has taught, the present improved economic conditions result in better funding for housing policies and the overall capabilities of families to invest in their homes (i.e., by both acquiring property and remodeling existing ones). Second, many Latin American cities – particularly larger ones – are being confronted with urban transition and fertility decline, indicating a less intense overall metropolitan population growth in the near future. Finally, democracy is also a reality for most Latin American countries, and in spite of controversies, it makes governments more aware of the living conditions of their constituents, there including the very poor.

But the way ahead is far from easy. Even though informed housing policies and projects are able to change general social conditions, as in the case of Chile, income inequalities are still the norm, and democracy remains fragile, if not an illusion, in some countries. The information gap regarding peri-urban expansion still persists, and will have to be addressed to allow for broader changes in the peri-urban landscape.

NOTES

[1] Sabatini (2004) argues that although some wealthy enclosed neighborhoods will grow at a small fraction of the peri-urban region, especially in those areas adjacent to previously rich neighborhoods, most of the peri-urban area in Latin American cities will remain poor.

[2] United Nations Population Fund, 2007.

[3] In Latin America, a number of countries have experienced such changes – albeit at different rates and with different decentralization models (Finot, 2002, p. 2005)

[4] Census data may reduce this kind of problem only when they become available at a highly disaggregated scale (i.e., census tracts) and are entered into a GIS system so as to allow local administrators to identify under-recorded locations. We further discuss this issue at the end of this paper.

[5] Peri-urban regulation in Santiago was based on extensive housing programs, a process that is nevertheless followed by other social malaises (Sabatini, 2004).

[6] "To avoid adding to the backlog of problem housing and neighborhoods, new developments must meet basic – but not excessive – compliance standards" (World Bank, 1999, p. 146).

[7] Ironically, having a zip code is a form of hidden citizenship not clearly understood by most database practitioners.

[8] "In most countries, the needed information is available through completed censuses and surveys, and the amount of work required to compile the information is manageable and affordable (…) New technologies have made it easier and cheaper to process data and understand its spatial implications. If this information exists, why is it so difficult to access? Most cities have local planning offices or economic bureaus whose role is to collect and process statistical information about the city. But the

census and survey data routinely collected at the national level are typically not available to local offices, at least not ready in a usable form. In other cases local offices collect basic demographic and production statistics, but these data are transmitted directly to the national capital and are not analyzed locally, either because local economic officers do not have the skills or resources, or because the city's decision makers do not demand the information" (World Bank, 1999, p. 138).

[9] "Will there be enough land to support urban development? Will the prevailing patterns of population and housing density continue into the future or are there alternatives to urban development that require less land? How can agricultural land surrounding cities be preserved without driving the price of land beyond the low- and middle-income households? (…) The first (impediment to address the issue) is the absence of a workable model with which to understand the land market. The second is the lack of accurate and up-to-date information about urban growth" (Dowall, 1994, p. 24).

[10] "Effective management of regional growth without sacrificing productivity or public health requires a strategic rather than a deterministic approach. It will certainly require new institutional capabilities and management tools. Future institutional responses should include an "early warning" system of continually monitoring and reviewing infrastructure stress and developing strategic capabilities for coping with such stress" (Banerjee 1996, p. 62).

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THE HEALTH OF URBAN POPULATIONS IN DEVELOPING COUNTRIES

Mark R. Montgomery, Population Council and State University of New York at Stony Brook, United States of America

A. INTRODUCTION

Within the next two to three decades, the populations of poor countries will cross an historic threshold, becoming for the first time more urban than rural (United Nations, 2005). This transformation of the demographic landscape will have profound implications for health, affecting not only service delivery but also the nature of the risks facing what will be predominantly urban populations. As we approach this historical moment, it is important to set aside the habits of thought that, to date, have prevented the health needs of city-dwellers from being fully appreciated, whether by developing country policymakers or by the international institutions that assist them. Perhaps the most urgent need is to recognize the social and economic diversity of urban populations, within which can be found large groups of the poor, whose health environments differ little from those of rural villagers. It is not incorrect to say that, on average, urbanites enjoy an advantage in health relative to rural dwellers, but health policies for an urbanizing era cannot be based on averages alone. Disaggregation is essential if policies are to be properly formed and programs targeted to those in need.

There are several dimensions that require consideration. As just mentioned, to see the urban health situation clearly, the situations of the poor and near-poor must be distinguished from those of other urban residents. In what follows, we document the within-urban differences in health for a number of developing countries, and show how the risks facing the urban poor compare with those facing rural villagers. But still further disaggregation is in order. Among the urban poor, some live in communities of concentrated disadvantage—*slums*, in the usual shorthand—where they are subjected to a daily barrage of health threats, but other poor urbanites are dispersed among a variety of neighbourhoods.[1] Geographic targeting may well be an effective health strategy for reaching slum-dwellers, but other approaches will need to be devised for the urban poor who live outside the slums.

The supply side of the urban health system is in its way no less diverse than the urban population. Even a medium-sized city will present a full array of health providers, ranging from traditional healers and sellers of drugs in street markets to highly trained surgeons. Many of these providers are likely to be engaged in private practice, whether on a full-time or part-time basis, and for this reason urban health care is more monetized than rural care. However, the imposition of fees for service in the urban system does not imply that the services rendered are of acceptable quality. Recent studies of the quality of care provided to the urban poor reveal that the poor who are able to pay for health care receive rather little in return for their fees – the care delivered by both private-sector and public-sector health providers can be grossly inadequate. Although the physical distance to services is less than in rural areas, and modern health-care providers would seem to be near at hand, the urban poor may be unable to pay for such care or be assured of minimally acceptable quality when they can pay.

In addition to the socioeconomic and supply-side differences existing within any given city, there are important differences across cities that need to be considered. Small cities and towns house the vast majority of developing-country urban residents (United Nations, 2005; Montgomery, 2008a). A number of studies suggest that rates of poverty in these smaller settlements often exceed poverty rates in the large cities, and it can be shown that in many developing countries, small-city residents are more likely to lack

adequate drinking water and sanitation (Panel on Urban Population Dynamics, 2003). In addition, shortages of health personnel and services no doubt plague many small cities, leaving them in much the same situation as rural areas.[2] As developing countries engage in health sector reforms and continue to decentralize their political and bureaucratic systems, allowances will need to be made for the generally thinner resources and weaker capabilities of the small cities and towns (Panel on Urban Population Dynamics, 2003).

To convey the scale of the urban health challenge that lies ahead, we summarize in Sections A and B the urban health differentials that can be identified in data from internationally-comparable sample surveys. The approach is to disaggregate urban and rural populations according to a standard of living index specific to each sector, and then to document urban–rural and within-urban inequalities in health. Section C focuses attention on the supply side of urban health, with particular emphasis on the money costs and quality of health care. In Section D, we turn to a description of urban health risks that have not been sufficiently appreciated, or which, to be effectively addressed, would require an unusually expansive conception of the role of the public health system. Section E concludes.

B. The Urban Burden of Disease: Overview

To bring some order to what will be a wide-ranging discussion, we begin with an overview of urban causes of death and disability, drawing upon data from Mexico, one of the few low- and middle-income countries that can provide reliable cause-specific information. Table 1 shows the 15 leading causes of disability-adjusted life years (DALYs) lost in Mexico's rural and urban areas. Several lessons can be extracted from this table. First, urban areas do not necessarily present health profiles that are wholly distinct from those of rural areas. In Mexico, the causes of DALYs lost are much the same in urban and rural areas. Of the top 5 causes in Mexico's cities and towns, three (deaths related to motor vehicles, homicide and violence, and cirrhosis) are also among the top five in rural areas. Second, violence and to traffic-related deaths and injuries are two of the most important causes of death and disability in urban Mexico, but in many countries these risks would be considered outside the scope of the public health system. Third, the table reminds us that even in a middle-income country such as Mexico, diarrhoeal disease and pneumonia continue to be important causes of urban death and disability.

TABLE 1 – DISABILITY-ADJUSTED YEARS OF LIFE LOST IN MEXICO BY CAUSE AND RESIDENCE. 1991 ESTIMATES, EXPRESSED PER 1000 POPULATION

Cause	*Rural*	*Rural Rank*	*Urban*	*Urban Rank*	*Rural/Urban*
Diarrhoea	12.0	1	2.8	9	4.28
Pneumonia	9.3	2	3.9	7	2.39
Homicide and Violence	9.2	3	7.4	2	1.23
Motor Vehicle-Related Deaths	7.9	4	8.3	1	0.95
Cirrhosis	7.5	5	6.3	4	1.19
Anaemia and Malnutrition	6.8	6	2.4	11	2.86
Road Traffic Accidents	5.5	7	6.8	3	0.81
Ischemic Heart Disease	5.1	8	5.3	6	0.96
Diseases of the Digestive System	4.7	9	1.7	15	2.74
Diabetes Mellitus	4.1	10	5.7	5	0.72
Brain Vascular Disease	3.0	11	3.0	8	1.02
Alcoholic Dependence	3.0	11	1.9	13	1.56
Accidents (falls)	2.8	13	2.6	10	1.09
Chronic Lung Disease	2.6	14	1.9	13	1.39
Nephritis	2.2	15	2.2	12	1.01

Source: Lozano et al. (1999, p. 130)

C. AVERAGES AND INEQUALITIES

It is commonly believed that in modern-day populations, rural levels of health are worse than urban, and this belief is supported by good scientific evidence. In its analysis of 90 surveys from the Demographic and Health Surveys program, the Panel on Urban Population Dynamics (2003) found that, on average, the urban populations of poor countries exhibit lower levels of child mortality than rural populations, and similar urban–rural differences were evident across a range of health indicators. HIV/AIDS presents the large exception to the general rule of urban health advantage. Apart from HIV/AIDS, however, in most low- and middle-income countries, the urban advantage in terms of average health levels is too well-documented to dispute.

But as we have said, averages can be a misleading basis on which to set health priorities. Upon disaggregation, urban health averages can be shown to mask wide socioeconomic differentials, and when these are examined, the urban poor are often discovered to face health risks that are nearly as bad as those of rural villagers and are sometimes decidedly worse. In some studies of slum neighbourhoods, the health risks confronting this group of the urban poor have been found to exceed rural risks, despite the urban advantages conferred by the proximity of modern health services. Although less is known on a systematic basis about health differences across cities, it is clearly important to take account of differences in health institutions and personnel, and in the strength of oversight and management exercised by municipal and other tiers of government.

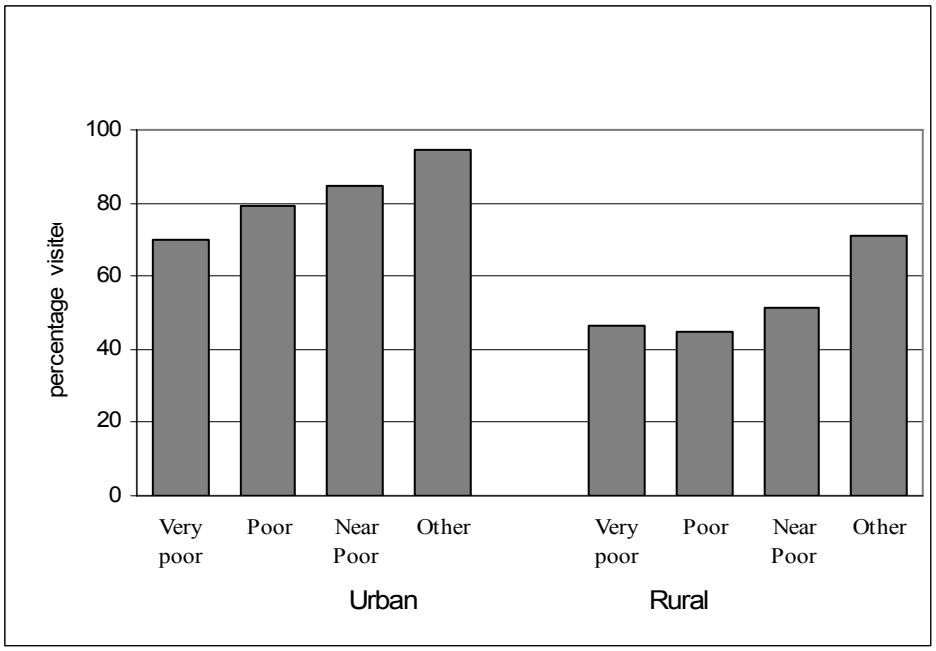
At present, very few developing countries can supply the detailed data needed to explore these important distinctions. Many countries have fielded nationally-representative health surveys, which allow a country's urban poor to be studied as a group but do not often provide reliable estimates of health among the poor in any given city, to say nothing of health conditions among slum-dwellers. In addition, as explained by the Panel on Urban Population Dynamics (2003), the major international survey programs focusing on health—the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS)—have not generally provided sufficient locational information to identify small and medium-sized cities, and the city-size dimension of health is consequently more difficult to document than might have been thought. Finally, the surveys in these programs do not gather information on income or consumption expenditures, and measures of living standards must therefore be based on proxy variables.

In what follows, I apply a factor-analytic statistical method to a set of such proxy variables in order to develop two rankings of relative standards of living:

- An urban household is classified as *very poor* if it is in the bottom 10 percent of the urban distribution in the survey; declared *poor* if it is in the 11–25th percentiles; *near-poor* if in the 26th–50th percentile range; and *other* if in the top half of urban households.
- A rural household is similarly ranked relative to other rural households.

The ranking is based on proxies for consumption (ownership of various consumer durables), together with producer durables and the age and education of the household head. The method is explained in detail in Montgomery and Hewett (2005).

Figure 1. Any prenatal care: urban and rural India (1998-2000)

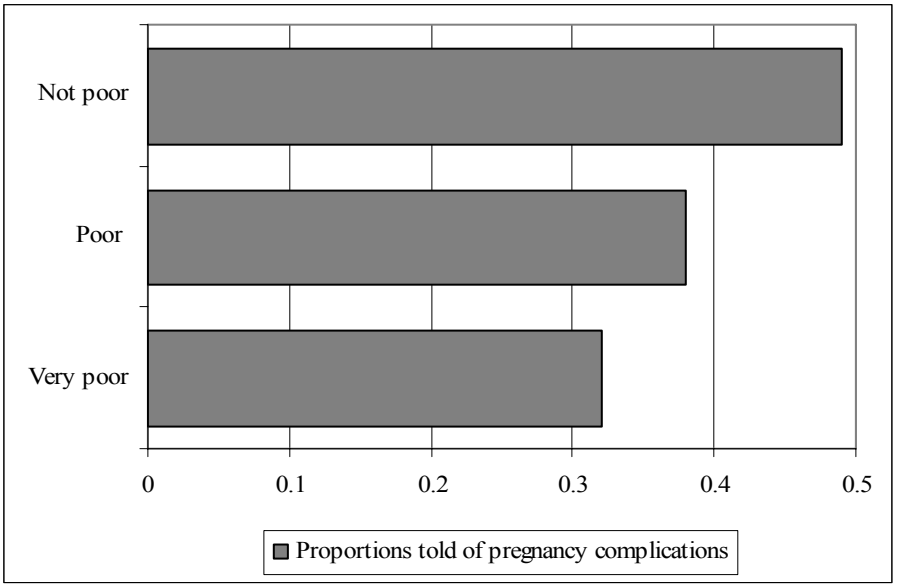


The essence of the results can be appreciated by considering the following small gallery of images in which, for a given health condition or service, the urban and rural populations are compared side-by-side. (A systematic summary based on all DHS surveys available as of the year 2000 is available in Panel on Urban Population Dynamics (2003)). To begin, consider in Figure 1 a basic measure of reproductive health, whether a pregnant woman made at least one visit for prenatal care, as recorded in the 1998–2000 Demographic and Health Survey for India. As can be seen, the percentages receiving care are notably higher for urban women than for rural, but within each sector, there are large differences evident by relative standards of living. (Recall that rural households are ranked relative to each other, and urban households also ranked in relation to other urban households). Only 69.7 per cent of very poor urban women in India receive any prenatal care—this is not much different from the percentage for rural women in the top half of the rural living standards distribution.

A sense of the quality of urban prenatal care can be gleaned from Figure 2, also for India (Islam et al. 2006). This figure depicts the percentage of women whose prenatal care included discussion of pregnancy complications (among those receiving prenatal care). Only about a third of very poor urban women could recall any such discussion during their prenatal care visits—and yet it is difficult to imagine what information could be more urgently needed than this.

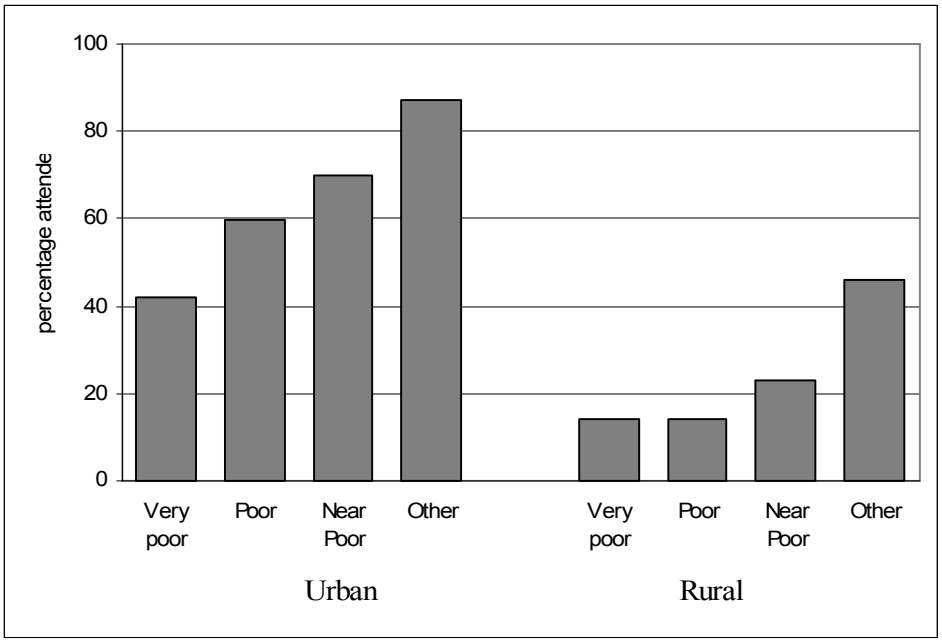
A similar picture emerges at the time of childbirth, when as Figure 3 shows for urban and rural India, there are enormous differences in the likelihood that a poor urban woman will have her delivery overseen by a physician or trained nurse-midwife, in comparison with better-off urban women. Obviously, differences within urban areas cannot be wholly attributed to shortages of health personnel, although that may be part of the reason why the urban–rural differences in birth attendance are as large as they are.

Figure 2. Quality of prenatal care in urban India (1998-2000)



Source: Islam et al. (2006)

Figure 3. Attendance of a physician or trained nurse-midwife at delivery: urban and rural India (1998-2000)



Large socioeconomic differences are also apparent among children, as can be seen the percentages of Indian children who are stunted (Figure 4) and for child anaemia among Egyptian children in the rural and urban areas of that country (Figure 5). For both measures and countries, the storyline is much the same – there is clear evidence of urban health advantage in general, but equally clear evidence that poor urban children suffer from much the same kinds of health disadvantages that afflict rural children.

Figure 4. Child malnutrition: stunting in urban and rural India (1998-2000)

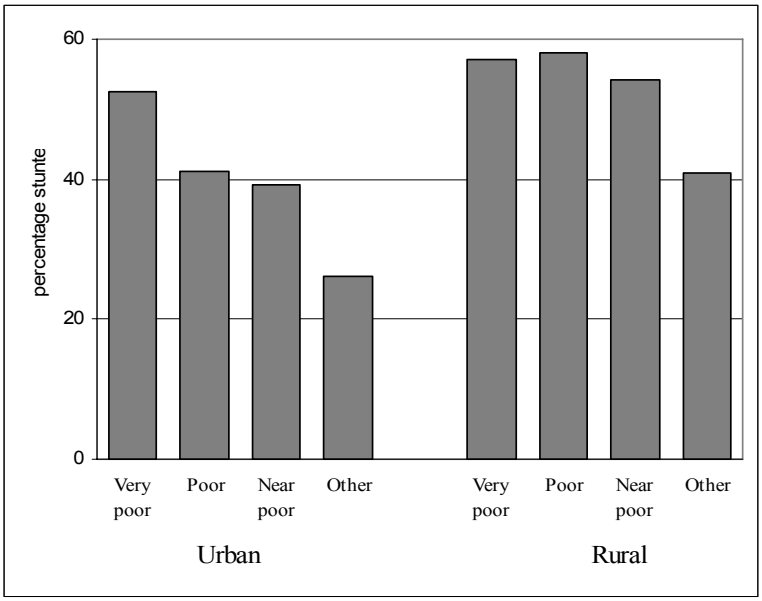
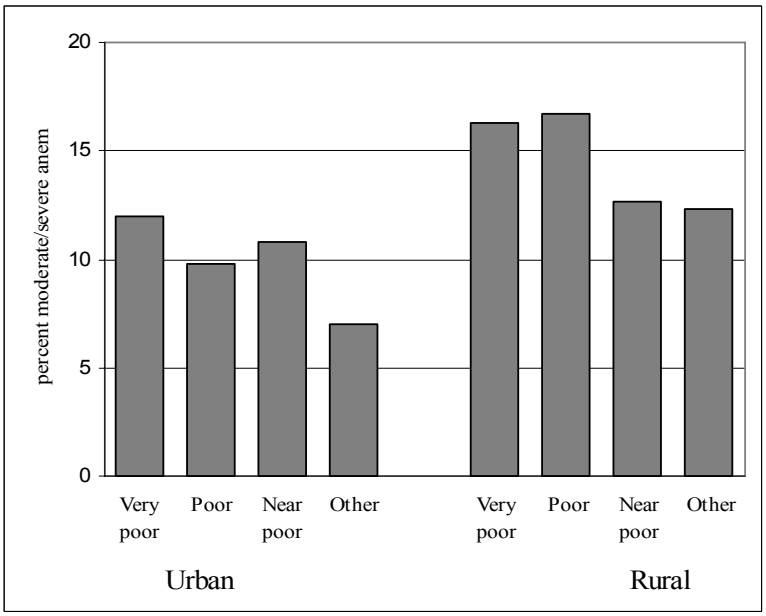


Figure 5: Anaemia among children: urban and rural Egypt (2005)



It should not be surprising, on reflection, that the health situations of poor urban and rural residents are so similar. When poor city-dwellers live in close proximity to each other without the benefit of safe drinking water and adequate sanitation, they face elevated risks from water-, air-, and food-borne diseases. In its examination of data from the Demographic and Health Surveys, the Panel on Urban Population Dynamics (2003) showed that the urban poor suffer disproportionately from a lack of access to piped drinking water and from inadequate sanitation. Table 2 presents selected findings from this study, comparing poor urban households with other urban and also rural households. As the table shows, the urban poor are markedly ill-served by comparison with other urban households. To be sure, rural households receive even less than poor urban households by way of water and sanitation services, although they benefit to an extent from lower population densities, which offer a form of natural protection against some communicable diseases.

TABLE 2 – PERCENTAGES OF POOR URBAN HOUSEHOLDS WITH ACCESS TO SERVICES, COMPARED WITH RURAL HOUSEHOLDS AND THE URBAN NON-POOR.

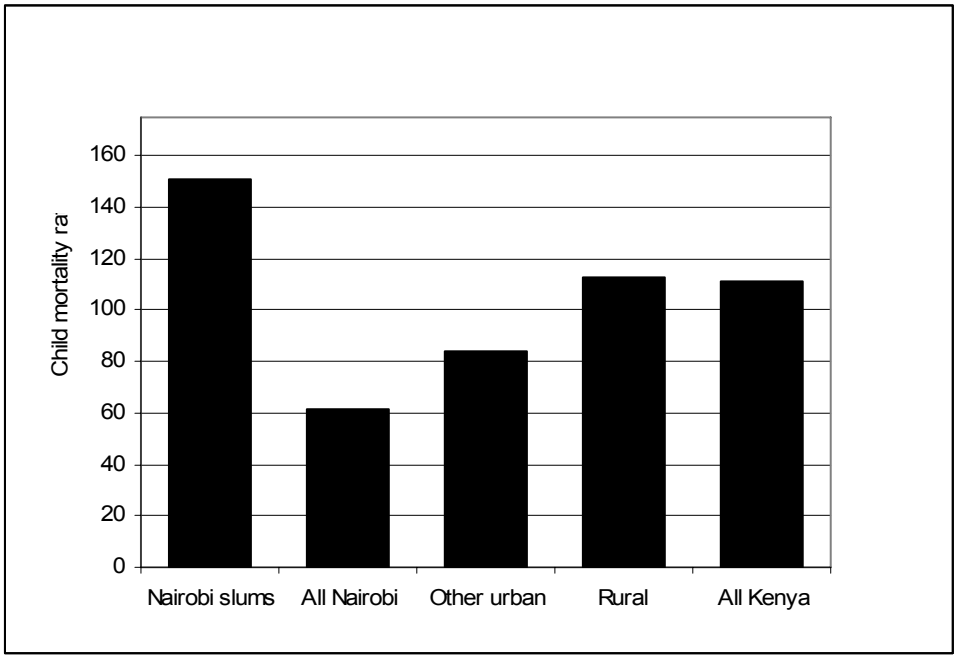
DHS Countries in Region		*Piped Water on Premises*	*Water in Neighbourhood*	*Flush Toilet*	*Pit Toilet*
North Africa	Rural	41.6	37.3	41.3	17.5
	Urban poor	67.3	27.8	83.7	8.5
	Urban non-poor	90.8	7.8	96.3	2.6
Sub-Saharan Africa	Rural	7.8	55.7	1.1	47.6
	Urban poor	26.9	61.6	13.0	65.9
	Urban non-poor	47.6	45.8	27.4	67.2
Southeast Asia	Rural	18.6	53.7	55.5	24.3
	Urban poor	34.0	53.7	61.8	22.9
	Urban non-poor	55.8	40.1	89.0	9.4
South, Central, West Asia	Rural	28.1	53.6	4.3	55.4
	Urban poor	58.0	36.3	39.8	34.1
	Urban non-poor	80.2	17.7	64.0	23.2
Latin America	Rural	31.4	36.4	12.6	44.0
	Urban poor	58.7	35.2	33.6	47.0
	Urban non-poor	72.7	24.9	63.7	31.6
TOTAL	Rural	18.5	50.7	7.5	46.6
	Urban poor	41.5	49.4	28.3	51.7
	Urban non-poor	61.5	34.0	48.4	46.5

Source: Panel on Urban Population Dynamics (2003)

1. The health of slum-dwellers

It is difficult to divide the overall risks facing slum-dwellers into the risks attributable to household poverty, and the additional risks produced by the spatial concentration of poverty in slum neighbourhoods. Although not definitive on this score, Figure 6 is at least suggestive of the impact of concentrated poverty on child mortality in Nairobi, Kenya. In the slums of Nairobi, child mortality rates, at 150 per thousand births, are substantially above the rates seen elsewhere in that city; slum mortality rates are high enough even to exceed rural Kenyan mortality. The addition to risk evident in the Nairobi slums may be due to multiple factors: the poor quality and quantity of water and sanitation in these communities; inadequate hygienic practices; poor ventilation and dependence on hazardous cooking fuels; the city's highly monetized health system, which for the poor delays or prevents access to Nairobi's modern health services; and the transmission of disease among densely-settled slum-dwellers.

Figure 6. Comparison of child mortality rates ($_5q_0$) in the Nairobi slums sample with rates for Nairobi, other cities, rural areas and Kenya as a whole



Source: African Population and Health Research Center (2002)

There are additional factors of a social epidemiological character that are worth considering. Facing health threats from their unprotected physical environments—with the lack of services being a constant reminder of social exclusion—and lacking the incomes needed to counteract these daily threats, the urban poor may well feel unable to take effective action to safeguard their health. Poor individuals and families may thus lack the sense of self-efficacy needed to energize their health-seeking behaviour in such difficult environments. Poor communities may be reminded by the absence of basic services that the community as a whole is socially excluded and lacks the political voice needed to bring attention to its plight. At the individual and family level, as we will discuss, social exclusion combined with the daily stresses of poverty may bring on paralyzing fatigue, anxiety, low-level depression and other expressions of mental ill-health. At the community level, the symptoms may be expressed in the weaknesses and fragilities of local community organizations, that is, in the lack of what has been termed "bonding" social capital.

D. THE URBAN HEALTH SYSTEM

A distinguishing feature of urban health systems is the prominence of the private sector. Not surprisingly, given the higher average levels of income in urban populations and the income diversity that establishes market niches, private services tend to be much more developed in cities than in rural areas, especially in the larger cities (Dussault and Franceschini 2006). Fee-for-service arrangements are generally characteristic of urban health care, whereas rural services are often ostensibly provided free of money cost (or made available for nominal fees) at public health-posts and clinics. In the more monetized urban economy, the urban poor without cash on hand can find themselves unable to gain entry to the modern system of hospitals, clinics, and well-trained providers.

As the Islam et al. (2006) study has documented for Manila and Indore, India, urban health providers are well aware of the effects of monetization on the health-seeking behaviour of the poor. They see poor

clients who, having endured their illnesses until care cannot be put off any longer, finally present themselves in a more debilitated condition than they would otherwise have been. Health providers realize that the poor are likely to abandon courses of prescribed medication to save on the costs of purchasing medicines, or may economize by buying less than what was prescribed. They are not really surprised when the poor fail to return as requested for follow-ups and assessments of progress.

On paper, at least, many countries offer subsidies allowing the poor to purchase certain medicines or types of care. But these subsidies often depend on an unsystematic set of arrangements, requiring poor patients and their families to spend time searching and negotiating with a bewildering variety of providers and suppliers. As they engage in this form of health-seeking behaviour, the poor can be discouraged by the difficulties of finding affordable transport, inconvenient hours of operation at clinics or health centres, the frequent absence of key staff, and long waits to receive care. A subsidy for the poor that exists in theory may prove to be no subsidy at all.

When the poor succeed in receiving formal health care, is that care likely to be of sufficient quality to make an effective difference to their health? A recent urban quality-of-care study in New Delhi raises serious doubts on this score (Das and Hammer 2007b,a). The study was set in both slum and non-slum neighbourhoods, covering a range of household income levels. A full inventory was made of the health providers who serve these neighbourhoods; it revealed that a short walk would bring a typical neighbourhood resident within reach of 70 health providers of some sort. Even for the poor, access in the sense of geographic distance was not the problem in this case. The study assessed the quality of healthcare provision via a series of vignettes measuring provider knowledge of the steps to take in making a diagnosis and prescribing treatment or referral (rating the provider responses in relation to examination protocols), and by a follow-up in which many of the same providers were observed as they interacted with patients.

The study found that the quality of care available in the poor neighbourhoods was so low that the authors could fairly describe it as "money for nothing." Both public-sector and private providers serve the poor neighbourhoods of Delhi, and both know less about appropriate care than the providers who practice in better-off neighbourhoods (Levels of provider knowledge were low across all study neighbourhoods, but were especially low in the poor neighbourhoods. Interestingly in light of Figure 2 on the quality of prenatal care in urban India, one vignette presented providers with a patient exhibiting the symptoms of pre-ecclampsia, a life-threatening condition for pregnant women. The providers were not generally able to identify this threat). Evidently, the Indian public sector does not see to it that its more competent providers are allocated to the poor neighbourhoods, where they are needed most. It would seem that even strenuous health-seeking efforts on the part of the New Delhi poor would bring them no assurance of reasonable quality health care.

E. Under-Appreciated Health Risks

In this section, we turn attention to specific urban risks and causes of mortality and morbidity. Several themes unite this material. First among them is the importance of disaggregation of urban health conditions and risk factors by poverty and place. A second and closely-related theme is that of urban social epidemiology, with emphasis on the concepts of individual and collective efficacy in health-seeking. A third theme in the discussion concerns health conditions or risks that are sometimes overlooked, or which are not as well-integrated as they might be in urban public health policies. Mental health is perhaps the leading example of such a condition. It is closely associated with poverty and with the health threats that arise from violence and alcohol abuse, which place disproportionate burdens on women. Other examples include the burdens of illness and death stemming from road traffic accidents and outdoor air pollution. In many countries, HIV/AIDS already occupies a prominent place on the urban

health agenda, whereas urban tuberculosis (and in some countries, malaria) receive less attention. In most developing countries, the health threats that will arise from climate change are not yet prominent on the health agenda.

1. Mental health

Mental health as such made no appearance in the quantification of DALYs given in Table 1, but it is arguably a central factor in the health of the urban poor, and one whose contribution to the urban burden of disease has been insufficiently appreciated. Over the past decade, the World Health Organization has issued a series of reports emphasizing the importance of mental health in developing as well as developed countries (World Health Organization, 1996, 2001, 2005b). Community-based studies of mental health in low- and middle-income countries suggest that 12 to 51 per cent of urban adults suffer from some form of depression (see 16 studies reviewed by Blue, 1999). Anxiety and depression are typically found to be more prevalent among urban women than men and are believed to be more prevalent in poor than in non-poor urban neighbourhoods (Almeida-Filho et al., 2004). In a study of Mumbai, Parkar et al. (2003) give an evocative account of the stresses that affect men and women in a slum community just north of the city. Men in this community are deeply frustrated by the lack of work, and this is reflected in a high incidence of alcoholism and violence directed at their wives.

Although less is known about mental health among adolescents in low- and middle-income countries, recent studies indicate that this age group also warrants attention. Harpham et al. (2004) made use of the World Health Organization's short-form, self-reporting questionnaire—a bank of 20 items designed to detect depression and anxiety—to study the mental health of adolescents in Cali, Colombia. Girls were found to be three times more likely than boys to exhibit signs of ill-health (as Prince et al., 2007 note, among adults the female–male ratio is typically 1.5–2.0) and further multivariate analysis showed that low levels of schooling, within-family violence, and perceptions that violence afflicts the community were all significantly associated with mental ill-health among adolescents.

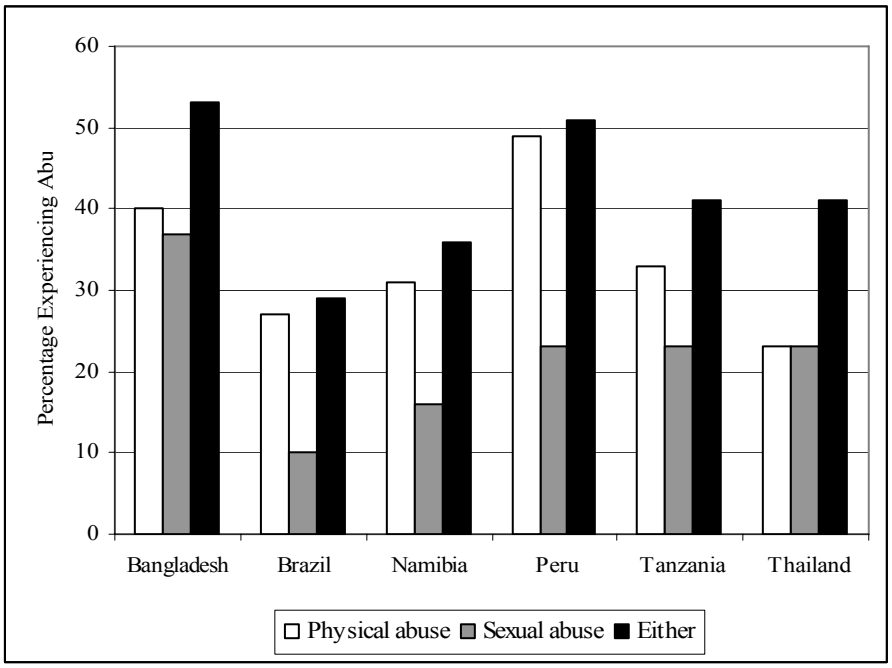
There are two avenues by which an individual's mental ill-health might affect other health dimensions. First, it has been hypothesized that socioeconomic stress undermines the physiological systems that sustain health (Prince et al., 2007; Boardman, 2004; McEwen, 1998; Steptoe and Marmot, 2002; Cohen et al., 2006; Hu et al., 2007). A second avenue needing exploration links women's mental health to the health-seeking energies they can deploy on behalf of their children and other family members. To judge from the review by Prince et al. (2007, p. 867), very little research has been conducted on how mental health affects women's health-seeking behaviour. Almost nothing seems to have been written on whether and how mental ill-health undermines the sense of self-efficacy that motivates a woman to seek healthcare for others in her family. This is a surprising gap in the literature, especially in view of the well-documented role that women play in protecting the health of their families and the equally common finding that mental ill-health is more common among women than men.

2. Intimate-partner violence and alcohol abuse

Violence in urban areas takes a variety of forms, ranging from political and extra-judicial violence to gang violence, local violent crime, and abuse taking place within the home. Our discussion will mainly be concerned with intimate-partner violence and its links to alcohol abuse and women's mental health. Heise et al. (1994) reviewed community-based data for eight urban areas from different regions of the developing world, finding that mental and physical abuse of women by their partners was common, with damaging consequences for women's physical and psychological well-being. Using data collected from a module included in several Demographic and Health Surveys, Kishor and Johnson (2004) examined whether women had ever been beaten by a spouse or partner. In Cambodia, 18

per cent of women had been beaten, and the percentages in the other study countries were also high: Colombia (44 per cent), Dominican Republic (22 per cent), Egypt (34 per cent), Haiti (29 per cent), India (19 per cent), Nicaragua (30 per cent), Peru (42 per cent), and Zambia (48 per cent). In seeking to understand why women who were the victims of violence did not seek help from the authorities or others outside the home, this study found that embarrassment was a major reason given by women, as well as the belief that it would be futile to seek care or that partner violence was simply to be endured, an inescapable part of life. In some countries (but not in all), poor women were more likely than other women to have experienced violence at the hands of their spouses or partners. Where the connection could be explored, strong links were also found between spousal alcohol abuse and violence.

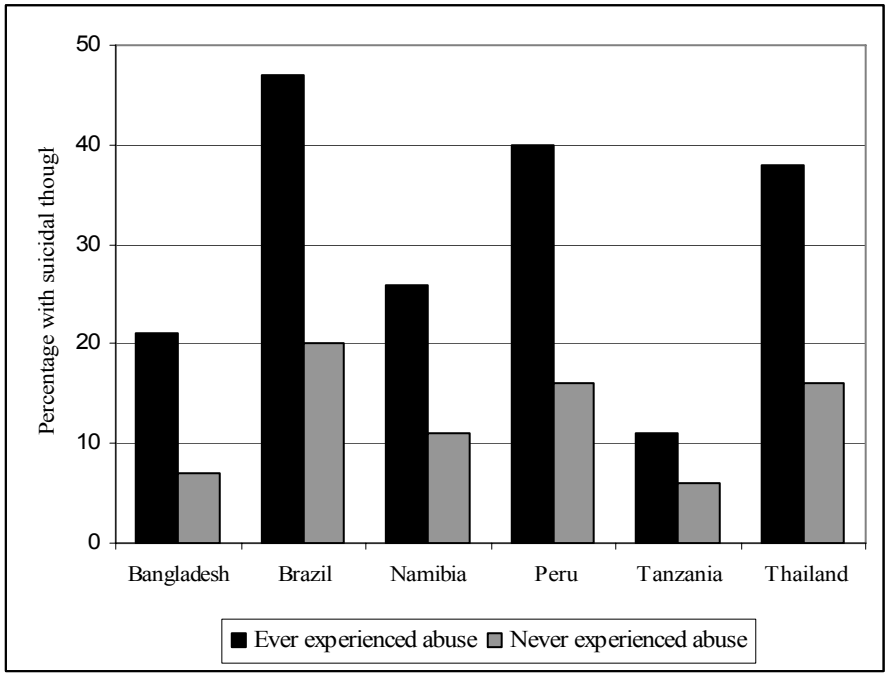
Figure 7. Experience of physical or sexual violence by an intimate partner since age 15, among ever-partnered urban women



Source: World Health Organization (2005a)

These findings were echoed in the World Health Organization (2005a) study summarized in Figure 7, which covered both urban and rural study sites. The World Health Organization analysis also documented a close association between the experience of violence and women's mental health. As Figure 8 shows, among the women in this study's Bangladeshi urban site (left-most bars) who had been abused by their partner, some 21 per cent had had thoughts of suicide, as against only seven per cent of women who had not been abused. In all but one of the sites in the study, the difference in this measure of mental health was statistically significant, and as can be seen in the figure, the ratios are on the order of 2:1 or higher.

Figure 8. Percentage of ever-partnered urban women reporting suicidal thoughts, according to their experience of physical or sexual violence, or both, by an intimate partner



Source: World Health Organization (2005a)

3. Reproductive health

The Panel on Urban Population Dynamics (2003) provides a lengthy discussion of reproductive health among urban women, and here we select only a few points for emphasis. Among all urban women, those who are poor are significantly less likely to use modern contraception to achieve control over their family-building (see Table 3). They are generally more likely to use contraception than rural women, but in some regions of the developing world there is little to separate the two groups. The unmet need for modern contraception—this is measured by the proportion of women in a reproductive union who say that they want to prevent or delay their next birth, believe themselves to be capable of conceiving, and yet do not make use of modern contraception to achieve their stated aims—is markedly higher among poor urban than other urban women.

As Panel on Urban Population Dynamics (2003) discusses, it is not clear that even when they use modern contraception to prevent conception, urban women are able do so in an effective manner. Although quantitative estimates are limited to selected case studies, unintended pregnancy and induced abortion are evidently not uncommon for urban women.[3] To cite a few examples: Women in three squatter settlements in Karachi, Pakistan were estimated to have a lifetime rate of 3.6 abortions per woman (Jamil and Fikree, 2002). Another study found abortion to be widespread in Abidjan, Côte d'Ivoire, where abortion is illegal, yet nearly one-third of the women surveyed who had ever been pregnant had had one (Desgrées du Loû et al. 2000). A recent study of Ouagadougou, Burkina Faso by Rossier (2007) estimated an annual abortion rate of 4 per cent among women aged 15–49 years, suggesting that over a reproductive lifetime, a woman would have 1.4 abortions on average. Calvés (2002) studied women in their twenties living in Yaoundé, Cameroon. Of these young women, 21 per cent reported having had an abortion; just over 8 per cent had had more than one. Once again, the fact

that modern contraceptive services are available in urban areas does not imply that women, especially poor women, have the knowledge and the social and economic wherewithal to make effective use of the methods.

TABLE 3 – CONTRACEPTIVE USE FOR WOMEN AGED 25-29 BY RESIDENCE AND, FOR URBAN AREAS, POVERTY STATUS

DHS Surveys By Region	*All Rural*	*Urban Poor*	*Urban Non-poor*
North Africa	0.26	0.37	0.48
Sub-Saharan Africa	0.08	0.13	0.22
Southeast Asia	0.44	0.40	0.47
South, Central, West Asia	0.33	0.35	0.44
Latin America	0.32	0.37	0.47
Total	0.22	0.26	0.35

Source: Panel on Urban Population Dynamics (2003)

4. HIV/AIDS

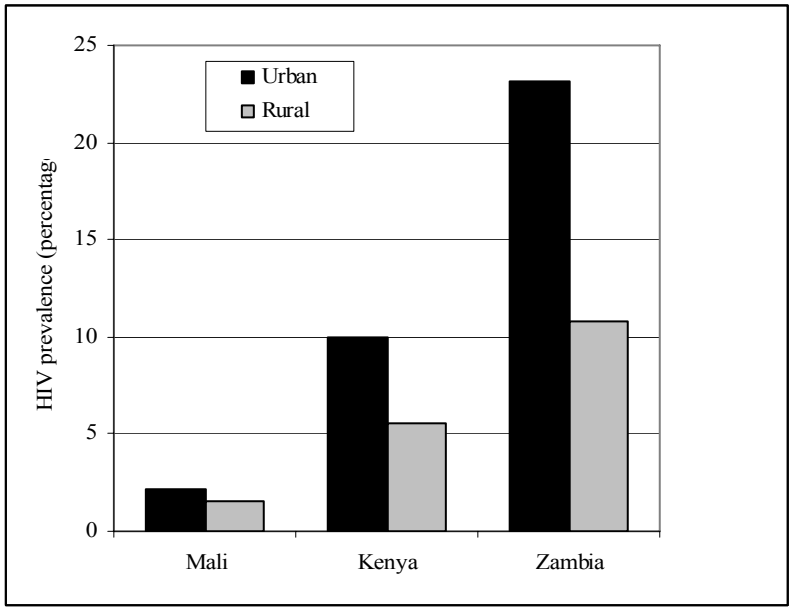
An enormous literature is now available on the epidemiology of HIV/AIDS in both developing and developed countries. Despite the quantities of research underway on HIV/AIDS, much remains to be learned about its social components. Indeed, although HIV/AIDS is commonly thought to be more prevalent in urban than rural areas, until recently the scientific basis for this belief has been thin (UNAIDS 2004, p. 31). In only a few developing countries are community-based studies of prevalence available to quantify the urban–rural differences.[4] Figure 9 presents findings from several nationally representative community-based studies in which prevalence is estimated from blood samples taken in connection with a DHS survey. In these three cases—Mali, Kenya, and Zambia—urban prevalence rates are clearly much higher than rural rates. Where HIV/AIDS is concerned, there is little evidence of the "urban advantage" that is seen in other domains of health.

Because the community-based studies are relatively recent, the role played by urban poverty in the risks of HIV/AIDS in low- and middle-income countries is only beginning to be studied. Using the community surveys conducted under the DHS program, Mishra et al. (2007) found that contrary to expectation, HIV prevalence is higher among the better-off families. These families were more likely to live in urban areas, which accounts for a part of the association, and other risk factors (including sexual risk-taking, use of condoms, and male circumcision) tended to mask the association between living standards and prevalence. Even with statistical controls for such factors in place, a positive association between living standards and HIV prevalence persisted. In studies of urban adolescents and other selected socio-economic groups, however, poverty has been linked to higher HIV prevalence as well as to a number of contributing risk factors, including earlier sexual initiation and more reported forced or traded sex, which would seem to place poor women at higher risk of contracting the virus (Hallman 2004). In short, the association of HIV/AIDS with living standards is still a matter of dispute.

5. Tuberculosis

Tuberculosis is even today among the leading causes of death for adults in low- and middle-income countries, killing an estimated 1.6 million people worldwide in 2005 (World Health Organization, 2007b). Much as in the nineteenth century, urban crowding increases the risk of contracting tuberculosis (van Rie et al., 1999), and high-density low-income urban communities may face elevated levels of risk. The interactions between HIV/AIDS and tuberculosis, and the spread of multi-drug-resistant strains of the disease, have generated fears of a global resurgence of tuberculosis.

Figure 9. Estimates of urban and rural prevalence of HIV from the Demographic and Health Surveys: Mali, 2001; Kenya, 2003; and Zambia, 2001-2002



Source: Mali Ministère de la Santé (2002), Kenya Central Bureau of Statistics (2003), Zambia Central Statistical Office (2003)

The concept of urban collective efficacy is directly relevant to the core of World Health Organization's treatment strategy, which is built upon the directly observed short course (DOTS) regimen. In a study of tuberculosis in urban Ethiopia, Sagbakken et al. (2003) showed how the local social resources of urban communities (organized in "TB clubs") can be marshalled to reduce the stigma associated with the disease and encourage patients to adhere to the demands of the short-course regimen of treatment. Similar interventions have been fielded in urban India, as described by Barua and Singh (2003), using community health volunteers to identify local residents with symptoms of tuberculosis and refer them to hospitals for diagnosis; local health workers attached to the hospitals then provide follow-up care and lend support during treatment. As the country profiles presented in World Health Organization (2007b) make clear, a number of countries have yet to reach World Health Organization's treatment success rate target of 85 per cent of identified patients, and although data are scarce, it is very likely that detection rates of tuberculosis among the urban poor are well below rates for other urban residents.

6. Traffic-related injuries and deaths

We now broaden the discussion to encompass sectors that have not always been carefully integrated with urban public health programs, yet which have significant implications for health. Injuries and deaths from traffic accidents are a case in point. Table 1 for Mexico showed just how important these are among all urban causes of death and disability, but the great range of factors involved—engineering concerns, urban planning, land-use policies, and individual behaviour—seem in many countries to have inhibited the public health sector from taking action. The scale of this public health problem is enormous – the World Health Organization (2004) estimates that road traffic injuries lead to 1.2 million deaths annually and an additional 20–50 million non-fatal injuries, the majority of which occur in low- and middle-income countries.

To elucidate the factors involved, Híjar et al. (2003) conducted a detailed analysis of pedestrian injuries in Mexico City, where pedestrian death rates are estimated at three times those of Los Angeles. Using a mix of spatially-coded quantitative data and qualitative methods, these authors developed portraits of drivers and victims that underscore the importance of several mutually reinforcing risk factors: poverty, a lack of understanding of how drivers are apt to react to pedestrians, inattention by drivers and pedestrians alike to risky conditions, insufficient public investment in traffic lights and road lighting, and dangerous mixes of industrial, commercial, and private traffic. Bartlett (2002) draws on hospital and community-based studies to show how poverty and gender affect the risks, and how the time pressures on urban parents limit the effort they can devote to closely supervising their children.

In seeking to raise the public-health profile of these important causes, World Health Organization (2004, 2007a) has given particular emphasis to the risks that are faced by adolescents and young adults, among whom road traffic injuries rank (worldwide) in the top three causes of death in the ages of 5 to 25 years (World Health Organization, 2007a, p. 3). In World Health Organization's Africa region, it is pedestrians (especially children 5–9) who face the greatest risks, whereas in Southeast Asia, the deaths occur disproportionately to riders of bicycles and motorized two-wheelers, who are aged 15–24 years. In poor countries of Asia, it is the vulnerable road users—pedestrians, bicyclists and operators of motorized two-wheelers—who bear a greater share of the injury burden than the occupants of cars, vans, and buses. For adolescents, young adults, and children alike, males face greater risks than females.

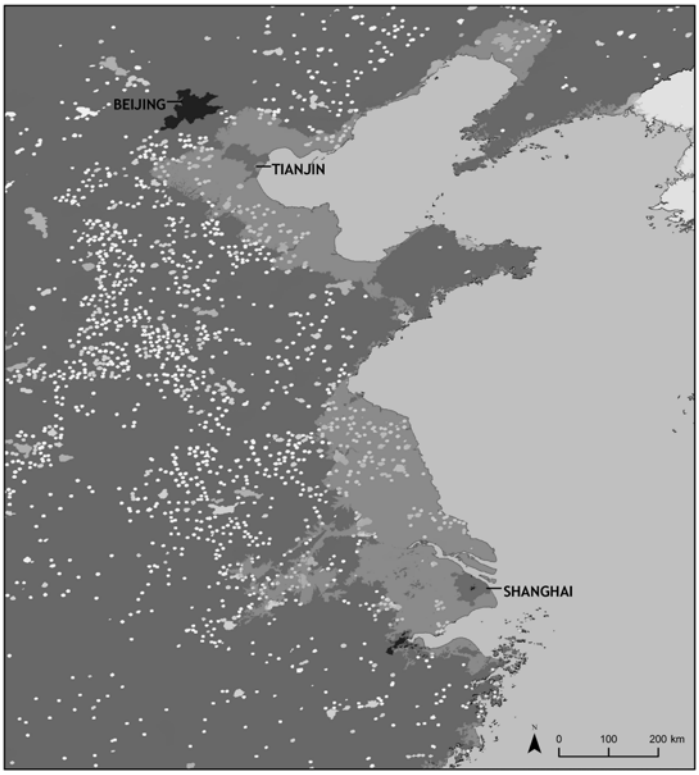
The full package of interventions known to be effective in high-income countries has typically not been implemented in low-income countries. The interventions include behavioural interventions—the promotion through media campaigns and other public-health communication outlets of seatbelt use for adolescents and adults and appropriate restraints for infant and child passengers, and encouragement for bicycle and motorcycle riders to wear helmets—as well as traffic engineering concerns, such as the need to remove "unforgiving" roadside objects, properly maintain existing roads, and situate new ones so that high-speed traffic is not routed through densely-settled communities or placed near busy markets, schools, and children's play spaces. In many low- and middle-income countries, only meagre resources are allotted to traffic control and enforcement of speed and road safety laws. Public health planners will also need to assess the priority that has been given to emergency rescue services (which may involve connections between the health system and the police) and the availability of pre-hospital care and in-hospital trauma centres.

7. Future risks from climate change

Although much remains to be done to clarify the health implications of climate change, enough is already known to sketch the core elements of an urban adaptation strategy for low- and middle-income countries (Huq et al., 2007; McGranahan et al., 2007; Satterthwaite et al., 2007). According to current estimates, gradual increases in sea level are now all but inevitable over the coming decades, and this will place large coastal urban populations under threat. Alley et al. (2007) forecast rises in sea level of between 0.2 and 0.6 metres by 2100, which will be accompanied by periods of exceptionally high precipitation, more intense typhoons and hurricanes, and episodes of severe thermal stress (The health effects of heat waves have not been much studied in the low- and middle-income countries, but the effects in Europe and the United States have been well-documented). In Asia, many of the region's largest cities are located in the flood-plains of major rivers (the Ganges–Brahmaputra, Mekong, and Yangtze rivers) and in coastal areas that have long been cyclone-prone. Mumbai saw massive floods in 2005, as did Karachi in 2007. Flooding and storm surges also present a threat in coastal African cities (for example, Port Harcourt, Nigeria, and Addis Ababa, Ethiopia) and in Latin America (for example, Caracas, Venezuela). Figure 10 depicts one of the major low-elevation coastal zones of China near Shanghai and

Tianjin, two of the world's fastest developing economic regions, in which increasing numbers of urban dwellers will be placed at risk.

Figure 10. Yellow Sea region of China, areas within 10 metres of sea level



Source: McGranahan et al. (2007)

Urban flooding risks in poor countries stem from a number of factors – the predominance of impermeable surfaces that cause water run-off; the general scarcity of parks and other green spaces to absorb these flows; rudimentary drainage systems that are often clogged by waste and which in any case are quickly overloaded with water; and the ill-advised development of marshlands and other natural buffers. When urban flooding takes place, faecal and other hazardous materials contaminate flood waters and spill into open wells, elevating the risks of water-borne disease. The urban poor are often more exposed than others to these environmental hazards, because the housing they can afford tends to be located in the riskier areas.

As Revi (2008) discusses in a detailed analysis of urban adaptation needs in India, governments from the local to national levels and their public health systems will need to anticipate increases in extreme-weather events. The Indian Ocean tsunami of 2005 heightened attention to coastal zone management in India and the region, but to judge from Revi's account, the responsibilities for urban adaptation and disaster management have been strewn across the bureaucratic landscape and are not yet organized in any coherent manner. Revi puts special emphasis on what is termed the "lifeline" infrastructure needed to cope with extreme events: the roads, bridges and other transport systems; water, sewer, and gas pipelines; infrastructure for coastal defences and drainage; the power and telecommunications infrastructure that are of vital importance during disasters; arrangements made with local non-governmental and relief agencies for alerting populations to imminent threats and responding to disaster; and the hospitals, fire and police stations, schools, military forces and other first-responders involved during the onset and aftermath of such disasters (Satterthwaite et al., 2007, McGranahan, 2007). To plan adequately for the upcoming era of climate change, the urban public health system must engage with partners across a broad range of urban agencies. Many of the priority areas needing attention are already areas of concern on other counts—for instance, improvements in water and sanitation systems for the urban poor—but the prospects of climate change adds a new element of urgency to them.

F. CONCLUSIONS

The preceding sketch of urban health in developing countries is no substitute for the full treatment that the issues deserve, but it may at least suggest where further basic scientific and program intervention research is most needed. Some of the key issues lie well within the scope of the public health sector. Among them, we would single out the quality of urban health care, which has received too little attention, and, given the monetization of the urban system, the performance of subsidy schemes meant to assist the poor, which also need careful examination.

A main theme in the preceding discussion is the need for the public health sector to work in tandem with other government agencies. Public health professionals cannot by themselves mandate the provision of safe water and adequate sanitation for the urban poor; nor can they, acting alone, reorganize traffic flows and pedestrian activities to reduce deaths and injuries, or ready cities to adapt to upcoming threats from climate change. What is needed is what Harpham (2007) terms "joined-up government," whereby public health agencies join with concerned actors in other sectors of municipal, regional, and national governments. Because the urban health system is dauntingly complex, with private for-profit and private nonprofit care being a significant presence in most cities, effective partnerships are also likely to require engagement with the private sector.

Public health officials have long known that a lack of access to drinking water and adequate sanitation afflicts poor urban-dwellers. But they have also known that investments in public health infrastructure require substantial financial sums, on a scale that dwarfs the typical public health budget. Although public health authorities can help publicize needs and exert pressure, the key decision-makers are generally located elsewhere in the political-bureaucratic system. Even these decision-makers may not be aware of the recent innovations in public-private packages of financing for improvements in urban water supply and sanitation, as well as housing, to which public health officials might direct attention (Evans 2007).

With political and administrative decentralization now well underway in many developing countries, the arena in which creative partnerships are forged will increasingly be the local and municipal level. Much remains to be learned about how health expertise that is now situated in national ministries of health, and the international funding and technical assistance that has also been directed to national ministries, can be redeployed to meet the many health needs of cities and their neighbourhoods.

NOTES

[1] No quantitative account is now available of the percentage of the urban poor who live outside slums, but they are believed to be a sizeable group.

[2] The Dussault and Franceschini (2006) review emphasizes urban–rural imbalances in health personnel, but does not differentiate among types of urban areas.

[3] AGI (1999) provide an excellent overview of induced abortion, a hidden and difficult-to-study area of health. See *International Family Planning Perspectives*, which is a good source of information on this topic; the publication archive is http://www.guttmacher.org/pubs. The journal *Studies in Family Planning* is another helpful source: http://www.blackwell-synergy.com/loi/sifp.

[4] See Dyson (2003). Country profiles are available at http://www.census.gov/ipc/www/hivaidsn.html, but these profiles are worked up from the reports of selected clinics and various sentinel sites, which do not necessarily yield statistically representative portraits for urban or rural populations.

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PROGRESS TOWARD THE CHILD MORTALITY MILLENNIUM GOAL IN URBAN SUB-SAHARAN AFRICA: THE DYNAMICS OF POPULATION GROWTH, IMMUNIZATION AND ACCESS TO CLEAN WATER

Jean-Christophe Fotso, African Population and Health Research Center, Kenya, Nyovani Madise, School of Social Sciences, University of Southampton, United Kingdom, Alex Chika Ezeh, African Population and Health Research Center and James Ciera, Department of Statistics, University of Padova, Italy

A. ABSTRACT

Improvements in child survival have been very poor in sub-Saharan Africa. Since the 1990s, declines in child mortality have reversed in many countries in the region, while in others, they have either slowed or stalled, making it improbable that the target of reducing child mortality by two thirds by 2015 will be reached. This paper highlights the implications of urban population growth and access to health and social services on progress in achieving Millennium Development Goal (MDG) 4. Specifically, it examines trends in childhood mortality in sub-Saharan Africa in relation to urban population growth, vaccination coverage and access to safe drinking water.

Correlation methods are used to analyze national-level data from the Demographic and Health Surveys and from the United Nations. The analysis is complemented by case studies on intra-urban health differences in Kenya and Zambia.

Only five of the 22 countries included in the study have recorded declines in urban child mortality that are in line with the MDG target of about four per cent per year; five others have recorded an increase; and the 12 remaining countries witnessed only minimal decline. More rapid rate of urban population growth is associated with negative trend in access to safe drinking water and in vaccination coverage, and ultimately to increasing or timid declines in child mortality. There is evidence of intra-urban disparities in child health in some countries like Kenya and Zambia.

Failing to appropriately target the growing sub-group of the urban poor and improve their living conditions and health status – which is an MDG target itself – may result in lack of improvement on national indicators of health. Sustained expansion of potable water supplies and vaccination coverage among the disadvantaged urban dwellers should be given priority in the efforts to achieve the child mortality MDG in sub-Saharan Africa.

B. BACKGROUND

Improvements in child survival have been very poor in sub-Saharan Africa. Since the 1990s, declines in child mortality have reversed in many countries in the region, while in others they have either slowed or stalled, making it improbable that the target of reducing child mortality by two thirds by 2015 will be reached by the majority of the countries in the region. Under-five mortality rate (U5MR) in sub-Saharan Africa varied from 185 (per 1,000 live births) in 1990 to 172 in 2003 (United Nations Development Programme (UNDP), 2003; United Nations, 2005). This corresponds to an overall decline of about 7 per cent, or nearly 0.5 per cent on an annual basis, while the MDG targets an average reduction of 4.3 per cent per year. If the region had been on track to meeting the MDG on child mortality, U5MR would be around 105 in 2003. At current trends, mortality rate in children younger than five years will decline by less than 15 per cent by 2015 from the 1990 base year, compared to the expected goal of 66.7 per cent.

It is estimated that more than 10 million children under the age of five years die each year, with about 90 per cent of these deaths occurring in just 42 countries, 36 of which are in sub-Saharan Africa (Black and others, 2003). Numerous studies on infant and under-five mortality in developing countries indicate that most of these deaths are from preventable causes – such as diarrhoea, pneumonia, measles, malaria, HIV and AIDS, and the underlying malnutrition – and suggest that the goal of reducing childhood mortality by two-thirds by 2015 could be achieved if few known and effective child survival interventions could reach population groups that need them most (Black and others, 2003; Jones and others, 2003; Bryce and others, 2005). These include immunization, safe water and sanitation, micronutrient supplementation, nutrition counselling, and in malaria-prone areas, insecticide-treated bed nets (Mohan, 2005). The task of scaling up child-health interventions to full coverage in countries with the highest mortality is within reach, and resources should be mobilized to match governments' and development partners' commitments with action (Mason, 2005).

1. Why focus on urban sub-Saharan Africa?

In sub-Saharan Africa, the 1980s was largely dominated by the protracted economic recession that affected most developing countries, with negative effects on food security and various aspects of human development (Food and Agricultural Organization (FAO), 2000). Countries were required by international lending institutions to implement structural adjustment programs meant to stabilize their economies. Real wages were reduced together with the provision of public social services; unemployment increased; and public support schemes in favour of agriculture and rural development was downscaled or abandoned (FAO, 2000; Cornia and others, 1987). This process resulted in increased migration flows from rural to urban areas, generally composed of disadvantaged families, who were likely to have a harder time coping in urban areas than in rural areas (Sastry, 2004). These trends were more pronounced in sub-Saharan Africa than in other parts of the developing world. Between 1980 and 2000, the region's urban population grew by about 4.7 per cent per year, compared to 3.5 per cent for the developing countries as a whole (United Nations, 2004), while at the same time, per capita gross domestic product (GDP) dropped by 0.8 per cent per annum (World Bank, 2003), and food production index per capita increased by only 0.2 per cent per year (FAOSTAT).

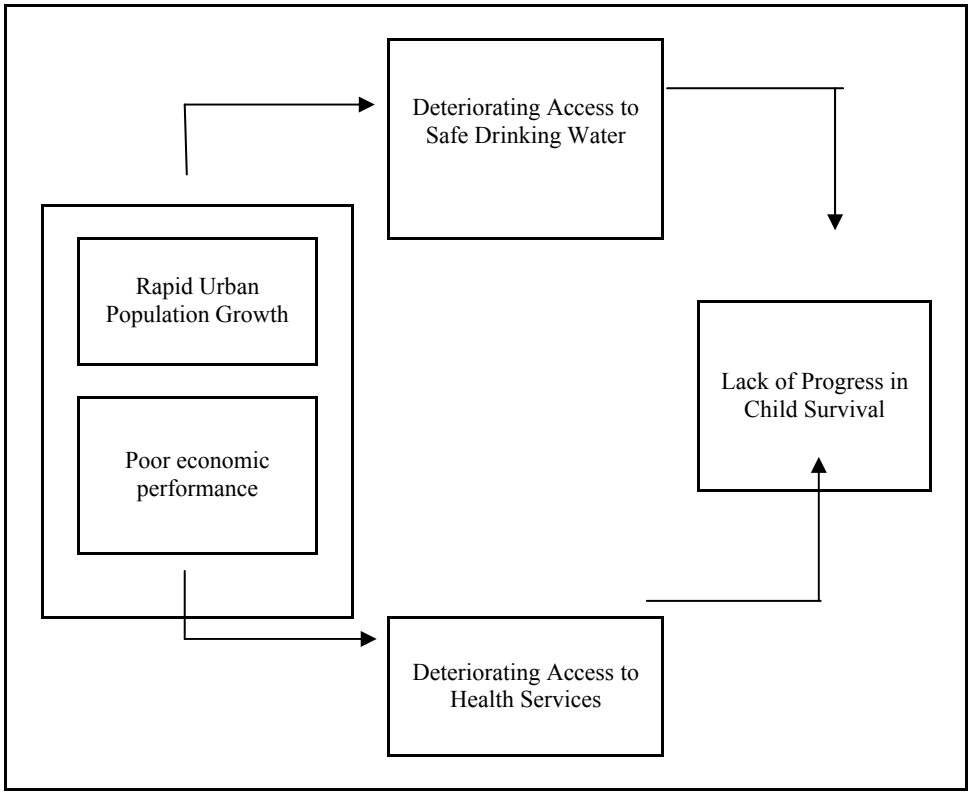
As a result of this rapid urbanization in the context of poor economic performance and poor governance, a rapidly increasing proportion of urban dwellers are living below the poverty line in overcrowded slums and shantytowns. These slums are generally characterized by poor environmental and sanitation conditions, poor access to basic amenities and social and health services, and poor livelihood opportunities, which in turn worsen the residents' susceptibility to various health problems (Zulu and others, 2002; African Population and Health Research Center (APHRC), 2002).

While national trends in child mortality are generally worrying, more worrying is the emerging body of knowledge suggesting that the worsening child health outcomes in sub-Saharan Africa may be accentuated among the urban poor (Victora and others, 2003; Brockerhoff and Brennan, 1998; Meno and others, 2000; Tim and Lush, 1995). Not only are disparities widening between the poor and non-poor in urban areas, in some countries current levels of child indicators among the poor in urban areas exceed the levels for all other sub-groups including rural residents (APHRC, 2002). A number of studies have also suggested that the rural/urban ill-health and mortality gaps in sub-Saharan Africa have narrowed in recent years, mainly as a result of stalling and even upturn in urban trends, as urban economic and environmental conditions have sharply deteriorated in rapidly growing cities (Fotso, 2007; Gould, 1998).

This study seeks to contribute to the growing evidence base on how far developing countries in general, and sub-Saharan African countries in particular, are progressing in reducing the persistent high child mortality rates. Though the MDGs have been set and are typically assessed at the national level, we argue that focus on urban areas of sub-Saharan Africa provides a useful starting point for stocktaking of factors likely to get the region on track to meeting the child mortality target. More specifically, the goal of

the paper is to assess the inter-relationships between urban population growth, trends in access to safe drinking water and in vaccination coverage, and trends in child mortality in urban areas of sub-Saharan Africa. Despite the amount of work on child morbidity and mortality in developing countries (Amouzou and Hill, 2004; Madise and others, 2003; Hobcraft and others, 1984), very few have focused on urban areas within a cross-country perspective. The paper is premised on a conceptual hypothesis which suggests that rapid urbanization amidst declining or stagnating economies is associated with poor access to safe drinking water and low health utilization, which in turn, lead to poorer or lack of progress in child survival in urban areas. This hypothesis is illustrated in Figure 1.

Figure 1. **Conceptual hypothesis on the linkages between urban population growth, access to water and to health services, and trends in child mortality**



The importance of access to safe drinking water on child health, especially in urban areas, has been well documented as diarrhoea remains the major cause of deaths among children under five (Black and others, 2003; Bryce and others, 2005; Woldemicael, 2000). In developing countries, migration streams to urban areas that have been the main fuelling factor of population growth in cities, strain existing water infrastructure. In this context, underprivileged urban populations often pay exorbitant prices for clean – and sometimes unclean - water, while services to wealthier groups are heavily subsidized (Mintz and others, 2001). Child immunization is another key factor influencing child survival in developing countries and has been considered as the most cost-effective health intervention (Mavimbe and others, 2005). Vaccine-preventable diseases remain major causes of morbidity and mortality in Africa. Reductions in vaccine-preventable diseases have been recorded following the introduction of appropriate vaccines for routine use in infants (Black, Morris and Bryce, 2003; World Health Organization (WHO)/United Nations Children's Fund (UNICEF)). Child survival is also influenced by the HIV epidemic through several mechanisms including mother-to-child transmission and breastfeeding (Newell and others, 2004), and evidence from various African countries suggests that paediatric AIDS has become one of the leading factors of mortality (Garenne and Gakusi, 2006). However, the fact that child mortality declined steadily in some of the countries heavily hit by HIV/AIDS such as Malawi, and went down only

minimally in some of the countries with low HIV prevalence like Senegal, suggests that AIDS may not be the only problem.

This study shows that more rapid rates of urban population growth are associated with negative trends in access to safe drinking water and in vaccination coverage, and ultimately to increasing or timid declines in child mortality. There is evidence of intra-urban disparities in child health in countries like Kenya and Zambia.

C. METHODS

This study uses data from the Demographic and Health Surveys (DHS) from 22 sub-Saharan African countries with two or more surveys carried out between the 1990s and the 2000s. DHS surveys provide detailed health information on women aged 15 to 49 years, on children born in the three or five years preceding the survey date, and on relevant household characteristics including the type of drinking water source. Data on population growth are from the Population Division of the United Nations. Univariate and correlation analysis are carried out on the following variables:

1. Annual urban population growth between 1980 and 2000.

2. Annual percentage change over time in urban under-five mortality rate. Rates for the ten-year period preceding the survey are used for the computation.

3. Annual percentage change over time in the proportion of urban households with access to clean water.

4. Annual percentage change over time in the proportion of children 12-23 months who are fully vaccinated. A child is fully vaccinated if he/she has received BCG, measles, and three doses of DPT and polio (excluding polio 0).

Table 1 shows the qualifying countries, the survey periods, and the variables presented above. The results of the macro-level correlation analysis are complemented by case studies using data from Kenya and Zambia. For Kenya, supplementary data are used from the Nairobi Cross-sectional Slum Survey (NCSS) carried out by the APHRC in 2000. The survey covered a representative sample of all slum settlements in Nairobi city. The study was designed to provide comparable data to the 1998 and 2003 Kenya Demographic and Health Surveys, with the aim of determining the magnitude of intra-urban health inequalities in Kenya. Based on census enumeration areas used in the 1999 Kenya National Census, a representative cross-sectional sample of households in all slum clusters of Nairobi was designed. Like in the DHS, enumeration areas (EAs) were selected at the first stage of sampling, while households were selected from sampled EAs at the second stage. In total, the NCSS administered interviews to 4,564 households and 3,256 women of reproductive age (15-49) (APHRC, 2002). The data, in conjunction with the Kenya DHSs, allow for comparative analyses of social, health and reproductive health indicators between respondents residing in the slums of Nairobi, and residents in other urban areas and rural Kenya.

We use data from the NCSS to identify households that were probably located in slum areas in the Kenyan and Zambian DHSs. From the NCSS, only seven percent of households in slums had own flush toilets. Using the absence of own flush toilet as an indicator of slums in both Kenya and Zambia, we were able to obtain intra-urban differences. The case studies contrast infant mortality rates for the five-year period preceding the survey between slum and non-slum sub-groups. There were problems with computing U5MR for some years because of small numbers of observations in some sub-groups. We also examine access to piped water and child immunization over time among slum and non-slum children in Kenya and Zambia.

The study reported in the paper did not require any ethical approval, as it mainly used secondary analysis of publicly available data from the well-known DHSs conducted in most developing countries since the mid-1980s.

TABLE 1 – TRENDS IN UNDER-FIVE MORTALITY, POPULATION GROWTH, ACCESS TO CLEAN WATER, AND CHILD VACCINATION IN URBAN SUB-SAHARAN AFRICA

	First Survey Year[a]	*Last Survey Year*[a]	*Under-five mortality rate*[e]	*Urban population growth*[b]	*Access to safe drinking water*[c]	*Full vaccination*[d]
Benin	1996	2001	-2.3	5.6	2.8	2.2
Burkina Faso	1992/93	2003	-0.8	6.3	2.8	-0.5
Cameroon	1991	2004	-0.1	5.0	0.1	0.6
Chad	1996/97	2004	-0.8	4.1	8.1	0.3
Côte d'Ivoire	1994	1998/99	0.9	4.7	0.3	5.7
Eritrea	1995	2002	-5.6	3.6	1.7	1.6
Ghana	1993	2003	0.3	4.6	-0.5	0.6
Kenya	1993	2003	2.2	7.4	-2.0	-4.1
Madagascar	1992	2003/04	-5.6	4.7	-1.5	1.6
Malawi	1992	2004	-4.6	5.8	-0.8	-1.7
Mali	1995/96	2001	-0.6	5.2	3.3	-0.6
Mozambique	1997	2003	-0.8	6.7	-2.7	-0.8
Namibia	1992	2000	-6.7	4.9	0.2	1.9
Niger	1992	1998	-2.7	5.8	0.7	0.2
Nigeria	1990	2003	1.2	5.3	-4.9	-5.4
Rwanda	1992	2000	-1.2	7.8	1.1	-2.3
Senegal	1992/93	1997	-2.9	4.3	0.1	3.3
Tanzania	1992	2004	-3.2	7.2	-1.2	-0.2
Togo	1988	1998	-2.6	5.3	0.8	1.5
Uganda	1995	2000/01	-5.0	5.0	6.6	-5.1
Zambia	1992	2001/02	-0.8	2.2	-0.9	0.3
Zimbabwe	1994	1999	1.8	4.9	0.2	-5.0

Source: DHS

NOTES – 1) First and last demographic and health surveys (DHS) carried out between the 1990s and the 2000s.
2) Annual growth of urban population (1980-2000). Source: Population Division, United Nations
3) Annual variation of the percentage of urban households with access to safe drinking water.
4) Annual variation of the percentage of urban children aged 12-23 months who are fully immunized.
5) Annual variation of urban under-five mortality rate.

D. RESULTS

1. Univariate results

As can be seen from Table 1, five of the 22 countries (Namibia, Eritrea, Madagascar, Uganda and Malawi) recorded declines in urban child mortality in line with the MDG target of about 4 per cent per annum, while at the other end, Kenya, Zimbabwe and Nigeria witnessed a sharp increase. Between these two extremes, six countries (Tanzania, Senegal, Niger, Togo, Benin and Rwanda) had a slow decline in mortality ranging from 1 per cent to 3.2 per cent per annum; and in eight others (Zambia, Burkina Faso, Chad, Mozambique, Mali, Cameroon, Ghana and Côte d'Ivoire), child mortality almost remained unchanged, with annual change ranging from -0.9 per cent to +0.9 per cent per year.

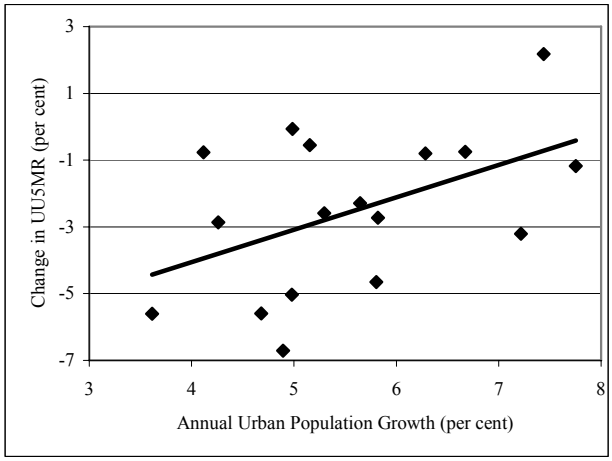
Between 1980 and 2000, the lowest urban population growth was noted in Zambia (2.2 per cent per year), and Eritrea, Chad and Senegal (between 3.6 per cent and 4.5 per cent), whilst five countries (Burkina Faso, Mozambique, Tanzania, Kenya and Rwanda) had annual urban population growth between 6.3 per cent and 7.8 per cent. With regard to access to safe drinking water, nine countries achieved improvement in access to clean water of between 0.7 per cent (Niger) and 8.1 per cent (Chad); seven others recorded a decline ranging from 4.9 per cent (Nigeria) to 0.8 per cent (Malawi); while the six remaining countries witnessed almost no change. Six countries witnessed a decline in the coverage of full vaccination ranging from 5.4 per cent (Nigeria) to 1.7 per cent (Malawi). At the other end of the scale, six others recorded an increase of between 1.6 per cent (Madagascar) and 5.7 per cent (Côte d'Ivoire).

2. Correlation analysis

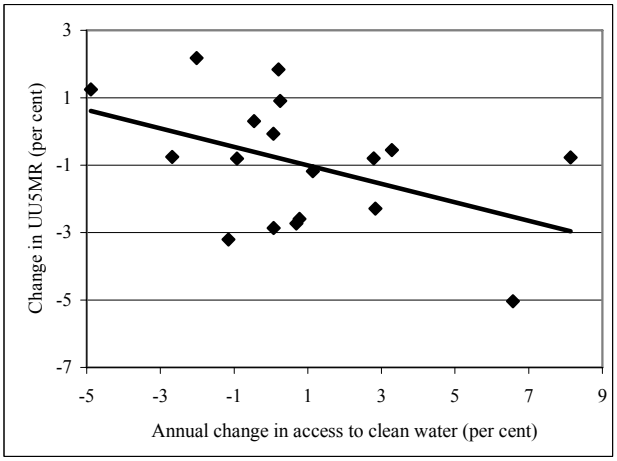
Figure 2 displays the inter-relationships between trends in urban under-five mortality, urban population growth, and trends in access to safe drinking water and in vaccination coverage. The upper left graph shows the association between urban population growth and change over time in urban under-five mortality. As expected, it indicates that countries with more rapid rates of urban population growth tended to experience worsening trends or timid declines in urban child mortality. The correlation coefficient (+0.41) is statistically significant at the level of 0.10. Next, we investigate the extent to which access to clean water plays a role in the above association. As can be seen from the upper right graph of Figure 2, change over time in access to water is associated with trends in child mortality (correlation of -0.45; p value of 0.06). Countries with greater improvement in access to safe drinking water among the urban dwellers were likely to witness higher declines in under-five mortality. Moreover, the middle left graph indicates that higher rate of urban population growth is associated with deteriorating access to safe drinking water over time (correlation of -0.42; p value of 0.07).

Finally, the role of access to health services – proxied by child full vaccination- in the association between urban population growth and trend in child mortality is examined. The middle right graph of Figure 2 shows a very strong negative association between trends in child vaccination and change in under-five mortality (correlation of -0.73, p value of 0.00). It indicates that countries with greater improvement in child vaccination coverage consistently displayed more rapid declines in urban child mortality. Further, the bottom left graph indicates that higher rate of urban population growth is associated with decline or minimal increase in urban child vaccination coverage (correlation of -0.57, p value of 0.01). Overall, the inter-relationships between urban population growth, trend in access to clean water and health services, and change in under-five mortality appear to be consistent with our conceptual framework.

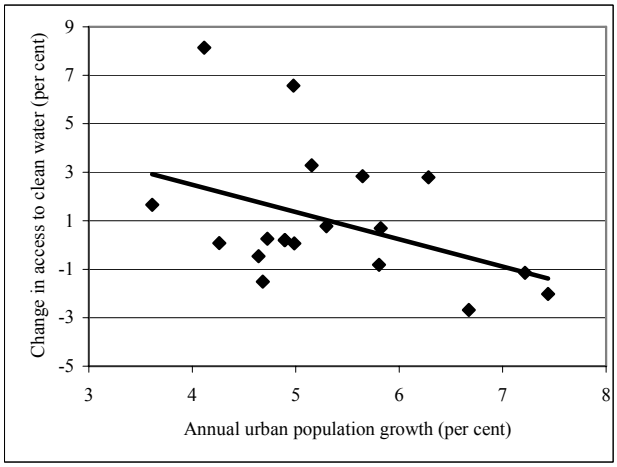
Figure 2. Inter-linkages between trends in urban population growth, access to safe drinking water, vaccination coverage, and under-five mortality in sub-Saharan Africa



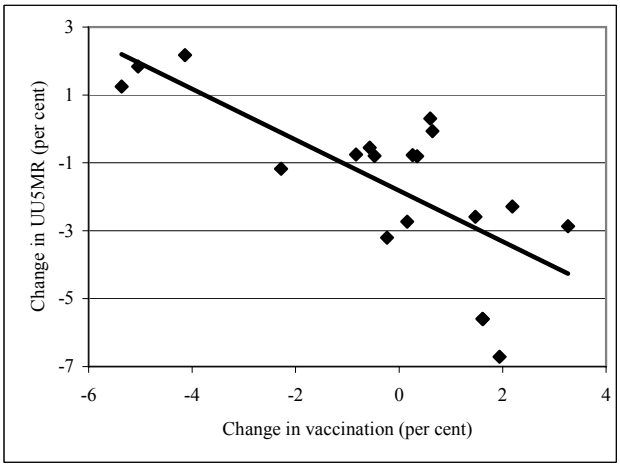
Population growth and under-five mortality in urban areas of SSA (4 outliers excluded). r = +0.41(0.09)



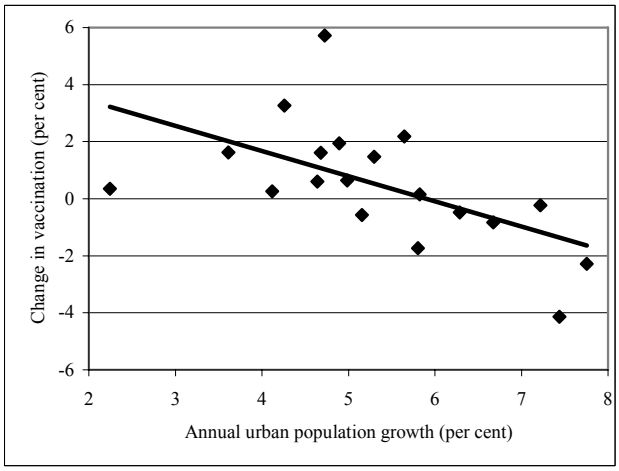
Access to safe water and under-five mortality in urban areas of SSA (4 outliers excluded). r = -0.45(0.06)



Population growth and access to safe water in urban areas of SSA (3 outliers excluded). r = -0.42(0.07)



Child vaccination and under-five mortality in urban areas of SSA (3 outliers excluded). r = -0.73(0.00)



Population growth and child vaccination in urban areas of SSA (3 outliers excluded). r = -0.57(0.01)

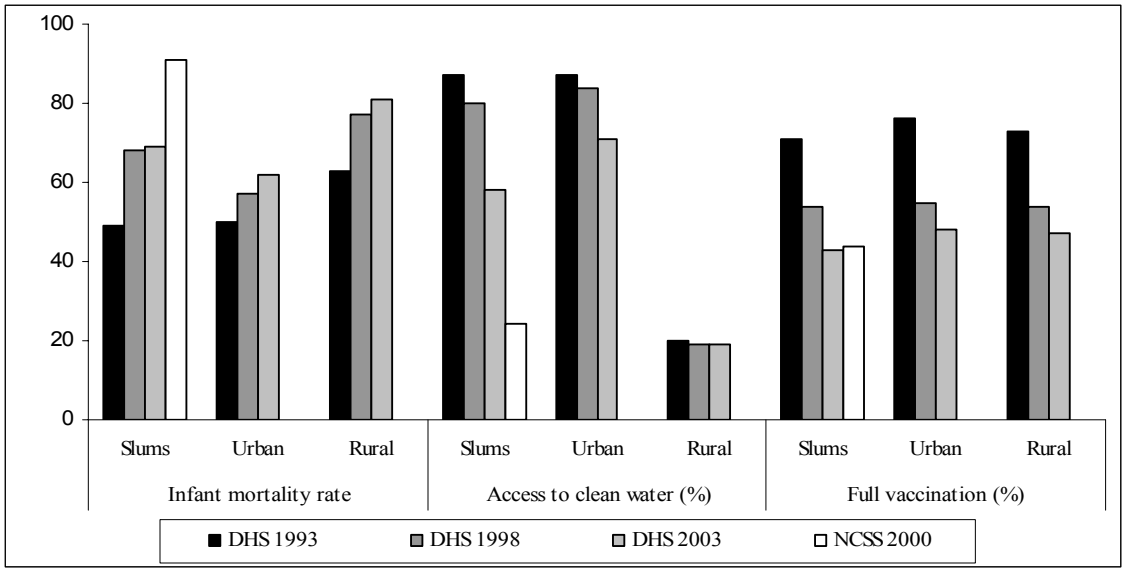
3. Case studies of Kenya and Zambia

a. Kenya

Kenya typifies the current urban population boom and associated urban health and poverty problems. Between 1980 and 2000, its urban population increased at an annual rate of 7.2 per cent, whilst per capita GDP dropped annually by about 0.1 per cent. According to the 2003 DHS, about one quarter of Kenyans were living in urban areas. The Welfare Monitoring Survey shows that while absolute poverty increased from 48 to 53 percent in rural areas of Kenya between 1992 and 1997, it almost doubled from 27 to 50 per cent over the same period in Nairobi City (Central Bureau of Statistics, 2000). Nairobi has indeed grown into a poverty hub with more than half of its population estimated to be residing in slum settlements (Matrix Development Consultants, 1993).

As can be seen in Figure 3, infant mortality in Kenya has been increasing since the early 1990s. This increase in childhood mortality was observed in both rural and urban areas but was generally faster in slums than in rural areas. Between 1993 and 1998, the increase in infant mortality was about 39 per cent in slums, compared with 14 per cent and 22 per cent in urban Kenya and rural areas, respectively. Using data from the NCSS of 2000, which was representative of slums of Nairobi, we see that slum children exhibit much higher infant mortality (91) than the average urban child, and more importantly, than those in rural areas of Kenya (81). Figure 3 also shows that access to clean water has been deteriorating in urban slums between 1993 and 2003. Slightly over half of households in slums had access to piped water in the 2003 DHS compared with 87 per cent in the early 1990s. This represents a drop of about 33 per cent, compared with 18 percent in urban Kenya and 5 percent in rural areas. The much lower figure reported from the NCSS data (24 per cent) is due to the fact that water bought from street vendors were not classified as safe. Similarly, the proportion of urban children who were fully immunized dropped markedly from 76 percent in 1993 to 48 per cent ten years later. Within slums, immunization rates were lower and dropped from 71 to 43 per cent.

Figure 3. Infant mortality, access to safe water and full vaccination in Kenya



The disadvantage of the poor is not limited to child health. Detailed analysis of DHS data (results not shown) further indicate that in some countries like Kenya, while the fertility of the richest 20 per cent has declined by more than 1.5 children in the last decade, the poorest 20 per cent has either

remained unchanged or has increased by more than one child in some countries. The poor have almost three times more children than the rich, they are also three times less likely to use contraceptives, and three times more likely to have unmet need for family planning. These results suggest that the high fertility of the poor may be largely unplanned or unwanted. With growing poverty and growing poor-rich fertility gap, greater proportions of children are increasingly born to poorer families (Brockerhoff and Brennan, 1998). This has implications for future population growth and the attainment of the health MDGs.

b. Zambia

Zambia is another interesting case study, exhibiting higher infant mortality than Kenya overall, but showing a mix of increasing and declining trends in the last few decades. Of particular focus to this paper are the intra-urban mortality differentials in childhood mortality and access to services and healthcare. The growth of urban centres in Zambia can be traced to the late 1950s, where urban growth rates of more than eight percent were recorded when copper mining was at its peak. Much of this growth was rural-urban migration as well as international migration. From the mid-1970s, copper prices started to fall, thus affecting the economy and the provision of essential services. According to the United Nations Population Division indicators, the urban population growth rate was less than three percent between the early 1990s and mid 2000s. Despite the slow down in urban growth rate, about 40 per cent of the Zambians reside in urban areas, which is high for the region. Between the 1960s and 1970s, infant mortality in Zambia declined from about 141 to 90 deaths per 1000 live births, but a reversal of this trend was noticed in the mid-1990s, with infant mortality rising to about 100 deaths per 1000 live births. Evidence of worsening child health among the urban poor was reported by Madise et al. who analyzed the 1992 and 1996 Zambian DHS data to identify changes in socioeconomic and demographic determinants of infant mortality (Madise and others, 2003). They found that in the mid-1990s, children of the urban poor had a 46 per cent higher probability of dying in infancy than the poorest rural children. They also reported reversal in household socioeconomic status between the two surveys and lower utilization of health care.

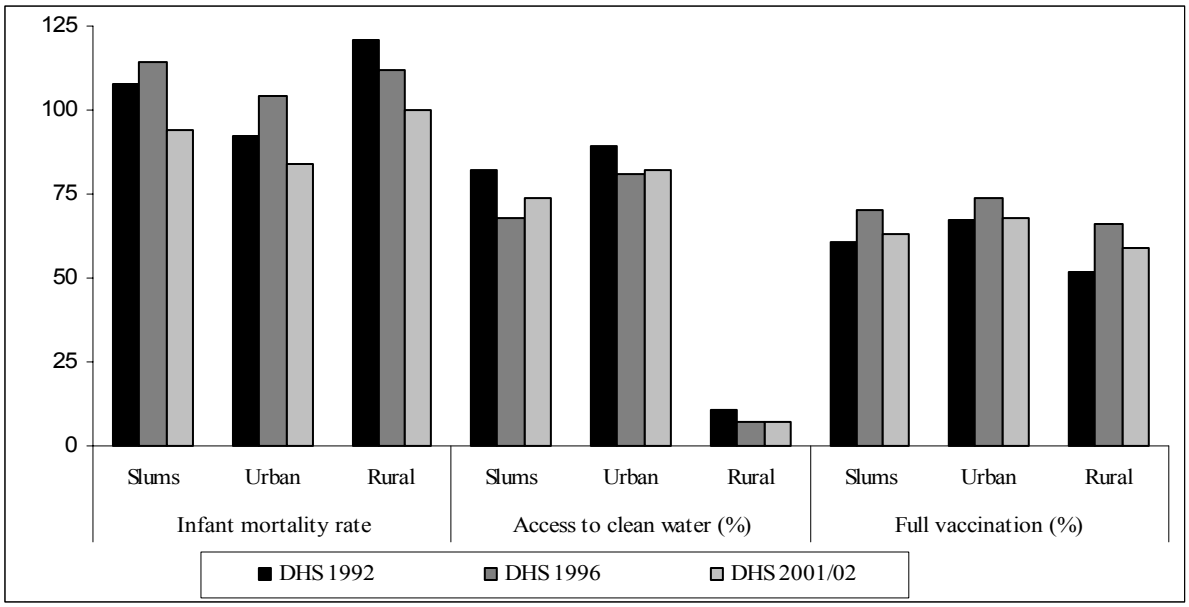
Figure 4 lends further evidence of deteriorating child health among urban inhabitants between the early and mid-1990s. The pattern shows an increase in infant mortality in slums of about 7 per cent compared with a reduction of 3 per cent in rural areas between the 1992 and 1996 DHS surveys. While mortality in urban areas increased in the 1990s, the rural areas experienced sustained declined between the early 1990s and early 2000s. Access to piped water in slum areas declined between the early and mid-1990s, lending support to the poor provision of social services during the economic slump of the country. In 1992, 82 per cent of households in the slums of Zambia had access to piped water, but this percentage dropped to 68 in the 1996 survey. The general decline in vaccination coverage between 1992 and 2001 was more pronounced in the slums (-13 per cent) than in urban Zambia as a whole (-9 per cent).

E. DISCUSSION

Declines in child mortality have been very poor in sub-Saharan African since the early 1990s, making it difficult for the region to meet – or at least get closer to – the MDG on child mortality. This paper has provided some degree of evidence on the linkages between urban population growth, change over time in access to safe drinking water and health services, and trends in child mortality. It has focused on urban areas of sub-Saharan Africa – where health outcomes are generally perceived to be better and services more accessible – to highlight an issue that seems to be neglected: high rates of urban population growth will greatly undermine efforts to improve the wellbeing and reduce poverty, which is the underlying goal of the MDGs.

Our results show that only five of the 22 countries included in the study have recorded declines in urban child mortality that are in line with the MDG target of about 4 per cent per year; five others have recorded an increase; and the remaining 12 countries have witnessed only minimal decline. The study has

Figure 4. Infant mortality, access to safe water and full vaccination in Zambia



shown that more rapid rate of urban population growth is associated with increasing or timid declines in urban child mortality. Consistent with our initial hypothesis, poor access to safe drinking water and to health services are associated with periods of deteriorating child health. Higher urban population growth is associated with negative trends in access to safe drinking water, while at the same time, countries with greater improvement in access to safe drinking water among urban dwellers tended to experience higher declines in urban childhood mortality. Similarly, higher rate of urban population growth is associated with decline or minimal increase in child vaccination coverage, and countries with greater improvement in child vaccination coverage consistently displayed more rapid declines in urban child mortality.

Our findings concur with those of other studies that have shown the health effects of inadequate water supply and poor sanitation. It is estimated that almost half the people in the developing world have one of the main diseases related to inadequate water supply and sanitation, and that about 90 per cent of diarrhoeal disease – the second leading cause of death among children under five years of age – is attributed to unsafe drinking water, inadequate sanitation and poor hygiene (Mohan, 2005; Wagstaff and Bustreo, 2004). Other research at the micro level has shown that improved availability and use of piped water would have substantial effects on reducing urban mortality, especially during the post-neonatal and childhood periods (Woldemicael, 2000). Immunization, on the other hand, remains one of the most cost-effective health interventions likely to help achieve the MDG on reducing child mortality (Bryce and others, 2005). WHO/UNICEF global immunization strategy for the years 2006-2015 noted regrettably that immunization coverage has increased only marginally in some regions of the world since the early 1990s, and emphasizes the need to improve existing levels of vaccine coverage, particularly by accessing hard-to-reach populations on a regular basis.

Results from the Kenya case study indicate that urban under-five mortality has increased over time, and importantly, that urban poor children have higher mortality than even their rural counterparts. They also indicate that Kenyan poor women have almost three times more children than the rich, and are three times less likely to use contraceptives and three times more likely to have unmet need for family planning. Such poor reproductive health outcomes could further worsen child health outcomes among the poor. Another case study is that of Zambia, which has relatively high urbanization for the region. Periods

of severe economic hardship in the early and mid-1990s were accompanied with increasing childhood mortality. This increase in mortality was observed among the urban population, particularly among the urban poor. In sub-Saharan Africa, the growing poverty and growing poor-rich fertility gap will result in greater proportions of children increasingly born to poorer families, with predictable implications for future population growth and the attainment of the health MDGs.

Rapid rate of urban population growth creates pressures on available infrastructure which, in many parts of Africa, have remained stagnant. The poor will increasingly lose out in such instances as the Kenya and Zambia case studies show. Consequently, the urban poor will experience many of the health challenges associated with lack of access to these basic amenities and services. The impact of this burden on the urban poor, combined with their growing size and proportion as many economies stagnate, creates an overall worsening of health indicators across urban areas in sub-Saharan Africa (Tim and Lush, 1995). Where evidence exists, huge inequities are observed among the poor and non-poor in urban areas of sub-Saharan Africa (APHRC, 2002; Menon and others, 2000; Fotso, 2006).

Some of the findings of this study are rather counter-intuitive. For example, Tanzania and Malawi, and to a lesser extent, Madagascar, have higher rates of urban growth and poorer improvement in access to safe drinking water and child vaccination. Yet, they display strong declines in child mortality. By contrast, Côte d'Ivoire has increasing mortality despite noticeable increase in water supply and child vaccination. Country-specific policies and program context may explain some of these contrary-to-expectation results. With support from various development partners, Madagascar has implemented sound strategies of vitamin A supplementation, de-worming, insecticide-treated bed nets and oral rehydration salts, among others, to reduce child mortality and morbidity (UNICEF); Malawi has put in place measures to address various child health and survival issues including developing nutrition rehabilitation strategies, providing insecticide-treated bed nets, and providing cholera treatment centres with essential drugs and other materials and training of health personnel on early detection and case management (National Statistical Office and UNICEF, 2007); and the Tanzanian government has shown consistent commitment to invest in health and decentralize decision-making for health spending based on district priorities (DFID).

F. STUDY LIMITATIONS

The study has some limitations. All retrospective survey data in general, and birth history data in particular, are subject to biases arising from faulty respondent recall, the most common of which are completeness or displacement of birthdates; misreporting of age at death; death omissions, especially for infants who died early in life in the distant past; and survival bias since birth history data are limited to the experience of children born to surviving mothers (Bicego and Omar, 1996). Despite these limitations, several reports have indicated that the quality of DHS data to directly estimate infant and child mortality rates and to compare trends over time is generally good (Bicego and Omar, 1996; Curtis, 1995).

The paper presumes a constant rate of change in mortality, access to clean water and immunization coverage during the inter-survey period. This may not be the case in all countries. However, the constant rate approach has the advantage of summarizing in a single coefficient the change between the first and the last surveys. The study has other limitations, including the exclusion of three or four outliers (out of 22 countries) in the correlation analysis, which represents a non-negligible proportion. For example, the strong association between trend in child vaccination and change in mortality ($r = -0.73$; $p<0.00$) is substantially weakened if the three outliers (Côte d'Ivoire, Malawi and Uganda) are included in the analysis ($r = -0.42$; $p<0.10$). The analysis does not take into account the standard errors of the estimates in the calculation of percentage change over time in each of the indicators. Since DHS surveys are based on population samples, some of the differences presented may not be statistically significant. Variance estimation of mortality rates requires the use of specialized software to perform complex calculations (i.e. Jacknife repeated replication methods), which was beyond the scope of the study.

Another limitation of the study is that identification of slum areas in DHS samples is not straightforward. In addition, urban samples are often small that trying to isolate intra-urban differences can sometimes be problematic. The estimates that we present of slum childhood mortality and vaccination rates are based on our definition of slums (absence of a flush toilet), which may not be fully accurate. The NCSS survey was a representative survey of slum households in Nairobi and our assertion of the disadvantage of slum children compared even with rural children, is strengthened by that survey's findings. We recommend that NCSS-type surveys should be undertaken periodically to provide good data for the study of intra-urban health differentials. Finally, the effects of HIV and AIDS are not included in the analysis, as previously indicated.

G. CONCLUSION

Overall, the results of this analysis suggest that the urban poor should not be neglected in policy attention and resource allocation. While the poorest families and neighbourhoods are the most likely to need interventions to prevent illnesses in children, existing evidence from sub-Saharan Africa suggests that they are often the least likely to receive them, which not only adversely affects the health and survival of their children, but also pushes them further into indebtedness and poverty (Wagstaff and Bustreo, 2004). Failing to appropriately target the growing sub-group of the urban poor and improve their living conditions and health status – which is an MDG target itself – may result in lack of improvement on national indicators of health. This may consequently move countries further away from achieving the MDGs. In addition to improving the overall urban and national averages of health indicators, it is important to analyse, track and purposefully reduce health inequities – inequalities that are unjust and unfair, and ethically indefensible (Victora and others, 2003; Zere and McIntyre, 2003; WHO, 2000), since progress towards the achievement of the health MDGs will not automatically benefit the underprivileged population sub-groups (Wagstaff and Bustreo, 2004; Wirth and others, 2006). The concern for equity therefore applies even to countries witnessing a substantial decline in child mortality. Progressive and sustained expansion of access to safe water supplies and vaccination coverage among disadvantaged urban dwellers, will contribute greatly to reducing under-five mortality from major causes of death in urban sub-Saharan Africa, and consequently, put countries on track to meeting the MDG target. The implementation of these interventions could be a measure of the attention paid by governments and development partners towards equity in the provision of health-related services.

Competing interests

The authors declare that they have no competing interests. The study was supported with grants from the Wellcome Trust, the Hewlett Foundation and the Rockefeller Foundation. The sponsors had no involvement in the study design; in the collation, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

Authors' contributions

Jean-Christophe Fotso framed the research question, conducted the literature review, led in the data analysis, contributed in the writing of the paper. Alex Chika Ezeh conceived the idea of this manuscript and provided the overall guidance for the write-up. Nyovani Janet Madise contributed in the data analysis and in the writing of the manuscript. James Ciera was responsible for collating data for the study and also contributed in the data analysis. All authors read and approved the final manuscript.

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GLOBALIZATION AND URBAN ENVIRONMENT CONDITIONS IN THE ASIA-PACIFIC REGION

Peter J. Marcotullio, United Nations University, USA

A. INTRODUCTION

This paper brings together three different literatures – on socio-ecological systems, global cities and urban environmental transitions, in an attempt to shed light on the conditions of contemporary urban environments in rapidly developing Asia-Pacific economies. The main argument is that urban environmental transitions are significantly different in Asia-Pacific economies than those experienced by the now developed world. The differences in transition experiences are identified by comparing the experiences between those economies that developed before the current age of globalization-driven growth with those undergoing development during the contemporary era. One of the main underpinning arguments is that globalization processes play a major role in transforming patterns of the development of urban socio-ecological systems, although not in ways previously identified.

Combining these literatures adds further insights into each. The paper departs from the literature on the urban environments by starting with a conceptualization of cities as socio-ecological systems (SES) (see for example, Young, et al., 2006) and therefore the argument is based upon notions of urban ecosystems and ecosystem services. Urban ecosystem analysis suggests mutual interactions between social and economic activities within urban areas and the natural services they depend upon (McGranahan, et al., 2005). Much of the focus on urban environmental issues in contemporary literature focuses on the state of (infrastructure) conditions that directly affect human well-being (see for example, Hardoy, et al., 2001). The paper also considers literature on globalization and global cities (Brenner and Keil, 2006), which focuses largely on the transnational trade and local economic consequences of high end business services. There is little in the global cities literature on the impact of trade in goods as ecosystem services. At the same time, there is a growing literature on the impacts of trade, such as the flows of unintended materials (biological invasive species, for example) and the in how trade impacts nutrient cycles (Grote, et al., 2005; Galloway, et al., 2007). Combining the insights from these studies highlights the changing impacts of this trade on urban socio-ecological relationships, as changes related to the trade and investment (for a review see, Neumayer, 2001; Gallagher and Werksman, 2002), and also suggest major differences in development contexts, as the global linkages between the consumers of ecosystem services and ecosystems that provide these services intensifies. Finally, the paper is based upon an understanding of environmental change in cities as identified by urban environmental transition theory (McGranahan, et al., 2001). This notion suggests that the relationship between environmental conditions shifts with growing income (see also, Smith, 1990; Smith and Lee, 1993; Satterthwaite, 1997). The urban environmental transition provides a heuristic to ask questions about the differences in experiences between the now developed world and the rapidly developing contemporary world. The impacts of globalization on the changing relationship between humans and the natural environment define unique contexts for development during different eras of history. Combining aspects of these sets of perspectives allows for an integrated examination of the development of cities and the resources that those that live in them depend upon.

While this paper summarizes previous arguments it also attempts to break new ground in this area in two ways. First, it provides a theoretical background for understanding the patterns identified in the comparisons of developed and developing economies. Second, it attempts to flesh out the underlying dynamics of contemporary environmental transitions. Using parts of each of these perspectives outlined, the paper puts forth some ideas as to why new patterns are emerging.

The paper is divided into eight sections. The second section outlines notions related to socio-ecological systems and how this concept informs an understanding of contemporary environmental conditions within the rapidly developing world. The second section reviews the literature on globalization, with particular reference to the region and points out how globalization processes impact natural systems. The third section reviews the urban environmental transition theory. The fourth section puts forth a framework within which all three sets of notions play an important role and presents the claims of the research. The fifth section presents empirical evidence for the claims. The sixth section presents a discussion as to why these patterns have emerged. The seventh section identifies some of the implications of the findings and the eighth section concludes the paper.

B. SOCIO-ECOLOGICAL SYSTEMS

Recent studies on the state of the environment suggest significant human intervention in bio-geophysical processes at all scales, including the global, resulting in both environmental degradation and increasing potential and actual harm to human well-being (Millennium Ecosystem Assessment 2005; Bernstein, et al., 2007; UNEP 2007). Human activity is a major driving force in environmental change at all scales.

Understanding the growing complexity of how humans are interacting with the environment has become a major interdisciplinary research agenda (Holling, 2001; Kinzig, 2001). Instrumental in these efforts is the conception that human activities are dependent upon and structurally linked to natural ecosystem processes, structure and function. The notion of coupling the human or social sphere, and the environmental or ecological sphere is fundamental to a new avenue for integrated research called "socio-ecological systems" (SESs) (Young, et al., 2006) or coupled human and natural (or environment) systems theory (Berkes, 1998; Turner, Matson et al., 2003; Liu, et al., 2007).

Socio-ecological systems research emphasizes the reciprocal and interdependent interactions and feedback linkages between the human and ecological spheres at and across all scales. A continual challenge, however, has been how to integrate socio-economic and biophysical variables. One promising solution has been advanced through the use of the ecosystem services concept. Ecosystem services are those goods and services that ecosystems provide for human well-being in all its manifestations (Daily, 1997; Millennium Ecosystem Assessment, 2005). Using ecosystem services as a concept that connects ecological processes and patterns, and functions directly and indirectly to human activities, researchers have examined how humans have impacted the state of the environment, how the environment has responded in terms of its ability to continue providing ecosystem services and how these impacts have resulted in changes in human well-being.

An important insight from these studies is the evident change in dynamics between the human and ecological spheres over time. Changes in environmental conditions were noted throughout history and some regional impacts have been identified as resulting from activities human activities thousands of years ago. For example, McNeill (2000) suggests that emissions from Roman smelting could be found in Swedish bogs and Greenland ice. Indeed, emissions of copper surged twice before the industrial revolution, once after the introduction of coins in the ancient Mediterranean and during the Song Dynasty (960-1279 AD) (see also, Hong, et al., 1996; Nriagu, 1996). Ruddiman (2003) goes even further back in history to argue that the "long summer" over the past 10,000 years that allowed for the development and distribution of our species was partly due to human activities, including carbon and methane releases from deforestation and irrigated rice cultivation. These activities helped to prevent glaciations and initiated anthropogenic global warming and hence the advance of humans (see also, Flannery 2005).

While the changing relationships amongst components of the SESs can be identified in early human history, the most dramatic changes began with the industrial revolution and major global scale linkages tightened and intensified since the middle of the twentieth century. For example, changes in human activities during the twentieth century (1890-1990), such as a 40-fold increase in industrial output, a 14-fold increase in the world economy, a four-fold increase in the world population and a 13-fold increase in the world urban population have been associated with, among other impacts, a 13-fold increase in energy use, a doubling of land put under cultivation, a five-fold increase in irrigated area, a 35-fold increase in marine fish catch, a nine-fold increase in water use and a decrease in the blue whale population by 99 per cent (McNeill, 2000). Recent assessments suggest much of the major changes have occurred over the recent past. The Millennium Ecosystem Assessment (2005) stated that over the last 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of human history. A recent UNEP Global Environmental Outlook report (2007) suggests that over the last 20 years there has been unprecedented changes in land use, for example, driving land degradation into the ranks of climate change and biodiversity loss as threats to habitat, economy and society.

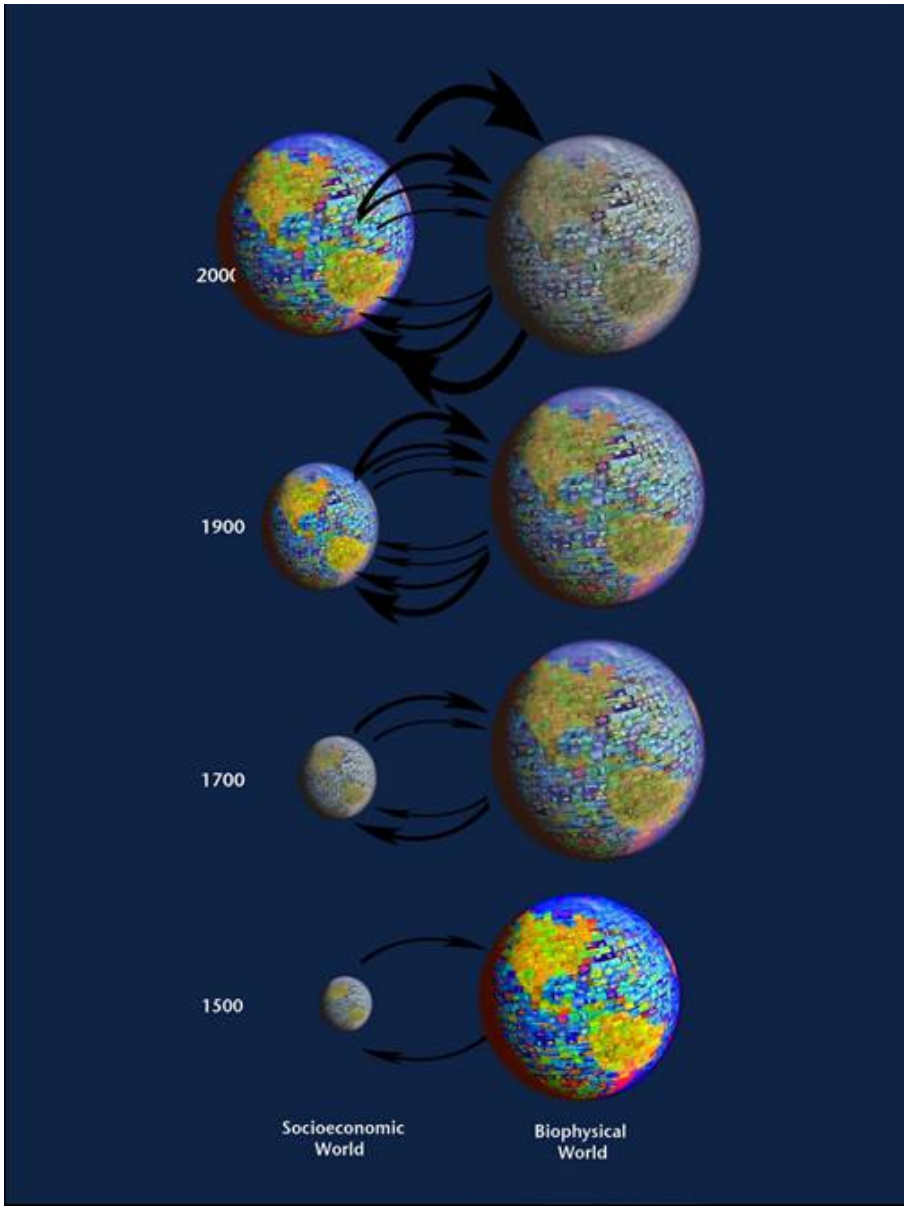
The major changes in the relationship between the social and ecological spheres can be conceptualized in terms of the growing number of linkages and deepening of these articulations between them. That is, as the social sphere has grown it has only done so with increasing impact on and management of the biophysical sphere. The expansion in the number of linkages includes the increasing number of different types of ecosystem services appropriated by humans. Much of this is reflected in our need to increasingly manage ecosystem services. For example, with the expansion of agriculture, reliance on pollinators to help spread genetic material between plants has increased. With increasing impacts on ecosystem and loss of biodiversity, some pollinator activities are increasingly managed. There is now a several million US$ United States-Australia trade relationship in honeybees, for example. This trade, however, has come with a significant cost to the pollinators, as it has been linked to the sudden disappearance of honeybees in the United States of America through a phenomenon called colony collapse disorder. The origin of the disorder is a suspected pathogen found in Australian bees, but not affecting them. The introduction of the pathogen to United States bees has infiltrated approximately 23 per cent of United States beekeeping operations, which have lost up to 90 per cent of their hives (Skokstad, 2007).

Moreover, as the linkages between the social and ecological sphere have increased, the intensity of service provision has also grown. Recent estimates suggest that humans are now appropriating a significantly large share (between 20 and 40 per cent) of global net primary production (Vitousek, et al., 1997; Imhoff, et al., 2004).

Figure 1 is a representation of these shifting conditions. It portrays two linked spheres where the linkages have grown in number and intensity over time. With these linkages, the social sphere has grown in size (from 1900 to 2000, GDP increased from less than US$2 trillion to over $36 trillion in purchasing power parity –PPP-) and population size has increased from 1.2 to over 6 billion),[1] while the biophysical sphere demonstrates increasing significant changes in fundamental characteristics (for example, climate and weather variations, biodiversity loss, land degradation, etc).

From a human development perspective, given these changes over time, we expect to see differences in the context framing growth at different stages in the evolution of local, regional and planetary socio-ecological systems. For example, growth that occurred during the eighteenth and early

Figure 1. Changes in the global socio-ecological system



nineteenth century was experienced under significantly different ecological conditions than growth today. As such, these changing conditions have placed a shifting number and type of constraints upon economies and cities as they grow. That is, the relationship of New York City to its hinterland and environmental resource base during the turn of the twentieth century is fundamentally different from that of Shanghai to its hinterland and resource base at the turn of the twenty-first century.

C. Globalization and World City Formation

An important start to understanding the development of urban socio-ecological systems is to focus on a selected number of major influences. Arguably, one of the most important factors in urban socio-ecological system development has been the influence globalization (Young, et al., 2006).

Globalization is the "…the *widening*, *deepening* and *speeding up* of worldwide interconnectedness in all aspects of contemporary social life, from the cultural to the criminal, the financial to the spiritual" (Held, et al., 1999). It is a defining feature of our time and the basis for growth and urban development. While globalization and cross-border transactions have occurred for centuries, the current era is arguably different in terms of the quality and quantity of these interactions (Held, et al., 1999)

Globalization has had a significant impact on urban development processes in the Asia Pacific (Lo and Marcotullio, 2000). The Asia-Pacific region[2] includes several large and growing economies of differing per capita incomes that have experienced rapid and sustained globalization driven growth over the past few decades. This trend continues today, although there is increasing variation among nations.

An examination of globalization has often meant a focus on economic variables (trade, foreign direct investment (FDI), and finances, movements of people and information, etc), both because these indicators were easiest to collect and analysts have privileged economic flows in defining global processes. Hence, the indicators for each of the three general trends associated with globalization (widening, deepening and speeding up) are largely defined in economic terms. Evidence for globalization within the Asia-Pacific region is typically provided in terms of increasing trade, FDI, movements of people, information, etc. For example, despite the 1997-1998 financial crisis, FDI inflows into developing Asia reached a record level of US$143 billion in 2000 (UNCTAD, 2001), Asia's share of world trade recovered (for exports) to it previous peak level of 27 per cent (with the noted recovery of the five Asian countries most affected by the turbulences)[3] and GDP growth for developing Asia reached 6.8 per cent, although growth varied from 8.0 per cent for China to 4.0 per cent for the Philippines (International Monetary Fund, 2001).

Globalization flows are expected to further influence growth in the region over the medium term (World Bank, 2007). The predicted economic growth from 2006 to 2010 for the Association of Southeast Asian Nations (ASEAN) is 5.6 to 6.5 per cent annually, higher than that for the world (3.1–3.5 per cent), United States (2.5–3.5 per cent) and Japan (1.2–2.8 per cent). China's forecasted annual growth (6.6–8.6 per cent) is more than double the world average during the same period (The Economist Intelligence Unit, 2006). Growth predictions to 2030 suggest that the global economy will more than double from the 2005 level (slightly faster than from 1980 to 2005) and economic increases will be generated increasingly by developing countries. As a result, much of East Asia is expected to move up in world rankings of total volume of economic output (World Bank, 2007).

Part of the widening of international interactions at the urban level includes the articulation of more cities to the global city system. The global or transnational urban system consists of cities in different countries that are linked through the internationalization of economic transactions, particularly in services and finance, but also through other aspects of trade, investment and movements of people and information and culture (Sassen 1994; Lo and Yeung, 1996; Lo and Yeung, 1998; Gugler, 2004).

Studies of cities within the world city system suggest that major metropolitan centres specialize in particular activities. Much work has focused on the emergence of urban economies around advanced business services, headquarter functions, finance, accounting, legal services and the like (Sassen 1991). Recent studies suggest that the map of global cities with significant numbers of firms in these areas and linkages amongst each other, includes up to 122 cities, with 55 characterized as "world cities" (Beaverstock, et al., 1999; Beaverstock, et al., 2000). Of the 55 world cities, 12 are located in the Asia Pacific region.[4]

Within the Asia-Pacific region, researchers have posited a regional, but globally connected, functional city system, described as, "[a] network of cities that are linked, often in a hierarchical manner, based on a given economic or socio-political function, at the global or regional level" (Lo and Yeung,

1996, p. 2). This network is composed of a large number of smaller networks within the region and reaches from Tokyo and Northeast China, via the two Koreas, to Malaysia, Indonesia and the Philippines. The urban corridor in the Asia-Pacific region is not simply a set of mega-cities exclusively providing economic goods and services, markets and governmental services for individual nations, but rather cities linked to the system are providing these to people throughout the entire region (Douglass, 1998).

Recent global city scholars have not only looked beyond the developed world, but also at more than economic linkages in the analysis of the global urban hierarchy. These scholars have identified the importance of political and cultural linkages within the regional and world system (Gugler, 2004). Certainly, the widening process associated with globalization includes more than economic flows.

Deepening processes have helped to activate within urban areas articulated to the world city system a set of processes associated with "world city formation," (Friedmann and Wolff, 1982; Friedmann, 1986; Friedmann, 1995) part of which is the active accumulation of the world's capita in major metropolitan areas. The accumulation of large amount of capital helps to transform the physical form of cities. The restructuring of world cities through the world city formation process includes the development of similar international linkage infrastructure within cities articulated to the system, on the other hand, it also suggests that the exact type and intensity of infrastructure development within an urban area is based on the role of the city within the global or regional hierarchy (Lo and Marcotullio, 2001).

Within the Asia-Pacific region, scholars have identified the emergence of various forms of world city formation infrastructure (Lo and Yeung, 1996; Dick and Rimmer, 1998; Douglass, 1998; Lo and Marcotullio, 2000; Lo and Marcotullio, 2001). These include large transportation nodes and inter-urban high-speed train lines (with associated bridges and tunnels), communications infrastructure (teleports) and industrial parks, urban mega-projects with "prestige buildings" usually as part of inner-city development and research and development complexes just outside the city.

Significant transportation-related projects include large airports, such as the recently opened Chek Lap Kok in Hong Kong, Kansai airport in Osaka, the Seoul Inchon International Airport and Dong Maung in Bangkok, high speed trains, such as the Japanese Shinkansen, new light rail systems in Bangkok, Kuala Lumpur and Tokyo and impressive cargo ports, such as those the Yokohama-Tokyo combined port, the port of Hong Kong, the port of Singapore and Kaohsiung.

At the same time, cities also differ spatially according to functional attributes. For example, within the Asia-Pacific region, there are cities that house the command and control functions including Tokyo, Osaka, Seoul and Taipei, which concentrate commercial activity and specifically cater to the needs of transnational corporations. The sites of industrial development – Bangkok, Jakarta and Shanghai, for example – are developing urban forms dedicated increasingly to manufacturing and hence are better known for their ring of production sites, facilitated by FDI, in their peri-urban areas.

Other cities, such as Hong Kong and Singapore, have developed regional reach and have extended their metropolitan regions across international boundaries. These are important financial and entrepot centres in the regional city system that act as hubs and have extended their most intense linkages to areas directly outside their city boundaries. Thus, the emergence of the functional city system suggests that cities have not developed uniformly and, given the trend in urban competition, they will not do so in the future.

The additional emphasis on socio-ecological development focuses attention on new indicators of widening and deepening. Under globalization, the expansion of the global urban network facilitates the connections between cities trading a larger number and wide variety of ecosystem services. Deepening includes the increasing reliance on larger amounts of these services as consumption increases.

Previous studies on the impact of trade and investment on the environment have largely focused on the direct impacts such as how the externalities brought about by trade increases environmental impacts, such as emission (North American Commission for Environmental Cooperation, 2001) or how trade includes unintended consequences such as increasing invasive species of the indirect effects associated with changes in economic scale, technological, composition and regulations (Grossman and Krueger, 1995; Gallagher and Werksman, 2002; North American Commission for Environmental Cooperation, 2003).

Rather than strictly focusing on these trade processes and these direct and indirect impacts, a new set of studies has examined the role of trade in goods and services and their relationship to ecosystem services. Arguably, these studies have been influenced by urban ecological footprint and material flows analysis. This technique identifies the total amount of resources a city or nation consumes and the wastes a city emits. What is useful about the technique is that it includes all resources consumed, both those internal to the economy as well as those from "distant elsewheres" and it turns these figures into a single indicator (the number of hectares per capita) (Rees, 1992; Wackernagel and Rees, 1996; Wackernagel, et al., 2002; Wackernagel, et al., 2006). Recent applications of the ecological footprints in United States and United Kingdom cities and communities suggest that citizens need between three and 42 times more biocapacity within their cities to produce necessary ecosystem services (Best Foot Forward, 2002a; Best Foot Forward, 2002b; Redefining Progress, 2004; Redefining Progress, 2005). Those that have examined the footprint of Hong Kong suggest that the area needed to produce the ecosystem services and absorb waste is more than 2,000 times the size of the city. Moreover, these researchers have found that approximately 30 per cent of resources (excluding energy) are appropriated from China (mainly Guangdong) and 60 per cent from other parts of the world (Warren-Rhodes and Koenig, 2001).

Ecological footprint analysis is built on studies of bulk and specific material flows.[5] For example, studies of globally-traded flows in ecosystem services include agricultural livestock products and implicitly impact cycles of water, nutrients and land. Quantifying the movement of these resources demonstrates the tremendous impact that humans, and particularly those living in cities, have on their environment. A recent study of the major exporters and importers of pork and chicken suggest that Japan's imports of these commodities embodies the equivalent of 50 per cent of its arable land and half of the nitrogen used to produce it is lost in the United States of America. China's imports account for 15 per cent of the their nitrogen is left in Brazil (Galloway, et al., 2007). These flows of nitrogen are not included in the findings of a 380 per cent increase in reactive nitrogen in Asia over the last 40 years (Zheng, et al., 2002).

A recent study of nutrient flows in Bangkok from food consumption, fertilizer use and atmospheric deposition suggests that only a small percentage of total nutrients are sourced from within the city (Faerge, et al., 2001). Furthermore, only a small fraction of nutrients flowing into the city are recovered (approximately seven percent of nitrogen) and of the nitrogen lost, 97 per cent ends up in the local Chao Phraya River. Schulz (2007) has demonstrated historical changes in the material consumption of Singapore, as the city globalised and hence increasing by imported materials in larger quantities. Another further study demonstrates that as Japan's production of seafood declined, starting in the 1990s, imports picked up to maintain consumption levels. At the same time, the composition of fish eaten in the city changed as consumers began eating down the food web (Gadda and Marcotullio, 2006). These research projects, however, are not often included in the global cities literature, but importantly demonstrate the impact of linkages between trade, cities and natural resources.

In addition to studies of consumption and material flows, a new analysis of the flows of disease demonstrates that globalization has increased the volume and speed of cross-border transmission of diseases. While the international transmission of disease is not new, air travel and international contacts

have accelerated its potential speed. For example, approximately five months after the February 2003 initial reports from East Asia on the appearance of an atypical, highly contagious and life-threatening respiratory disease, later called SARS, more than 8,000 cases had been reported in close to 30 countries (World Bank, 2007). A recent study of the spread of the disease amongst world cities with a focus on Toronto, demonstrates how globalization has increased the trajectory of disease as it jumped from one city to the next (Ali and Keil, 2006).

These findings indicate the increasing transnational linkages between cities, not only in economic, social and political terms, but also in terms of biophysical flows. They mark the changing socio-ecological relationship at the urban level. They also implicate cities in the changing context of global SESs. As a result of these flows, and particularly over the past 50 years, the social sphere has grown at the expense of the biophysical sphere, which is becoming cumulatively and systemically more unstable (vulnerable to abrupt significant change), less productive of services (more degraded) and less diverse in biological content (genetic, species, etc.) (Millennium Ecosystem Assessment, 2005; Bernstein, et al., 2007; UNEP, 2007).

D. URBAN ENVIRONMENTAL TRANSITIONS

Whether these changes in global impacts have had similar impacts on cities throughout the world, however, is another question. In order to understand how globalization and the impacts on flows of resources are changing environmental conditions within cities, however, we need to turn to another notion; urban environmental transitions.

Urban environmental transition theory had been developed over the past decade (McGranahan, et al., 2001). Urban environmental transition theory states that urban environmental burdens tend to shift in poor cities from local, health-threatening challenges that have an immediate impact, to global ecosystem threatening, with delayed impact in affluent cities. Importantly, the model is based upon the notion that the scale of the environmental impact increases with wealth. Accordingly, as a poor city moves beyond the "brown" agenda, for example, environmental impacts of cities increase in scale from the household and neighbourhood levels to citywide regions. For those cities, struggling with the "green" agenda, the dominant environmental impacts of urban-based activities are regional if not global (for example, greenhouse gas and ozone depleting substance emissions). The brown agenda prioritizes concerns such as inadequate water and sanitation, indoor air quality, drainage and solid waste disposal. The green agenda, on the other hand, focuses on ecological sustainability and addressing issues related to resource degradation, contributions to global environmental burdens and other extra-urban problems. The theory is a powerful tool for developing an understanding of shifting environmental conditions within cities.

Historical urban research that associates urban growth and environmental impacts suggests that in the past, urban environmental burdens were addressed by simply dispersing the associated harms to greater scales. Urban environmental historians in the United States have also noticed the change in environmental burdens over time. Melosi (2000) identifies how environmental challenges associated with water supply, sanitation and solid waste management have undergone a series of changes over time and have increasingly spread to wider geographical spaces. Tarr (1996) suggests that urban environmental history can be fundamentally characterized as the search for larger and larger sinks in which we have sent wastes. Both these historians have identified changes in type and geographic and temporal aspects of environmental burdens that are comparable to urban environmental transition theory.

Urban environmental transition theory has been applied to different contexts, including economies in rapidly developing Asia (Webster, 1995; Bai and Imura, 2000; Bai, 2003). These applications have either simply described differences between cities of different income levels or included changes in the speed of transitions. Bai and Imura (2000) for example, insist that environmental

transitions can be observed within Asia cities and that they have occurred in sequence, from traditional to industrial, to modern environmental challenges, albeit in a faster manner than previously experienced.

Like the early studies of global cities, however, studies of environmental burdens suffer from the lack of data at the urban level as researchers often used national level indicators and applied them to cities (Short, et al., 1996). More importantly, however, these authors have missed the impact of globalization on urban socio-ecological system development in terms of the indirect effects related to shifts in time-space effects. That is, globalization processes in shifting the speed, timing and occurrence of environmental conditions under unique conditions of SES development has fundamentally changed the urban environmental transition patterns of the past.

E. Environmental Transitions in the Asia-Pacific Urban Socio-ecological Systems Undergoing World City Formation Processes

In order to focus on how globalization affects the development of urban socio-ecological systems, the paper uses the urban environmental transition framework, but focuses on indirect effects of globalization typically ignored in the economic and environmental literatures. These include time- and space-related effects. Importantly, globalization is altering the way human activities (and the perceptions of those activities) unfold across time and space (called time- and space related effects). Over the past 100 years and more recently, over the past 30-40 years, the impacts of time- and space-related effects have increased. Time-related effects are changes in development patterns as a result of changing speed and efficiency of human socio-economic activities. Time-related effects draw places closer together and create urban dynamics across the globe, forcing convergence among urban areas. Space-related effects concentrate increasingly diverse phenomena unevenly in spatial nodes (i.e., within and among cities) and create urban dynamics across the globe forcing divergence among urban areas.

There is a significant history of studies of time-space effects in the geography and sociology literatures. Within these areas there are three interlinked ways of thinking about how these effects relate to human activity including: *time-space convergence*, *time-space distanciation* and *time-space compression*. *Time-space convergence* refers to the decrease in the friction of distance between places (Janelle, 1968; Janelle, 1969). It refers to the apparent convergence of settlements linked by transport technology. As transport evolved, travel time would be reduced between them, giving the sensation that they had moved closer together. The velocity at which settlements are moving together may be called the time-space convergence rate.

Time-space distanciation refers to the stretching of social systems across space and time (Giddens, 1990). The argument is that people interact in two ways: face to face and remotely through transport and communications technologies. The second modality has become increasingly important with globalisation, "distanciating" social relationships. Thus, during the contemporary period, it is not necessary for people to be physically present at a particular location to be important social factors. Importantly, *time-space distanciation*, does not necessarily lead to homogenization, as it can increase the potential for humans to restructure global scale systems to fit local needs.

Time-space compression refers to "the annihilation of space through time" that lies at the core of the capitalist dynamic (Harvey, 1990). While the concepts of *time-space convergence* and *time-space distanciation* does not offer an explanation for why social relations and development patterns have been stretched across space and subsequently dramatically changed the development context, *time-space compression* does. The argument is that this is one of the central processes of capitalist development. As "time is money," the tendency for relations under this mode of production is to find ways to speed up the "circuits of capital" so as to reduce the "turnover time of capital" (i.e., the amount of time it takes to convert investment into a profit). As a result, technologies and policies to facilitate these processes

facilitate *time-space compression*. The effect of time-space compression is disorienting and disruptive on the balance of class power and upon social and cultural life. This concept encompasses the descriptive accounts of *time-space convergence* and *distanciation*, making them a result of *time-space compression*. Ultimately, the argument places an economic rationale at the core of change, and not surprisingly, this has been criticized by some cultural scholars.

To these three concepts of time and space, I add a fourth, *time-space telescoping*. *Time-space telescoping* is also a descriptive narrative similar to *time-space convergence* and *time-space distanciation*. It is evident in the shifting patterns associated with development, such as environmental transitions. *Time-space telescoping* is reflected in contemporary conditions and transitions in developing countries and cities, in the *sooner* (at lower levels of income) occurrence, *faster* (over time) rates of change and the *simultaneous* (as sets of challenges) emergence of environmental challenges, as compared to the experiences of the developed world (Smith and Lee, 1993; Popkin, 2002; Marcotullio, 2005).

The notion of *time-space telescoping* stresses that the result of these changes in drivers, for example the process of globalization, is more than the speeding of development. China, for example, is not simply undergoing a quicker version of what the United Kingdom or the United States had experienced during the late nineteenth and early twentieth centuries. Rather, while speed is important, the addition of conditions and challenges appearing at lower levels of income and the layering of previous sequential development patterns makes the current context much more complex and bewildering.

F. Impacts of Globalization and Time-space Telescoping on Urban SES Change in the Asia Pacific Region: Comparative Analysis

One way to observe the time-space telescoping of development patterns is to compare the histories of countries and cities across time and space. As mentioned previously, this is not an easy task as the data requirements are large and specific. Comparable urban-level data are typically not available. This is not to suggest, however, that evidence for these patterns cannot be found. This section presents some empirical explorations of the development patterns and environmental conditions within cities and economies of the Asia-Pacific region in comparison to those of the now developed world (economies that passed their middle-income status prior to 1950).

The data for the various analyses are from a variety of different sources. The focus is on cities and the various aspects of the urbanization processes, but the data are sometimes aggregated at the national level. Whenever possible, the analysis focuses on urbanization, and in some cases, uses data at the urban level from secondary sources. Rather than being comprehensive, the survey of analyses is meant to be indicative. Explanations and descriptions for the data and methods are space-consuming and therefore not included in this paper. Those looking for the specifics can find details in previously published articles (Marcotullio and Lee, 2003; Marcotullio, et al., 2005; Marcotullio, 2007; Marcotullio and Schulz, 2007).

The comparisons are performed across similar levels of GDP per capita. Within the figures, GDP at purchasing power parity (PPP) is typically used on the x-axis (although sometimes it is replaced by the national per cent of urban population). Using GDP per capita on the x-axis, however, does not imply that income can replace "development." Rather, using similar ranges of GDP to compare nations and cities demonstrates the complexity of development issues. Certainly, the main argument presented is that not all aspects of societies (in this case environmental burdens) change during economic growth in similar manners. Development patterns are what we are aiming to define, so one can think about this as the dependent variable.

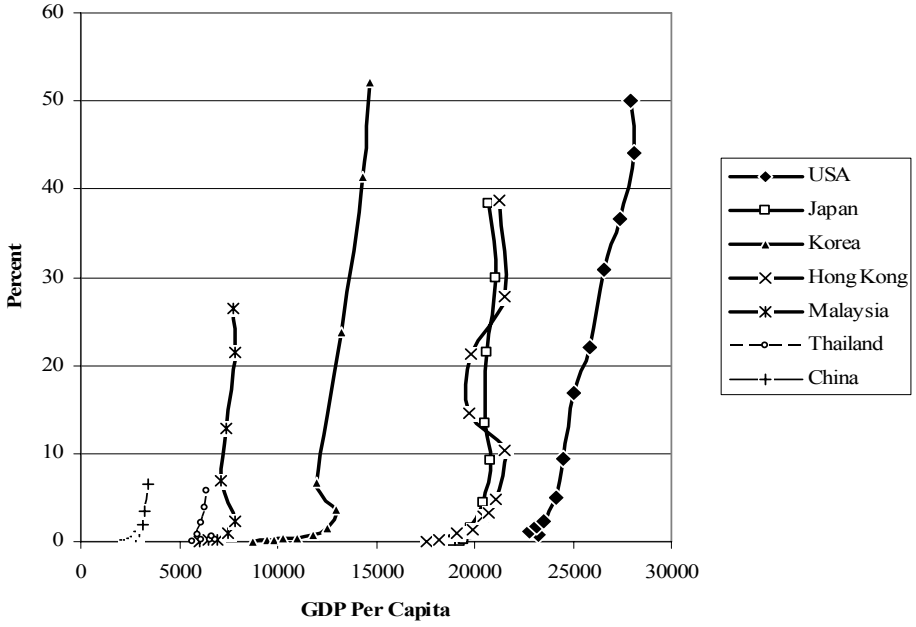
The section is organized by the particular pattern of interest. The first sub-section focuses on the widening aspect of globalization and the accompanying sooner emergence of environmental challenges. The second sub-section presents an analysis of deepening of globalization and the various intensities of environmental impacts. The third section focuses on the speeding up and the faster shifts in urban environmental conditions. The fourth section presents evidence for the shifts in timing and the more simultaneous occurrence of sets of environmental burdens.

1. Comparative widening and the sooner emergence of some environmental conditions

This sub-section presents a set of different analyses to demonstrate the early emergence of some environmental conditions within rapidly developing countries. Early, in this case, means earlier in economic growth or in the urbanization process. Four representative phenomena are presented, including the earlier uptake of high technology, the earlier consumption of some transportation technologies (and hence their emissions), the earlier occurrence of shifts in energy supplies, and the earlier occurrence of urbanization in general.

Figure 2 presents an analysis of the uptake of Internet access within some developing countries of the Asia-Pacific region compared to that of Japan and the United States. At the far right of the graph, the United States curve demonstrates immediate and strong uptake of the technology once the country reaches a level of income past $22,000/capita. Interestingly, the other Asia-Pacific economies copy this pattern, but mirror it at lower levels of income. Specifically, Japan and Hong Kong experienced increases in Internet penetration after $20,000 per capita and Korea's increase occurred after $12,000 per capita. Malaysia, Thailand and China are following the same patterns, but starting at GDP per capita levels of below $8,000 per capita.

Figure 2. Growth in ICT (Internet) penetration in selected countries

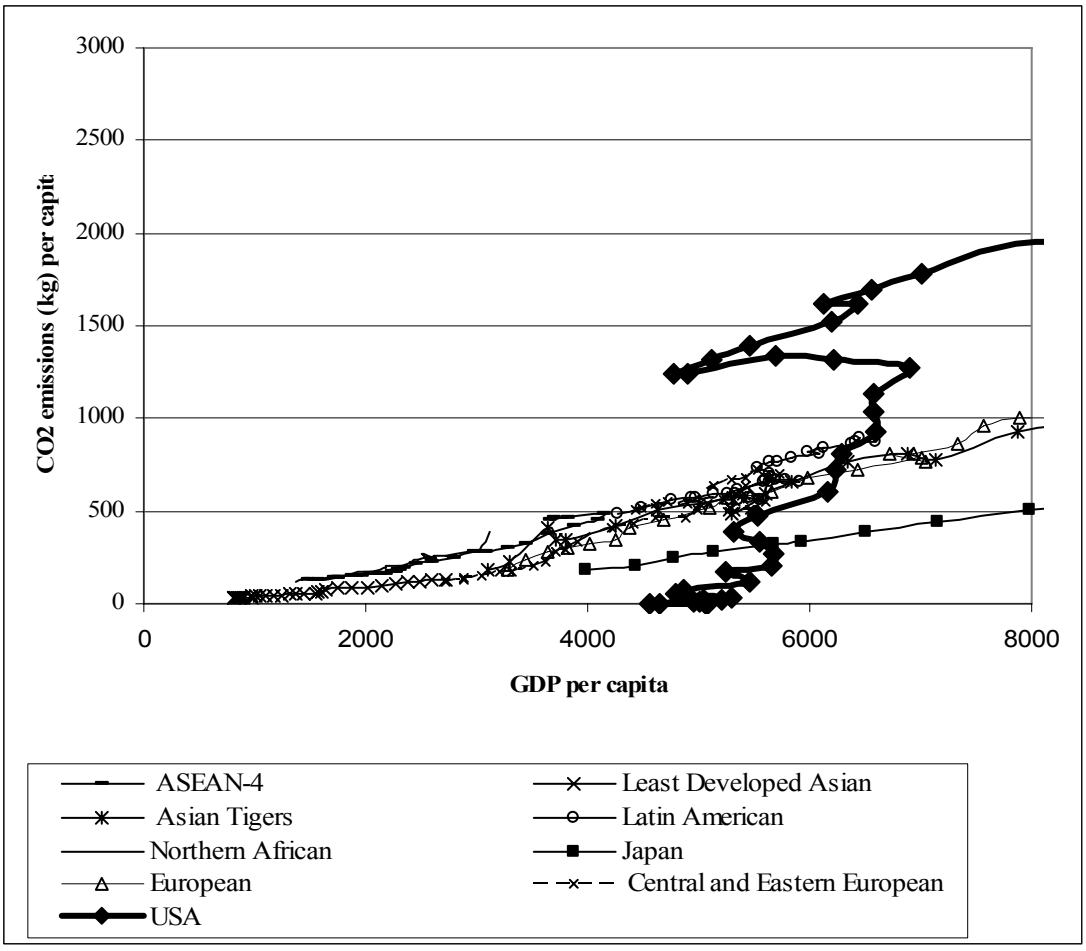


Source: Author's calculations

Figure 3 presents an analysis of transportation-related carbon dioxide (CO_2) emissions by GDP per capita. These data were calculated directly from motor vehicle, truck and airplane fuel consumption

and represent differential uses of the technology. The automobile was developed at the turn of the century and was mass-produced starting around 1908 in the United States. Subsequently, adoption of this technology skyrocketed along with the consumption of petrol and subsequent emission of carbon dioxide from the combustion of the fuel. Trucks and diesel fuels were important starting in the mid-1920s. While airplanes were invented earlier, the commercialization was not apparent before the mid-1930s and really took off after World War II.

Figure 3. Total transportation CO_2 emissions (kg) per capita by GDP per capita in selected countries



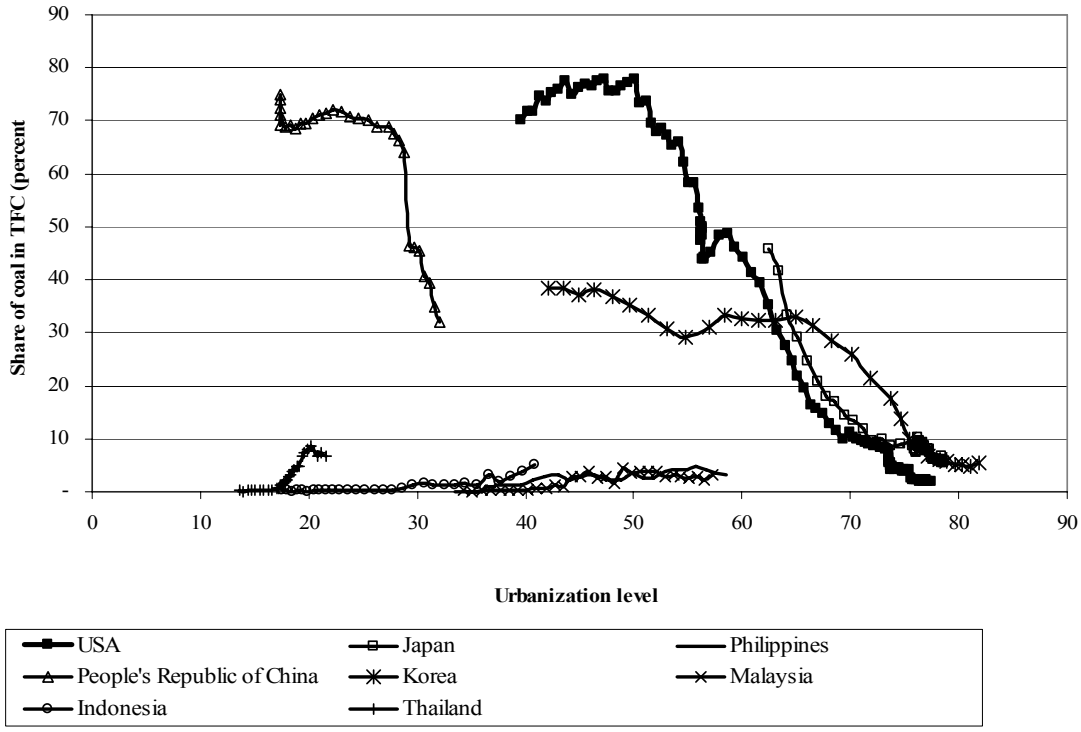
Source: Marcotullio, et al. (2005)

What is obvious about the presented patterns is that the technologies that created the emissions are increasingly adopted at lower levels of income. For example, the "least developed Asia" category includes India, China and Vietnam and in aggregate these economies have been experiencing transportation carbon dioxide emissions at levels under $1,000 per capita.

Figure 4 presents shifts in energy supply at different levels of urbanization. The United States curve demonstrates that during the development process and late into the urbanization process coal remained the major fuel source. Coal accounted for approximately 80 per cent of the nation's fuel consumption at a time when 50 per cent of the population lived in cities. Historical accounts of air conditions within these cities attest to this trend, as accounts suggest that smoke was creating an environmental disaster (Stradling 1999). This pattern was matched closely by East Asian economies such

as Japan and Korea, but subsequently altered dramatically. Even China, a coal rich nation, has shifted from coal to other sources much earlier in during the urbanization process. Despite description of China's cities as laden with coal smoke (see, for example, Freese 2003) the data presented suggest that the country is switching to other fuels before the United States of America did during its city building program.

Figure 4. Share of coal in total final consumption by level of urbanization in selected countries

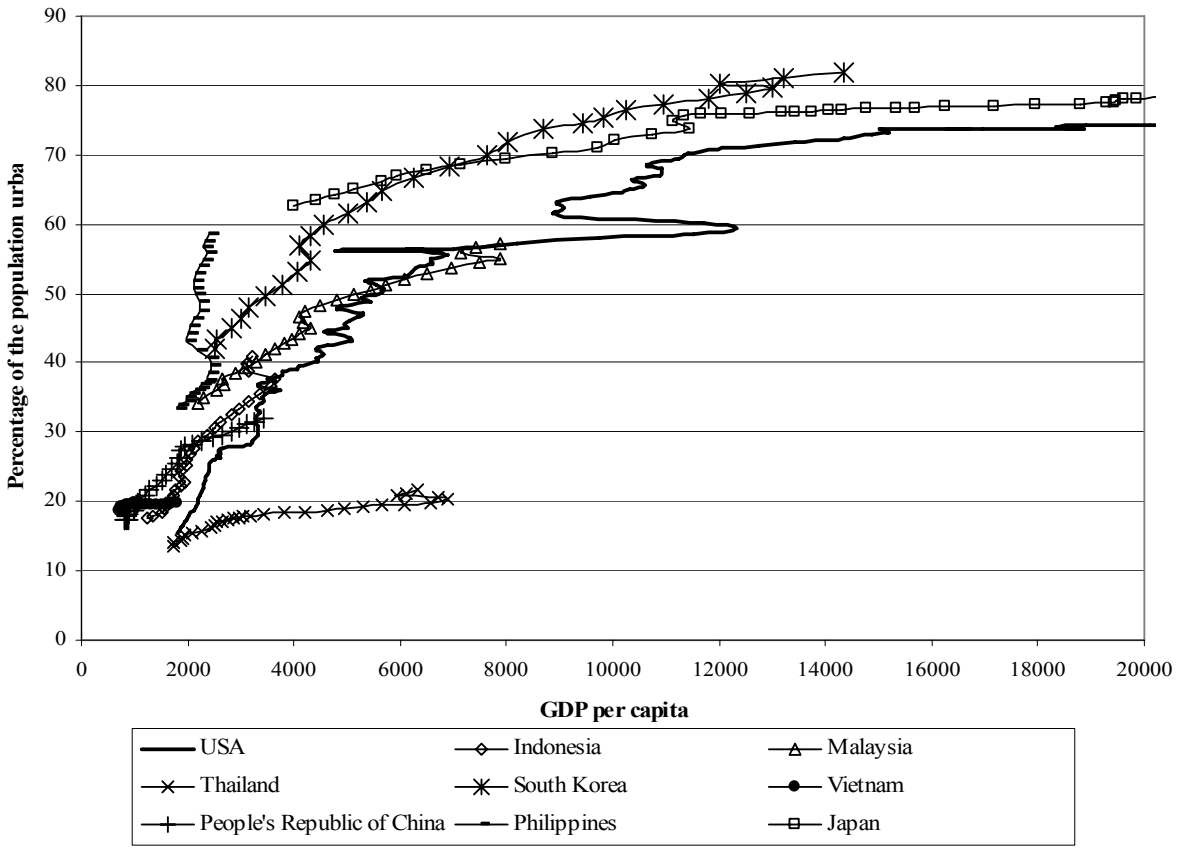


Source: Author's calculations

Finally, Figure 5 compares the levels of urbanization of the United States of America, Japan and several Asia-Pacific economies. Of note are the higher urbanization levels at lower levels of income. While this analysis is incomplete and needs the inclusion of other developed country experiences, within the sample, it suggests that urbanization is occurring lower down on the income ladder. What is also interesting is that this is not the case for all Asia Pacific economies and may not hold with rising income. For example, Thailand's patterns of urbanization are dramatically different from those of its neighbours and from those of the developed world, as Thailand has increased in wealth without urbanizing. On the other hand, Japan and Korea seem to have reached higher levels of urbanization at lower levels of GDP per capita than those of the United States. Finally, other economies, such as Malaysia, seem to have urbanized at lower levels of income, but seem to be converging with the patterns of the United States.

The emergence of technologies and their impacts at lower levels of income helps to partially explain how transnational interactions are widening and therefore shifting environmental transitions. Many of the high technologies are developed in North America, Europe and Japan and are increasingly finding their way around the world and into Southern cities. A longer discussion as to some of the details on why this is occurring and its implications are provided in later sections.

Figure 5. Urbanization levels by GDP per capita in selected countries



Source: Marcotullio and Schulz (2008)

2. Comparative deepening and the impact on ecosystem services

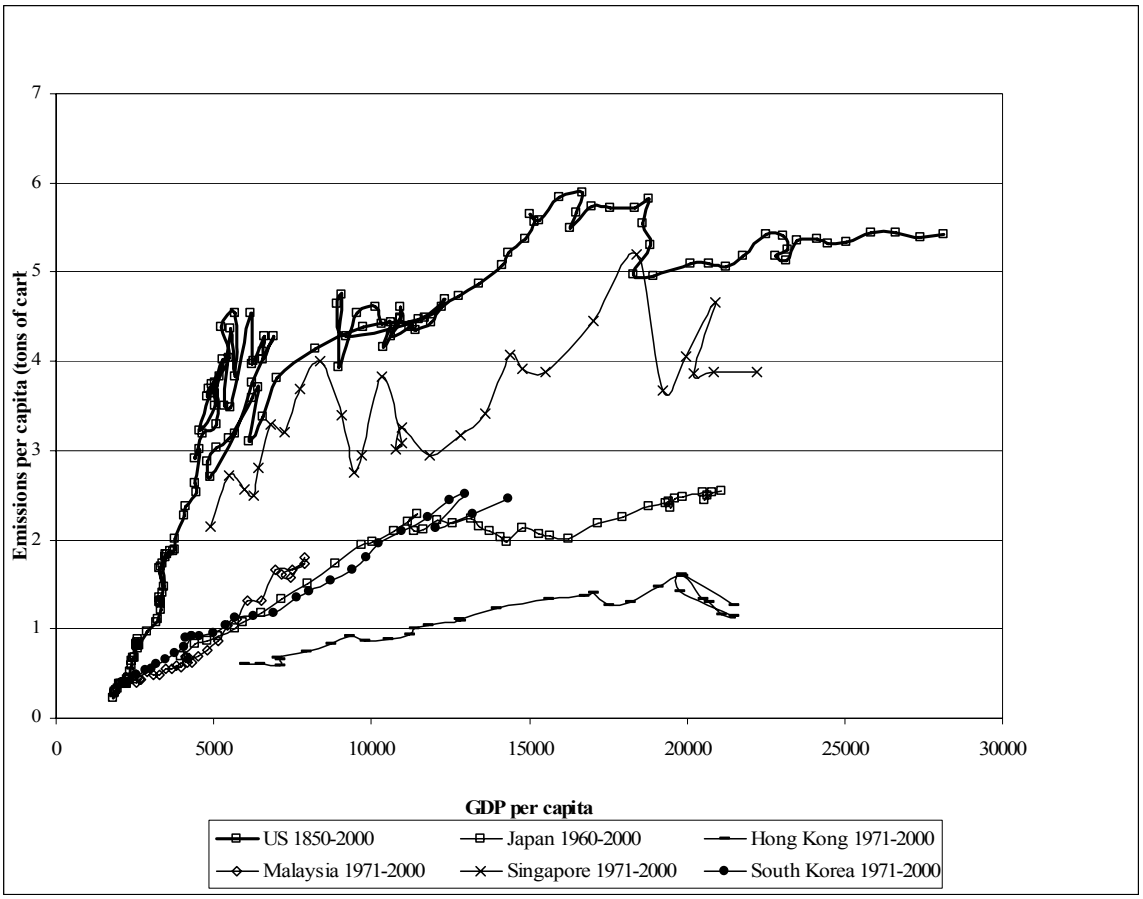
This section presents data and analysis that help to assess whether the impact of current trends in urban socio-ecological is greater than those of the developed world. The argument is based upon the reasoning that if the impacts are greater, it is due to a deepening of global flows. The more and the greater the quantity of flows the more embedded is the city or nation within the socio-ecological system.

The analysis in this case is inconclusive. In some cases, the impacts of environmental challenges are less than those experienced by the developed world, and in particular the United States of America. Although this is true for some nations, it also varies amongst cities and nations in the region. For other types of impacts, however, the articulation to the global system is greater and we see larger per capita impact.

We explore these differences in terms of energy and food consumption. We map the differences in total CO_2 emissions by income, and the differences in road transport CO_2 emissions by income between rapidly developing Asian economies and Japan and various developed economies. Finally, we compare the consumption of food in the form of kcal per capita per day. Patterns in this case are different and average daily material consumption in developing countries follows pattern higher than those of the United States of America, for many economies.

Figure 6 presents an analysis of total CO_2 emissions for activities within the economies of the United States of America, Japan and several Asia-Pacific economies. It demonstrates that, at any level of GDP per capita, emissions of carbon from developing countries in the region are lower than those of the United States of America. The only economy that competes with the United States of America in terms of high levels of emissions is Singapore. The higher levels of per capita CO_2 emissions in Singapore are probably due to the role of this economy as an oil-refining centre within the Southeast-Asian region (Schulz 2007).

Figure 6. Changes in carbon emissions per capita by GDP per capita in selected countries



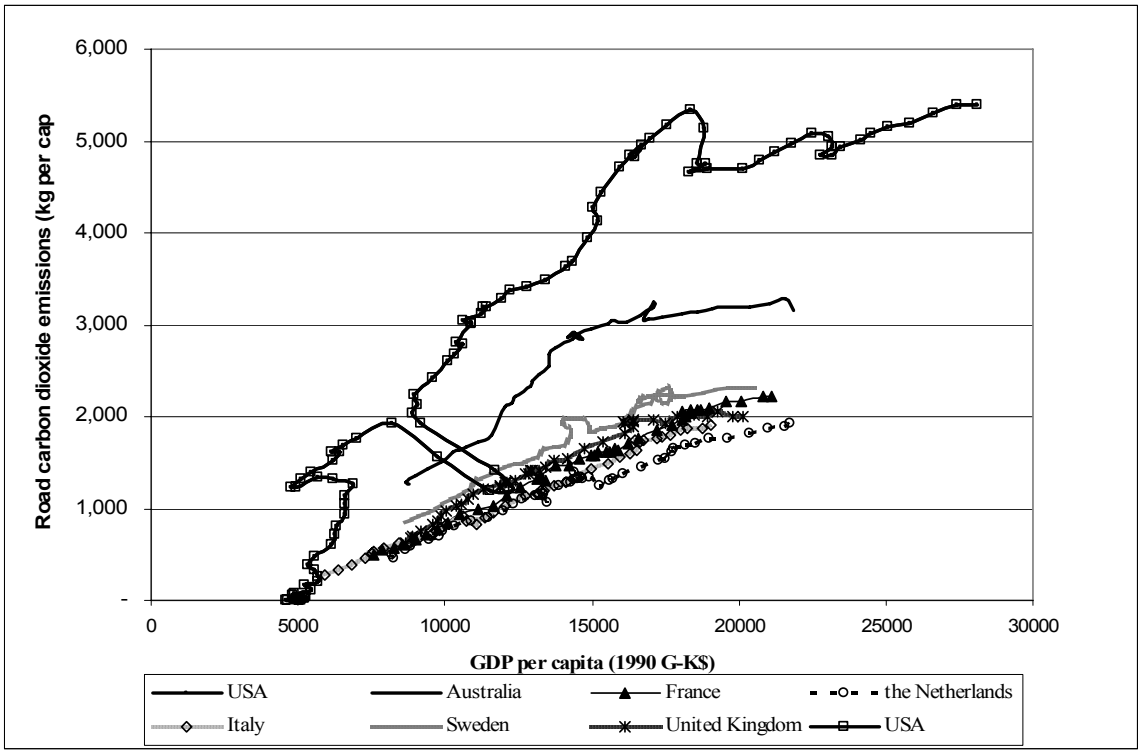
Source: Marcotullio and Schulz (2008)

When road CO_2 emission trends in Asia-Pacific economies are compared to trends in a larger sample of developed countries rather than only the United States of America, a few exceptions emerge (for instance, Malaysia and Thailand) wherein rapidly developing economies exhibit road-CO_2 emissions increases as high as or higher than those in Europe.

Figure 7 presents the trends in road CO_2 emissions in several developed economies (Sweden, United Kingdom, Australia, the Netherlands, France and Italy). From this, we created a simplified set of charts that draw out the differences between road CO_2 emissions trajectories in the Asia-Pacific region (Figure 8a). For visual clarity, the plots provide data at 10-year intervals. Interesting differences among nations emerge from these figures. To highlight differences in trends, we shaded the area between the European country with the lowest trend (the Netherlands) and that of Australia. When compared to various developed countries, three sets of trends amongst Asia-Pacific economies emerge, as seen in Figures 8b, 8c, and 8d. We argue that despite the small number of countries that makes up each group

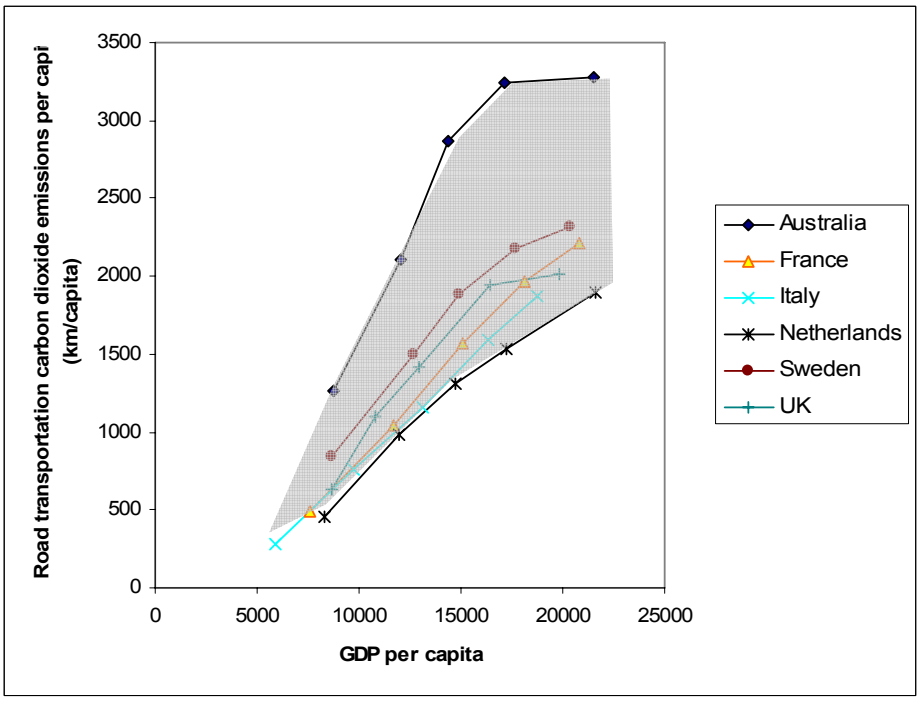
(two to three countries per group), the three trajectories represent possible futures for other countries in the region.

Figure 7. Road carbon dioxide emissions per capita by GDP per capita in selected countries



Source: Marcotullio and Marshall (2007).

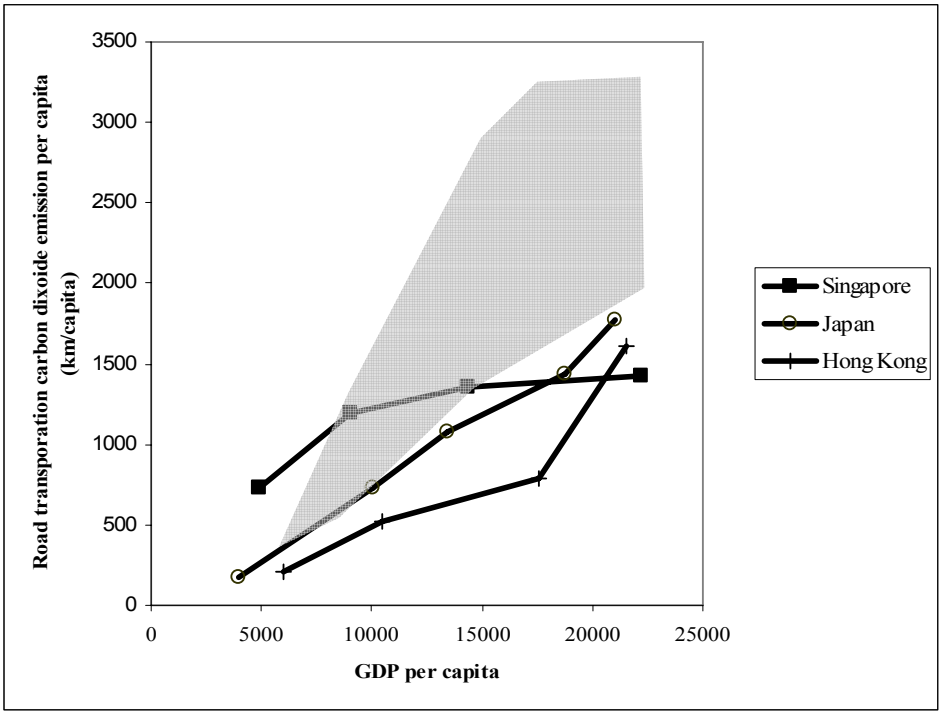
Figure 8.a. Road transportation carbon dioxide emissions per capita: Simplified comparison



Source: Marcotullio and Marshall (2007).

Some Asian Pacific nations (Hong Kong, Japan, Singapore) exhibit current emissions below those of the United States of America, Australia and Europe (Figure 8b, group A). In a few cases, at a specific historic income level, emission levels were slightly more for a Group A country that for the lowest-emission European country (those of Singapore, for example). However, such exceptions are few. In all cases, *current* emissions are lower for Group A countries than for European countries. The different slopes – less steep for the Group A countries than for the European countries – suggest that, in the near future, the emissions for Group A will remain below those for the European countries.

Figure 8.b. Road transportation carbon dioxide emissions per capita: Group A, low emitters



Source: Marcotullio and Marshall (2007).

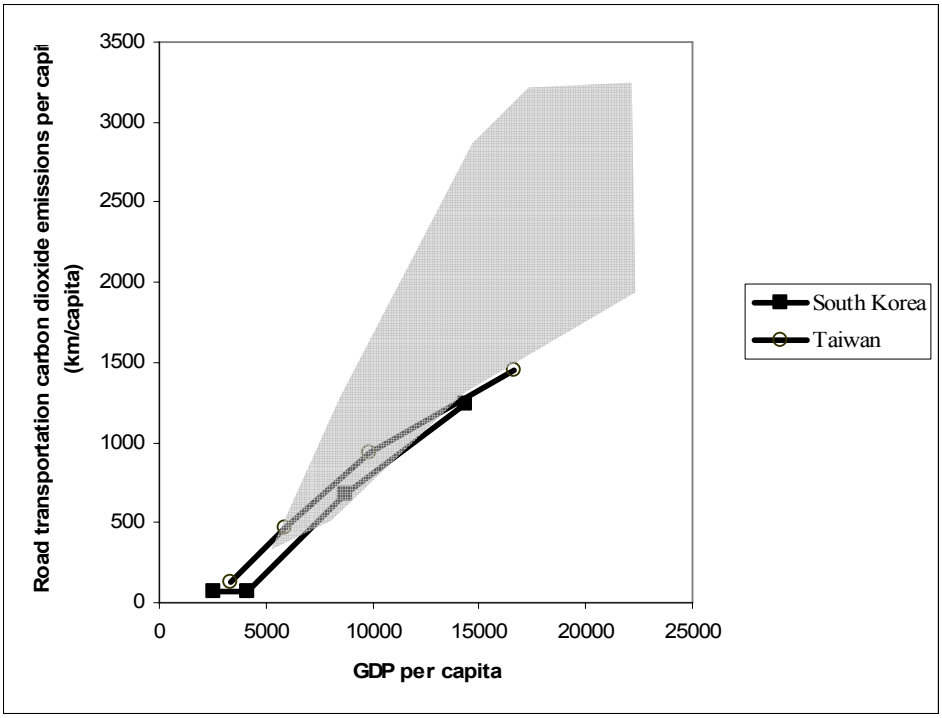
A second group of Asian Pacific countries (Korea and Taiwan) appear to be following the same trends as European economies (Figure 8c, group B). Emission trends for Group B are only slightly higher than for Group A – just enough to place this group inside the grey area.

Finally, some Asian Pacific countries have road-CO_2 emissions above the European economies (Figure 8d, group C)**.** For example, emission trends for Malaysia and Thailand suggest that future emissions (at comparable income levels) will continue to surpass the emission from Sweden and possibly match those of Australia.[6]

Finally, when we compare consumption of food calories, a different pattern emerges. Figure 9 demonstrates that, with increasing income, Americans consume a larger and larger number of calories daily. This is perhaps related to the current obesity crises within the country (Abelson and Kennedy, 2004). Interestingly, however, rapidly developing Asia Pacific economies demonstrate even sharper increases in food consumption, such that for some economies, per capita calorie consumption is even higher than that of the United States of America at comparable levels of income (exceptions include Japan and Thailand). Nutritionists have also noted the phenomenon of rapid increases in calories within some Asian nations. Popkin and Bisgrove (1988) summarize a large literature on the differences in dietary intake between urban and rural counterparts suggesting that as people move to cities diets tend to shift to superior grains (rice, or wheat rather than corn or millet), more milled and polished grains, food with

higher fat, more animal products, more sugar, more processed food and more food prepared away from home. This has been part of the nutrition transition and the differences tend to be more marked in lower income economies than in higher income economies (Popkin, 1999). Moreover, during contemporary times, unique dietary and nutritional patterns are emerging, suggesting that in some lower and middle income economies, the transition and resulting changes in activity and body mass are occurring at lower levels of income and more rapidly (Popkin 2002). This study demonstrated that in China, from 1989 to 1997, the proportion of underweight men and women dropped considerably and the prevalence of both overweight and obesity men more than doubled (from 6.4 per cent to 14.5 per cent) while that of women increased by 50 per cent (from 11.5 per cent to 16.2 per cent). These results for the current shifts in the nutrition transition are similar to those presented in this paper for environmental transitions in general.

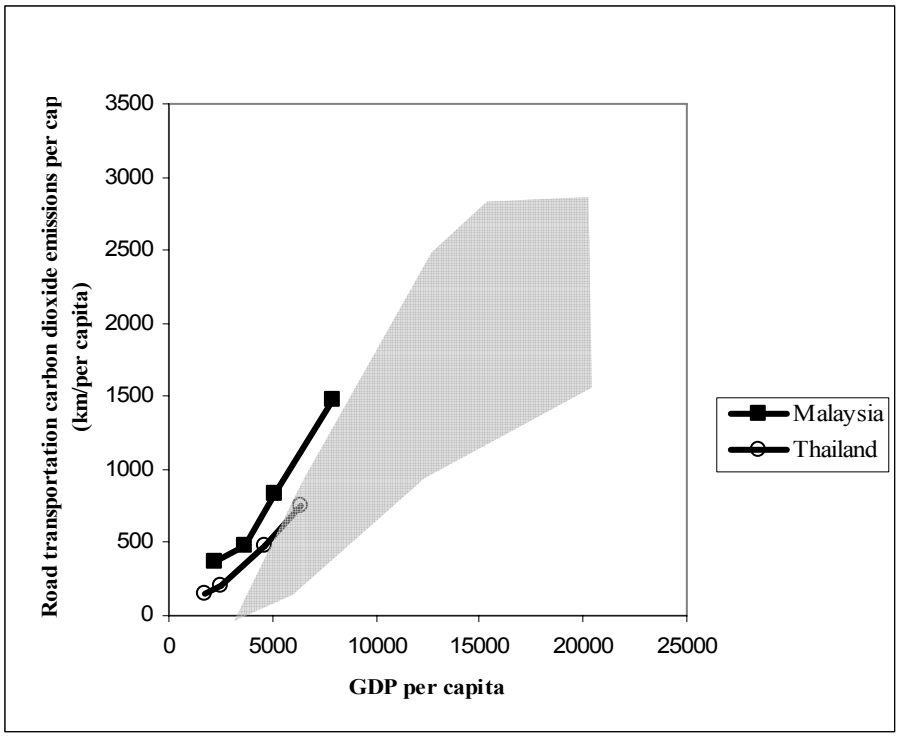
Figure 8.c. Road transportation carbon dioxide emissions per capita: Group B, medium emitters



Source: Marcotullio and Marshall (2007).

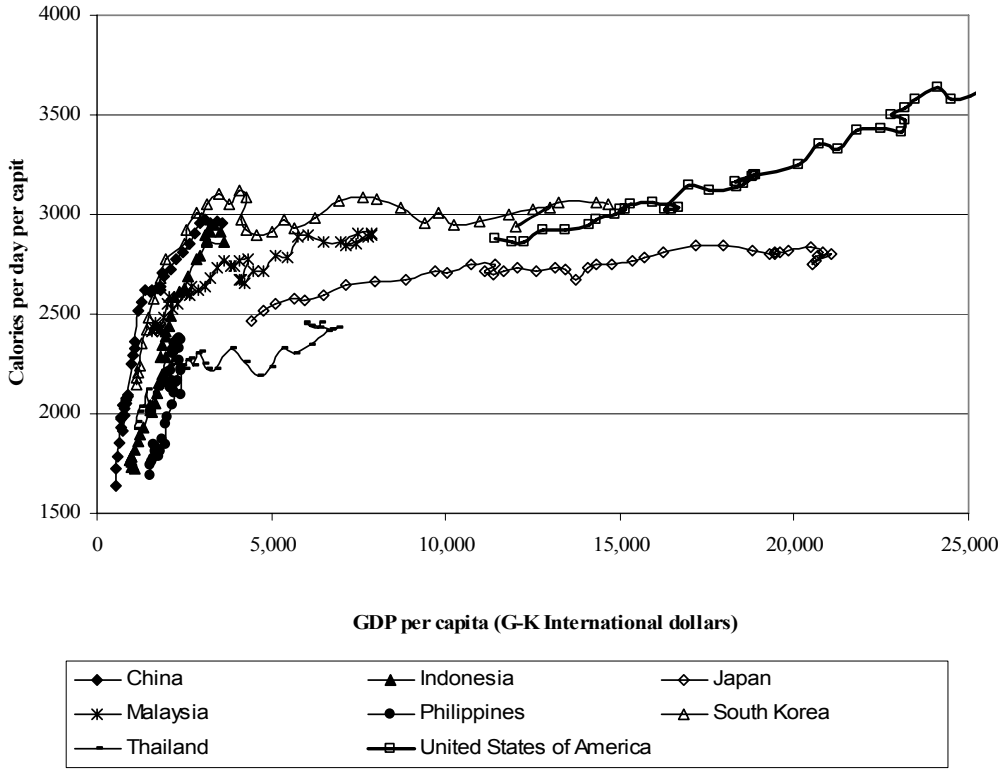
Despite the lower per capita impact, socio-ecological system deepening depends also on the total flows of ecosystem goods and services. In this case, we find that not only are the flows high, but that they are predicted to increase over the middle term. One important influence on the deepening of these interactions is the growth in income. The World Bank (2007, p. xvi) predicts that by 2030, "fully 1.2 billion people in developing countries, 15 per cent of the world population, will belong to the global middle class, up from 400 million today." Middle class families are those with an income of between $16,000 and $68,000 in PPP dollars. This enormous emerging middle class will have the purchasing power to buy automobiles, purchase many consumer durables and travel abroad. Indeed, by 2040, future automobile consumption in India and China alone will double the total number of vehicles currently on the road (i.e., add an addition of 800 million automobiles to global car usage) (Wilson, et al., 2004; The Economist, 2006).

Figure 8.d. Road transportation carbon dioxide emissions per capita: Group C, high emitters



Source: Marcotullio and Marshall (2007).

Figure 9. Caloric Intake by GDP per Capita



Source: Author's calculations

3. Comparative speeds

Part of the globalization process consists of the speeding up of cross-border linkages. Not only are transnational flows moving faster, however, the changes within societies are also occurring with greater speed. We present data on the comparative speed of urbanization and the changes in energy supply between the United States of America, Japan and selected economies in the Asia-Pacific.

Table 1 presents annual rates of change in urbanization levels between economies in the Asia-Pacific region and the United States. These rates of change were calculated at similar income ranges. That is, calculations for per cent annual change in urbanization level were made only at similar GDP per capita income ranges shared by the United States of America and the particular economy. The results demonstrate that the changes occurred faster in almost all cases, except for Thailand.

TABLE 1 – COMPARATIVE CHANGE IN URBANIZATION LEVEL AT SIMILAR INCOME RANGES (PERCENT/YEAR)

		USA
South Korea	1.46	0.49
China	0.51	0.47
Thailand	0.24	0.51
Malaysia	0.79	0.50
Indonesia	0.94	0.47
Philippines	0.92	0.49
Japan*	0.87	0.47

Source: Marcotullio and Schulz (2008).
NOTE: For this analysis, Japanese data includes the range 1920-2000
*In 1960, the year that the energy data begin, Japan was approximately 63 per cent urbanized.

Table 2 presents a comparison of the rate of change in road CO_2 emissions over time. Units are in kilograms per capita per year. Within the Asia-Pacific economies, the fastest changing producers of CO_2 emissions are Hong Kong, Malaysia, South Korea and Taiwan. That is, over any given period of time within comparable income ranges, the road CO_2 emissions grew at a faster rate in these economies than they did for other Asian economies. When compared to the United States of America, emissions grew faster in South Korea and Malaysia. All other economies had CO_2 emissions growth at lower rates of speed than the United States of America. The higher rates of growth for South Korea and Malaysia demonstrate that environmental conditions within these economies changed faster than they did for the United States of America.

The comparisons again were different for other developed economies. In general, Hong Kong, South Korea and Taiwan's road CO_2 emissions grew at faster rates than most developed world economies. Malaysia's rate was faster than those of Italy and even Japan's growth in road CO_2 emissions surpassed that of the United Kingdom, Sweden and the Netherlands. Only Singapore's growth rates of road CO_2 emissions were consistently lower than those of the developed world.

TABLE 2 – COMPARISON OF CHANGES IN ROAD CO_2 EMISSIONS PER CAPITA PER YEAR, OVER COMPARABLE INCOME RANGES

	Change in Asian road CO2 emissions per year (kg per capita/year)	*Change in developed world economy road CO2 emissions per year (kg per capita/year)*
	Asian	*USA*
Hong Kong	52.48	77.64
Japan	41.52	71.93
Malaysia	63.30	57.68
Singapore	28.62	70.85
South Korea	68.90	63.55
Taiwan	52.59	62.64
Thailand	37.87	57.32

	Asian	*Australia*
Hong Kong	59.90	53.74
Japan	38.55	53.74
Singapore	21.78	50.91
South Korea	52.15	87.61
Taiwan	61.89	72.91

	Asian	*France*
Hong Kong	48.04	42.92
Japan	39.18	42.92
Singapore	21.43	42.92
South Korea	63.98	62.13
Taiwan	62.83	49.75

	Asian	*the Netherlands*
Hong Kong	59.90	32.27
Japan	38.55	32.31
Singapore	22.65	32.31
South Korea	52.15	43.47
Taiwan	61.89	33.42

	Asian	*Italy*
Hong Kong	35.87	40.50
Japan	38.64	40.50
Malaysia	79.49	59.07
Singapore	32.57	40.50
South Korea	69.47	38.82
Taiwan	60.01	40.80

TABLE 2 (CONTINUED)

	Asian	*Sweden*
Hong Kong	48.91	34.29
Japan	38.24	34.29
Singapore	23.97	34.29
South Korea	52.15	60.33
Taiwan	61.89	44.85

	Asian	*United Kingdom*
Hong Kong	45.05	35.93
Japan	37.58	35.93
Singapore	25.86	35.93
South Korea	52.15	35.77
Taiwan	61.89	39.15

Source: Marcotullio (2006).

Finally, Table 3 presents the change in total primary energy supply (TPES) in the United States of America, Japan and economies in the Asia-Pacific. What is surprising here is that even compared to the United States of America, which has typically been an outlier, amongst developed economies in terms of energy consumption, when mapped over time, the Asia Pacific economies have experienced greater increases in their supplies than did the United States of America over comparable income ranges.

TABLE 3 – COMPARATIVE CHANGE IN TOTAL PRIMARY ENERGY SUPPLY (TPES) UNDER SIMILAR GDP PER CAPITA INCOME AND URBANIZATION RANGES

		USA
	Change in TPES	*Change in TPES*
South Korea	124.27	43.59
Singapore	187.21	58.55
China	17.12	11.08
Thailand	32.07	33.18
Malaysia	61.24	36.90
Hong Kong	59.45	75.94
Indonesia	15.53	11.28
Philippines	5.10	-5.49
Japan	76.29	57.67

Source: Marcotullio and Schulz (2008).

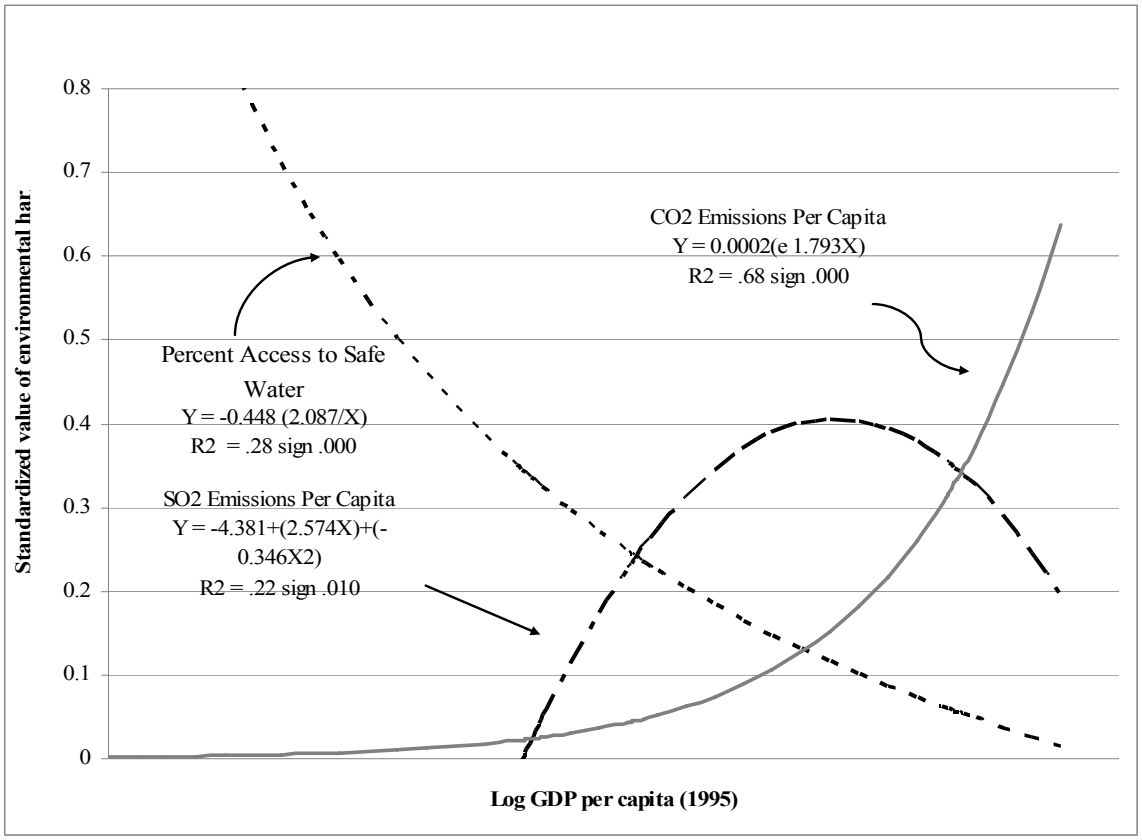
4. Comparative timing

Finally, as part of the time-space telescoping of the development, the patterns previously experienced in a sequential manner are increasing experienced simultaneously. This is a difficult set of relationships to explore and evidence provided is suggestive only.

The series of environmental agendas among nations in 1995 are schematically represented in Figure 10. An analysis of the data for three different types of environmental burdens helps reveal the specific characteristics of environmental transition scenarios that pertain to Asian cities. The figure

demonstrates the relationships among several key variables, all calculated for 1995: GDP per capita with percent of the population with no access to safe water, SO_2 emissions per capita and CO_2 emission per capita. Each function represents a significant relationship between wealth (in this case income) and the three sets of environmental issues.

Figure 10. Contemporary urban environmental transitions



Source: Marcotullio and Lee (2003).

The graph illustrates the dynamics of contemporary environmental transitions. The severity of environmental problems (such as access to safe water) varies inversely with wealth. One variable, access to safe water, constitutes a proxy for the entire group of variables related to the "brown" conditions. The trend of increasing access with wealth arguably approximates the trajectory for the other variables within this agenda, despite some dissimilarity between variables.

Environmental challenges related to industrialization and motorization are represented by SO_2 emissions, which make up the "grey" agenda. The curve for SO_2 per capita by income demonstrates the "inverted U-shape" of the Environmental Kuznets curve. This relationship represents the decreasing environmental quality associated with rapid development, followed by increasing environmental quality once some turning point is reached.

CO_2 is used as a measure of "green" agenda issues. Increased CO_2 emissions within cities have resulted primarily from an increase in automobile ownership.

The second interesting observation is the extent to which the variables overlap. From these estimations, it is possible to approximate the share of global urban population experiencing different categories of environmental risks at the same time. The points where the curves meet signify the shifts in

the types of environmental challenges. With GDP per capita and national urban population level figures, it is possible to estimate the number of people living under such conditions (Table 4). These educated guesses demonstrate that the majority of the world's urban population is living under at least two sets of burdens, and over 20 per cent are living under conditions of all three types of burdens. These figures also demonstrate that less than a quarter of the world's urban population is living under conditions largely related to the "green" agenda. That agenda, however, is increasingly the basis of the sustainable development mandate. Lastly, the figures show that a significant percentage of the world's urban population (18 per cent) is living in conditions dominated largely by the "brown" agenda.

TABLE 4 – ESTIMATED URBAN POPULATION LIVING UNDER VARIOUS ENVIRONMENTAL CONDITIONS, 1995

1995 GDP Category (US$)	*Environmental Challenge*	*Total Urban Population (thousands) (N)*	*Share of Total (%)*
< 467.74	Lack of Water and Sanitation ("brown" issues)	456 985	309.6
> 467.75 and < 1,071.52	Rising Industrial pollution ("grey" issues), and significant "brown" issues	518 812	351.5
> 1,071.53 and < 3,981.07	High "grey" issues, rising modern risks ("green" issues) and "brown" issues	526 315	356.6
> 3,981.08 and < 14,125.3	High but decreasing "grey" issues, rising "green" issues	296 993	201.2
> 14,125.3	Largely "green" issues	613 480	415.6
Missing		147 610	100.0
Total global urban population		2 560 195	100.0

Source: Marcotullio and Lee (2003).

Second, Table 5 presents the results of a survey of individual cities within ASEAN. This survey was undertaken to identify the major water related urban environmental challenges currently experienced by cities within the region. It demonstrates a number of different challenges that emerge at different scales and under different agendas are currently of concern to city managers of most cities across the region. The exceptions are those of Singapore and Bandar Seri Begawan, where seemingly the very local issues of access to water supply, sanitation and drainage have been addressed for most of the population. Otherwise, cities in this part of the world must address all of these issues simultaneously.

G. DISCUSSION

As argued, globalization is a major influence on the alteration of development patterns within urban socio-ecological systems. At the same time, the patterns of sooner, faster and more simultaneously are due to a number of different specific drivers, both direct and indirect. In this section, I attempt to outline some of the influences that relate to the outcomes presented in the previous section.

Many might look at the earlier emergence of environmental impacts (such as transportation CO_2 emissions) as a result of technological availability. Certainly, the fact that the technology being available is an important factor in explaining these observations, but not the only one.

TABLE 5 – SUMMARY OF VARIOUS WATER-RELATED CHALLENGES FOR CITIES IN DIFFERENT INCOME CATEGORIES IN SOUTHEAST ASIA BY SCALE OF IMPACT

City	*Local*	*Metro-wide*	*Regional and global*
Low-income cities			
	Low levels water supply coverage Low levels of sanitation coverage Poor drainage	River and coastal water pollution Overdrawn groundwater Subsistence Coastal area degradation Flooding	Economic water scarcity Vulnerability due to climate change
Middle-income cities			
	Low levels of water supply coverage Low levels of sanitation coverage Poor drainage	River and coastal water pollution Overdrawn groundwater Subsistence Coastal area degradation Flooding	Economic water scarcity Vulnerability due to climate change
Upper-middle income cities			
	Low levels to incomplete sanitation coverage Water supply coverage not complete poor to inadequate drainage	River and coastal water pollution Overdrawn groundwater Subsistence Coastal area degradation Flooding	Increasing water consumption per capita Vulnerability due to climate change
High income cities			
		River and coastal water pollution Coastal area degradation	Physical water scarcity Increasing water consumption per capita Vulnerability due to climate change

Source: Marcotullio (2007).

NOTES: Cities in low income category include Vientiane, Phnom Phen, Hanoi, Ho Chi Minh, among others
Cities in the middle income category include Manila, Jakarta, among others
Cities in the upper-middle income category include Bangkok, Kuala Lumpur, among others
Cities in the high income category include Singapore

As technologies developed within advanced economies diffuse globally, they are increasingly adopted in low-income nations. Hence, some technologies are being used in places with incomes comparable to developed economies at times when the technologies were not available. For example, the model T was developed in the United States of America around 1908, when the country had a GDP per capita greater than that of China, Vietnam or Indonesia in 2000 (Maddison 2001). Hence, it is not surprising that the movement of technologies, particularly advanced technologies, is occurring sooner, or all at lower levels of in economic growth than in the past.

At the same time, however, technological diffusion will also depend upon trade and investment policies. Moreover, the rapid increases, once the technology is available, are due to a number of national and local policies. Certainly, automobile technologies have been available before the 1990s, put were rare within China. It wasn't until the country began on its current open economic policy, along with the targeting of the motor vehicle industry as a major pillar of industrialization, that the CO_2 emissions per capita from this form of transport could be observed (Gan, 2003; Lee, 2007). Moreover, it is not all technologies that are diffusing rapidly. Just as the world city literature outlines, those technologies (telecommunications and transportation, for example) that are most representative and have the ability to

enhance global flows are typically privileged. In Vietnam, for instance, it is not uncommon to see farmers outside of Hanoi using oxen and plows.

The speed of change has been associated with the speed of economic growth. That is, city building and development has largely occurred during periods of economic expansion and slowed during recessions. Moreover, the intensity and speed by which a city expands is related to how fast the local economy is growing. Economic growth rates today are much faster than in the past. Table 6 presents 10-year annual averages in changes of growth for several economies. It suggests that growth rates for developed countries during any period of industrialization after 1870 have not matched those observed in parts of Asia today. With these rapid economic growth rates have come faster changes in a number of environmental concerns (including those related to consumption and waste emissions).

While the economic growth rates in countries throughout the region have become faster than those of the developed world, the differences in speed of environmental shifts over time between the developed and developing world, have been debated. For example, Satterthwaite (2007) has compared the speed of growth of cities in the developed and developing world based upon the size of settlement. He finds that Tokyo (4.4 per cent per year) and New York (4.3 per cent per year) have higher or comparable growth rates to Addis Ababa (3.8 per cent per year) and Bangalore (4.1 per cent per year). Los Angeles (7.6 per cent per year) has a higher or comparable growth rate to Nairobi (5.7 per cent per year), and Chicago (8.4 per cent per year) and Las Vegas (7.6 per cent per year) have higher or comparable growth rates to Abidjan (8.0 per cent per year) and Dar es Salaam (6.7 per cent per year).

Finally, the simultaneity found in developing world cities may be related to two different phenomena. First, as technologies previously available in stages are available immediately, they are being incorporated in this manner. Hence, in many United States cities, water supply systems were developed before sanitation systems were considered. It took another 20 to 30 years before conditions in large rivers were bad enough to consider water treatment for biological wastes. Finally, it wasn't until the 1950s, when rivers in the United States were overcome by chemical wastes that a discussion of a more intensive water treatment process started. Now, as cities quickly industrialize without providing complete access to water and sanitation, but move quickly into industrialization, they are experiencing all four challenges.

Second, the increased diversity of phenomena within cities of the developing world may be part of a larger worldwide phenomenon. Scholars have identified the increasing diversity of social forms found in cities. This increasing diversity, identified as the emergence of "multiplex" cities that are increasingly difficult to generalize (Amin and Graham 1997).[7] The reason for this increasing diversity relates to the political, social and institutional organization of societies. Under neo-Liberalization and the increasing privatization of formerly public services urban areas have "splintered," taking on zones of access and zones of non-access to services (Guy, et al., 1997; Graham, 1999). "Splintering" of urban areas within developing countries may be even more intense than that experienced by the developed world as the process is intensified at the local and regional levels. Moreover, as many cities in the developing world lack basic infrastructure for large population, the "splintering" process can have long lasting implications. Certainly, this new splintering is creating a new multiple-layered landscape that was not previously experienced.

TABLE 6 – ANNUAL GROWTH OF GDP PER CAPITA IN SELECTED COUNTRIES, BY DECADE, 1870-2000 (PER CENT)

Country	*1871-1880*	*1881-1890*	*1891-1900*	*1901-1910*	*1911-1920*	*1921-1930*	*1931-1940*	*1941-1950*	*1951-1960*	*1961-1970*	*1971-1980*	*1981-1990*	*1991-2000*
Australia	2.65	0.01	-1.50	3.10	-0.68	-0.42	3.54	0.88	1.59	3.34	1.61	1.55	2.56
Austria	0.49	1.31	1.41	1.40	-3.27	3.07	1.88	-1.28	5.11	3.63	3.04	2.11	1.53
France	1.11	0.80	1.69	0.48	-0.07	3.96	-0.47	4.77	3.11	4.01	2.24	1.77	1.37
Germany	0.92	1.83	2.22	1.55	-1.96	2.59	3.99	-3.79	6.24	3.15	2.45	1.19	1.14
Italy	0.48	1.29	0.79	2.13	0.50	1.44	2.00	0.20	4.70	4.31	2.94	2.14	1.26
UK	0.43	1.17	1.23	0.35	-0.35	2.06	2.93	-0.75	1.96	1.97	1.69	2.57	2.08
USA	1.47	1.51	1.67	1.07	0.96	1.56	2.11	1.54	1.14	2.80	1.96	2.10	2.13
Canada	0.34	1.55	1.91	2.76	-0.87	3.66	2.98	1.88	1.51	3.16	2.56	1.37	1.95
Japan	1.53	2.01	2.12	0.78	2.26	-0.05	4.58	-3.95	6.49	8.18	2.95	3.17	0.88
South Korea	-	-	-	-	2.66	-0.30	3.83	-6.08	4.54	5.69	5.02	7.30	4.30
Hong Kong	-	-	-	-	-	-	-	-	3.16	5.79	5.81	4.59	1.66
Singapore	-	-	-	-	-	-	-	-	0.25	6.25	6.33	4.27	4.14
Taiwan	-	-	-	-	-	2.33	2.37	-4.33	4.17	6.75	5.85	4.73	4.69
Indonesia	1.53	2.01	2.12	0.78	2.26	-0.05	4.58	-3.95	6.49	8.18	2.95	3.17	0.88
Malaysia	-	-	-	-	3.32	4.29	-1.90	2.33	0.61	2.70	5.31	2.99	3.75
Philippines	-	-	-	-	3.15	-	0.96	-	2.52	1.55	2.77	-0.75	0.99
Thailand	-	-	-	-	-	-	-	-	2.42	4.42	4.01	5.72	2.48
China	-	-	-	-	-	-	-	-	3.45	3.46	2.94	5.35	5.85
Vietnam	-	-	-	-	-	-	-	-	1.68	-0.99	0.05	3.02	5.25
Argentina	-	-	-	2.87	-0.75	1.63	1.15	1.48	0.92	2.22	0.86	-1.65	2.04
Brazil	0.48	0.48	-1.29	0.52	1.43	0.85	2.21	2.49	3.21	2.29	4.71	0.15	1.28
Mexico	-	-	-	1.45	0.66	-1.26	1.20	1.95	2.45	3.14	3.73	-0.88	1.44

Source: Marcotullio and Schulz (2007).
Notes – "-": data not available for calculation
Data for 1871 for all calculations is for 1870.

It is paradoxical that despite the diversity, complexity and rapidity of change in environmental challenges, some of the conditions in the now developing world (for example, those related to energy transitions) are less environmentally harmful than those produced by the developed world, at similar levels of income (as measured by supply and consumption of energy). There could be a number of different reasons for this outcome. Presumably, developing countries are benefiting from technology transfer and are growing in wealth in a more efficient manner than developed countries had. Smith (1993) has pointed out that over time, within the developed world, countries have become more energy efficient over time. The lower levels of emissions or greater efficiency, may also be due, in some cases to "infrastructure bottlenecks" as the development of necessary facilities (such as roadways) may be preventing the use of automobiles, for example (Marcotullio and Williams, 2007). This second theory suggests that as economic growth slows down or as more infrastructure comes on line (highways, electricity generation stations, etc.), the use of fuel will increase at continued rapid rates. Certainly, more research into development patterns is necessary before we understand how these trends will play out in the future.

H. IMPLICATIONS

There are many implications of *time-space telescoping*. Theoretically, the concept provides a framework for understanding changing development patterns. In the context of long waves of development, it sheds doubt on the continued systematic appearance of these cycles. That is, the emergence of *time-space telescoping,* in a world where the weight of economic growth is now shifting to developing countries, arguably shifts the underlying causes of these patterns (as experienced by the now developed world), such that previously consistent cycles may not longer be the norm.

Second, the concept also places doubt on the applicability of Environmental Kuznets curve analysis, as the Environmental Kuznets curve suggests that no matter what the context a city or nation develops, it undergoes similar processes and driving forces which produce similar outcomes (Stern 2004).

Practically, it suggests that currently developing world cities have less revenue to address environmental conditions (although this may be offset by the application of better and cheaper technologies) than previously experienced. Given rapid changes, it suggests that decision-makers may have a smaller window of opportunity to make long-lasting decisions (those that may lead to path dependent outcomes). Furthermore, it suggests that given the large number and diversity of trends occurring within cities, management is more complex and there is a threat of institutional capacity overload. Finally, with rapid changes and smaller windows of opportunity there is also a threat of unresolved environmental conditions, or situations where cities continue to work in affluence and in other arenas, but retain local traditional environmental burdens for a large proportion of the population.

Given these conditions, it is increasingly questionable whether policies, even sustainable urban policies, which were/are successful in the developed world, are applicable to the developing world context. Environmental policies in the North were underpinned by such mentalities as "first things first" (Warner 1955) and "the solution to pollution is dilution." In a world already polluted, increasingly experiencing synergistic anthropogenic impacts, these underpinnings of environmental policy are untenable.

For example, the idea of compact city or even concentrated decentralization has questionable application to parts of the developing world. First, many parts of the developing world are already compact (see for example, Asian cities), as they have not decentralized their populations as have those in the developed world. Second, given the economic structure and the presence of industrial activities and other stationary sources of air pollution, this solution will actually increase exposure, rather than decrease exposure to pollutants. While compact cities may help to decrease motor vehicle use, a growing issue of

concern in developing countries, the same policies can exacerbate other types of risks (air pollution exposure from other sources). Hence, compact city policies will not bring similar results to developing world cities as they are perceived to bring for those in the developed world.

At the same time, developing countries have the opportunity to develop synergistic responses to challenges at multiple scales early on in the infrastructure development process. Developed countries, in some cases, are locked into costly infrastructure developments due to their older incineration, water treatment plants or highways that are expensive to replace and are implicated in the displacement, rather than the mediation of environmental harms. Developing world cities are more likely to respond to environmental concerns at all scales in a more integrated manner. It is not surprising, therefore, to see some of the currently highly touted solutions to some environmental concerns in cities of the North (such as bus rapid transit, transit oriented development and congestion pricing), as previously developed and implemented, albeit under different names, in the South.

I. CONCLUSIONS

This article attempts to present a new understanding of urban environmental conditions in cities of the South. It argues that due to *inter alia* globalization processes, socio-ecological systems at the urban scale have undergone shifts in their development patterns associated with environmental transitions. The evidence in support of these trends is indicative, not comprehensive, and theoretical arguments are not fully developed yet. At the same time, this line of research presents a valuable way to explore the contemporary conditions in urban areas of the developing world.

NOTES

[1] Data from Maddison, A. (2001). *The World Economy, A Millennial Perspective.* Paris, OECD.

[2] For this study, the Asia Pacific includes China, Hong Kong (China SAR), DPR Korea, Japan, Mongolia, Republic of Korea, Brunei Darussalam, Cambodia, East Timor, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Taiwan, and Viet Nam.

[3] According to the World Trade Organization (2001), the seven most dynamic Asian traders with annual export and import growth in excess of 10 percent from 1990 – 2000 were Cambodia, China, Lao PDR, Malaysia, Myanmar, Philippines and Vietnam.

[4] These include Tokyo, Osaka, Hong Kong. Singapore, Seoul, Taipei, Bangkok, Jakarta, Kuala Lumpur, Manila Shanghai and Beijing.

[5] The material flows analysis has a long history (Fischer-Kowalski, M. (1998). "Society's metabolism, The intellectural history of materials flow analysis, Part 1, 1869-1970." Journal of Industrial Ecology **2**(1), pp. 61-78). While the methods of material flows are largely outlined in the 1960s, it wasn't until the 1990s that the approach became one of the most important perspectives for exploring the human-nature interactions (Fischer-Kowalski, M. and W. Huttler (1998). "Society's metabolism, The intellectual history of materials flow analysis, Part II, 1970-1998." Journal of Industrial Ecology **2**(4), pp. 107-136).

[6] Statistical analysis reveals that the trends within the Asia Pacific economies as aggregate groups are significantly different from each other.

[7] This argument is in direct distinction to that made by Young et al., (2007) who state that globalization is related to decreasing diversity, including loss of biological, institutional, ethnic, cultural, language, technological and diversity of tastes, preferences and values. The Young et al. (2007) group, however, do not provide any empirical evidence of this major (over) generalization. Indeed, anthropologists have been debating this issue with contributions on both

sides; arguments for both homogeneity and hybridity. For a review on how this related to studies of urbanization, see Smart, A. and J. Smart (2003). "Urbanization and the global perspective." Annual Review of Anthropology **23**, pp. 263-285. For an interesting argument on how cities are becoming socially diverse see Massey, D. S. (1996). "The age of extremes: concentrated affluence and poverty in the Twenty-First Century." Demography **33**(4), pp. 395-412. In the urban studies literature a important theme of work has been the emergence so much diversity in cities that urban patterns are arguably difficult to categorize Amin, A. and S. Graham (1997). "The ordinary city." Transactions of the Institute of British Geographers **22**(4), pp. 411-429.

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URBAN SYSTEM PLANNING IN CHINA: THE CASE OF THE PEARL RIVER DELTA

Mee Kam Ng, University of Hong Kong, Hong Kong

A. ABSTRACT

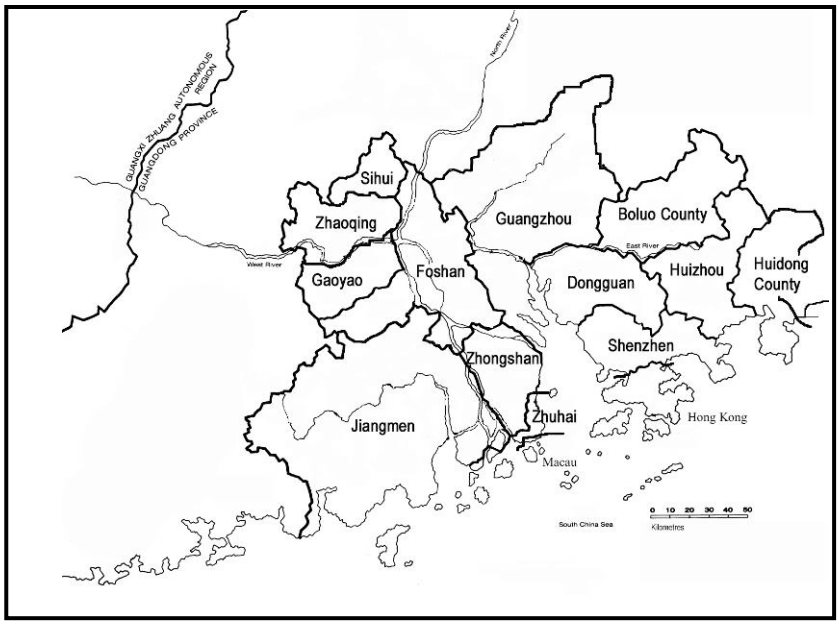
As a result of China's open door policy adopted in the late 1970s, the Pearl River Delta (PRD) in the Guangdong Province in southern China has become a "world factory," a growth pole in the transitional economy. Population in the PRD has grown from 16 million in 1980 to 44.5 million in 2006. Rapid urbanization and industrialization have brought about geographically uneven development, social polarization and environmental degradation. In 1991, 1995 and 2005, three urban system plans were formulated respectively to give directions for development in the region. This paper first outlines the rapid growth of the PRD, followed by a discussion of these urban system plans, highlighting China's evolving and maturing approaches to urban system planning for the transitional socialist market economy.

B. THE PRD REGION – GENESIS OF THE WORLD FACTORY

The PRD is situated within the Guangdong Province (Figure 1). Guangdong has always been the southern gate of China since time immemorial. Even before the Opium War around 1840, Guangzhou (Canton) had been a port of external trade for one hundred years (Yeung, 1994, p. 6). However, when the People's Republic of China was set up in 1949, a closed-door policy was adopted for almost three decades. When they realized that the closed-door policy and the centrally-planned economy had not been effective, vigorous economic reforms and open door policies were adopted in late 1978. China moved rapidly from a centrally-planned economy to a decentralized one with different levels of the party-led governments struggling to separate political and economic functions in the course of introducing market mechanisms. Today, after two decades of open door policy, China has eagerly joined the "family" of international trade and has determined to play a more active role in the international division of labor.

In order to understand this change, Hong Kong has to be brought into the picture. Hong Kong was ceded and leased to Britain in three stages. The Opium War turned Hong Kong into a British colony and changed the fate of the small fishing village. When China adopted a closed-door policy, the economy of Hong Kong flourished and became one of Asia's miracles. In many aspects, Hong Kong was the model of development when China started to carry out economic reforms and the open door policy. Together with the 1997 question, Hong Kong was brought back to the broader picture of development in the PRD. Since the 1970s, Hong Kong's economy has become territories. Rising production costs, escalating land and property prices and the attractions of speculative investment opportunities in the stock market had left little space for the survival of the manufacturing industries. Hence, the opening up of socialist China provided "a breathing space" for the then weakening manufacturing industries in Hong Kong. Today, about 90 per cent of Hong Kong manufacturers have production facilities in the PRD. In some 65,000 factories, Hong Kong investors have employed about six million workers in the Delta (Hong Kong Trade Development Council, 2002). Over 80 per cent of Hong Kong traders source from the PRD and Hong Kong handles about 80 per cent of the PRD's imports and exports (ibid, 2002) even though administratively speaking, Hong Kong is separated from the rest of the PRD under the arrangement of the "One Country, Two Systems" concept.

Figure 1. The Pearl River Delta



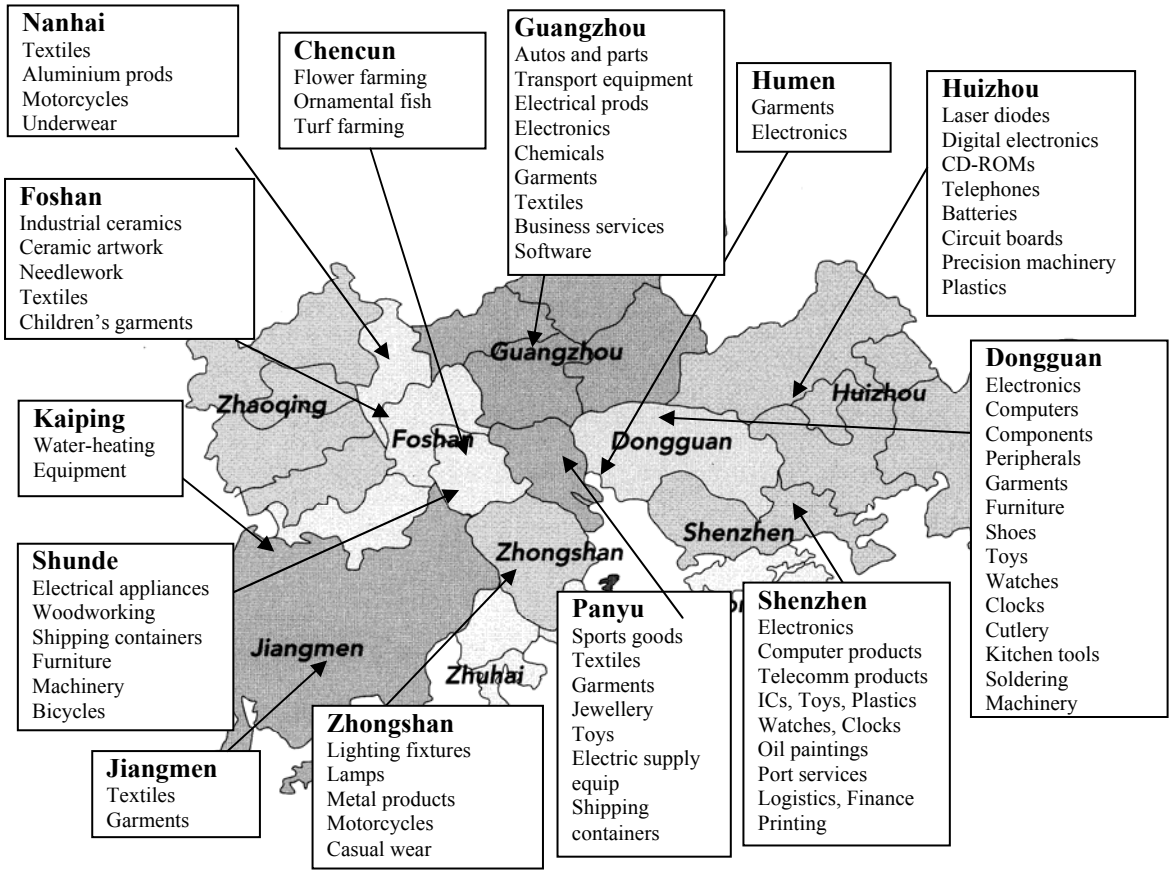
Source: Modified from http://www.c-c-c.org/images/roots/PearlRiverDeltaGuangdongChina1600x1304.jpg, accessed on 17 December 2007.

The PRD has been transformed from a rural region into an industrial powerhouse. Figure 2 shows the clusters of localized industries in the PRD region. From 1978 to 2000, the region's economy grew at a rate of 16.9 per cent a year, compared with 13.8 per cent for the Guangdong Province and 9.6 per cent for the Mainland (Enright and Scott, 2002). Hong Kong's productive investment in the PRD has changed Guangdong's economic structure. In 1978, 73.7 per cent of the total labor force in Guangdong was engaged in the agricultural sector. However, in 1997, the traditional agricultural sector employed only 41 per cent of the labour force, whilst the remaining 59 per cent were employed in the secondary and tertiary sectors (Ng, 2000, p.73). Table 1 displays various indicators showing the rapid growth of the PRD. Population in the PRD grew from 16.93 million in 1978 to 44.47 million in 2006.[1]

During the period from 1978 to 2006, GDP in the PRD increased 180 times; total investment in fixed assets was up 150 times; export expanded 507 times and the amount of foreign capital actually utilised augmented 41-fold. The amount of savings by urban and rural residents increased from 1.2 billion RMB in 1978 to 1,818.7 billion Renminbi (RMB) in 2006 (an increase of 1,528 times) (Guangdong Statistics Bureau, 2007).

Although the PRD occupies only one quarter of Guangdong's area and contains 48 per cent of its population, the Delta accounts for 81.8 per cent of the province's GDP and about 95.6 per cent of its exports (Table 2) (Guangdong Statistics Bureau, 2007). Growth is the order of the day in the Delta. The PRD is one of the Mainland's principal growth areas and one of the world's largest manufacturing base, with a GDP of RMB 2,142.43 billion (about US$291 billion at the 2007 exchange rate) in 2006 (ibid, 2007, p.557). With a population of 44.5 million, the Delta is not only a production centre but also a huge consumption market. Table 2 illustrates the importance of the PRD in Guangdong's economy.

Figure 2. Localized industries in the Pearl River Delta



Source: Enright, M.J., Chang, K.M., Scott, E.E. and Zhu, W.H. (2003). *Hong Kong and the Pearl River Delta: the Economic Interaction.* Sponsored and published by the 2022 Foundation, p.46.

TABLE 1 – KEY ECONOMIC INDICATORS OF THE PEARL RIVER DELTA (AT CURRENT PRICES)

Indicator	*1978*	*1991*	*2001*	*2005*	*2006*
Total end-year population (million)	16.93	19.64	42.88	43.15	44.47
Agricultural population with residence registration	12.64	11.89	11.98	n/a	n/a
GDP (RMB billion)	11.92[1]	112.28	840.07	1 805.94	2 142.43
Primary industry (RMB billion)	3.07[2]	19.03	44.80	49.88	51.4
Secondary industry (RMB billion)	5.40[3]	58.63	415.47	919.6	1 107.29
Tertiary industry (RMB billion)	3.45[4]	42.20	379.80	836.45	983.74
Total fixed assets investment (RMB billion)	3.92	19.21	310.22	526.33	588.91
Total retail sales of consumer goods (RMB billion)	4.81	30.69	312.01	579.61	668.19
Total amount of export (USD billion)	0.57	9.62	52.02	227.32	288.75
Foreign capital actually used (USD billion)	0.32	1.01	14.19	11.33	13.09
Government revenue (RMB billion)	3.20	12.37	74.57	118.91	142.43
Government expenditure (RMB billion)	n.a.	9.53	82.27	151.78	165.31
Savings deposits by urban & rural residents at year-end (RMB billion)	1.19	76.24	767.06	1 628.75	1 818.73

Sources: Guangdong Statistics Bureau, *Guangdong Statistical Yearbook 1992* (p.541)*, 2002* (p.556) *and 2007* (p.557).

[1-4]: 1980 figures from Enright, M.J., Chang, K.M., Scott, E.E. and Zhu, W.H. (2003). *Hong Kong and the Pearl River Delta: the Economic Interaction*. Sponsored and published by the 2022 Foundation, p.25.

TABLE 2 – KEY STATISTICS OF THE PEARL RIVER DELTA, 2006

Profile	*Per cent of China*	*Per cent of Guangdong*
Area	0.4	23.00
Population	3.38	47.79
GDP	10.23	81.76
Export value	29.79	95.63
Import value	27.56	96.86
Foreign Direct Investment	18.84	90.18

Source: Guangdong Statistics Bureau. *Guangdong Statistical Yearbook 2007*, p. 27 (for national and Guangdong figures), p. 557 (for PRD figures).

C. SERIOUS DEVELOPMENT PROBLEMS IN AN ADMINISTRATIVELY DISJOINTED REGION

1. Development problems

a. Geographically uneven growth in the Hong Kong-PRD region

Upon closer inspection, one can find that the growth of the PRD region is rather uneven. In fact, geographically speaking, the Eastern part of the PRD has grown much faster than the Western part, probably a result of its proximity to Hong Kong. It was only in the late 1990s that cities in the Western part of the PRD started to actively attract foreign investment and pursue economic growth. Home to indigenous companies serving China's domestic markets, the potential for the Western PRD to play a larger role in international trade is high especially with the accession of China to the World Trade Organization. Besides disparities between Eastern and Western PRD, there are also rural-urban disparities. Assuming a factor of one for the per capita consumption level of rural households, the rural-urban gap has widened from 1:2.7 in 1978 to 1:3.2 in 2006.[2] In 2006, the disposable income per capita of urban residents was RMB 12,432 (US$1,688 at the 2007 exchange rate) and the per capita net income of rural residents was RMB 3,886 (US$528 at the 2007 exchange rate).[3]

b. "Uncoordinated" economic integration reaching its limits

Different parts of the Delta have undergone various degrees of economic restructuring leading to all sorts of "destructive construction" (Ng, 2002, p. 287). Intensive and cutthroat competition for external investments has led to local protectionism, duplication of efforts and wasting of resources in the provision of infrastructure in the race to attract foreign investment (Ng, 2002, p.287). Rapid industrialization processes have also led to many social and environmental problems. Many of the joint ventures and outward processing industries have been developed at the expense of the natural environmental and ecological system. These problems further challenge the sustainability of regional development.

c. Environmental degradation

The PRD was once the "land of fish and rice." However, rapid industrialization has degraded the environment. Not only has rich agricultural land been taken up by industrial uses, the natural environment has been contaminated by air, water, noise pollution and wastes produced in the industrialization and urbanization process (Ng, 2002, p. 286). Cultivated land in the PRD dropped by 56 per cent, from 966,667 hectare in 1978 (Wang and Sun, 1998, p. 22) to 542,114 hectare in 2005 (Guangdong Statistics Bureau, 2007). The whole PRD lies within Guangdong's "acid rain control zone." There are over 10 mega-power plants along the coast of Shenzhen and Zhuhai, emitting pollutants without proper treatment

(Wang, 2000, p. 78). In other parts of the Delta, pollution in rural areas had led to death of poultry and in some places, water becomes undrinkable. All these have threatened agricultural modernization in the Delta (ibid, 2000, p. 78).

Water pollution is also another serious problem in the PRD. The problem can be reflected in the costs of controlling water quality in the eastern part of Shenzhen, on which Hong Kong relies for its water consumption. It was reported that at least a capital cost of 4.6 billion RMB and an annual operational cost of 0.5 billion RMB were required to maintain a grade III water quality (Xu, 2002, p. 6.4-4). The costs would be much higher if a grade II quality were to be attained, all due to rapid industrialization and urbanization in the catchments areas. It was reported that waste water discharged increased at an annual rate of 11.1 per cent in the early 1990s (Wang and Sun, 1998, p.20). And in 2006, 42.7 per cent of the waste water generated by urban residential areas was treated (Guangdong Statistics Bureau, 2007). Most of the cities in Guangdong had no sewage treatment plants. In 2006, household sewage discharge of the province amounted to 5.3 billion tons (Guangdong Statistics Bureau, 2007). Pollution problems in the PRD cannot be contained within the Delta itself and urgent environmental problems need to be tackled by concerted efforts of various constituencies of the Hong Kong-PRD region. However, institutional capital is weak in the region.

d. Population explosion and social problems

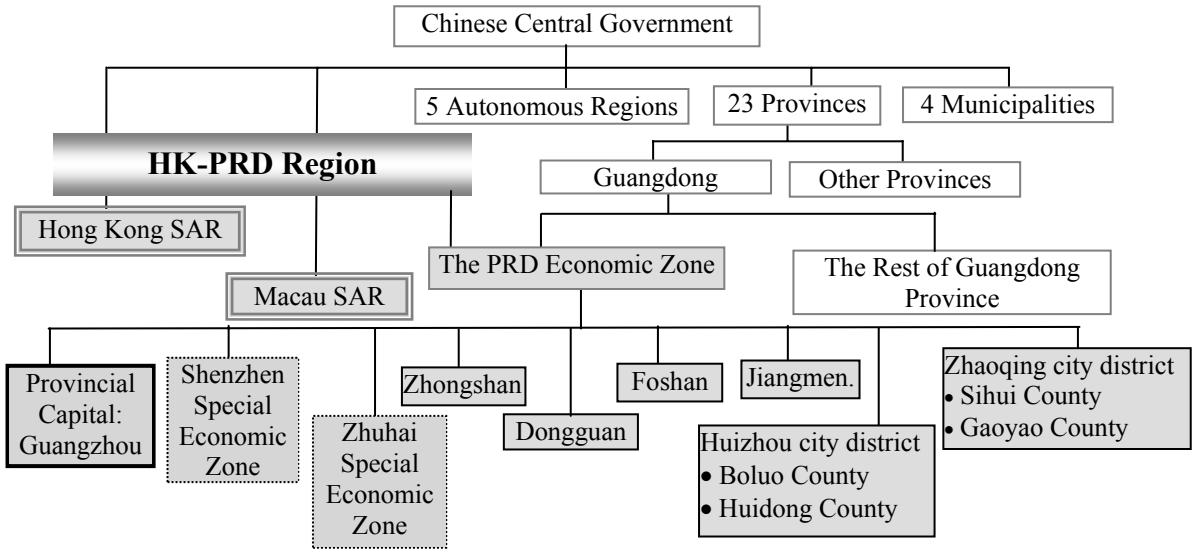
Besides environmental degradation, rapid urbanization and industrialization have also led to many social problems. In 1980, population of the PRD was 16.3 million. However, according to China's 2000 National Census, the population in the PRD had reached 42.88 million by 2000, a 2.6-fold increase within two decades, and by 2006, another 1.59 million was added to the population. According to the 2007 Guangdong Statistical Yearbook, there were more than 12.6 million migrant labourers working in Guangdong. Social development has, however, lagged behind economic growth. In fact, the existence of floating population has led to all sorts of social problems: unemployment, crime, prostitution, drugs and poor quality of human resources as education levels of the migrant workers tend to be low. Furthermore, because of the discrepancy of economic developments in Hong Kong and the PRD, many social problems such as second wives, trading of parallel goods and various crime-related activities also exist.

In recent years, as a result of the reforms of the state-owned enterprises, many workers were terminated, adding to employment problems. Further economic reforms will challenge the social security system in the PRD. With intensified economic restructuring and further opening up of new development areas in other parts of the nation, the PRD has suffered from a shortage of quality human resources. In 2006, only 1.4 million professional and technical personnel were found in the PRD (3 per cent of the total population) and the gross enrolment rate of higher education was 24 per cent (Guangdong Statistics Bureau, 2007).

2. Fragmented administration

Although the PRD region is situated within "one environment," there are "multiple administrative systems." Figure 3 highlights the complexities of the institutional set up. In the PRD region, there are two Special Administrative Regions, Hong Kong and Macao, which report directly to Beijing; and, within the PRD, there is the provincial capital of Guangzhou; the two Special Economic Zones of Shenzhen and Zhuhai; eight cities: Huizhou city district, Dongguan, Zhongshan, Jiangmen, Foshan, Zhaoqing city district, Sihui and Gaoyao and two counties: Huidong and Boluo.

Figure 3. "One environment, multiple systems" in the Hong Kong-PRD region



Source: Guangdong Statistics Bureau, *Guangdong Statistical Yearbook 2007*, http://www.gdstats.gov.cn/tjnj/table/20/e20_3.htm, accessed on 1 December 2007.

As argued by Sit and Yang (1997, p.659), foreign investments tend to go towards small cities and counties in the Delta, probably a result of the small- and medium-sized labour intensive nature of manufacturing enterprises. A more important reason is probably the availability of cheaper labour and land costs and looser regimes of environmental and planning control, which may in fact be lacking. In order to attract foreign investments, administrative units have engaged in fierce competition in terms of providing better and more infrastructure within their own jurisdiction. Luo (2002) describes local economies as "feudal economies" with government officials guarding local or self-interests, affecting genuine economic and spatial integration. The existence of numerous "feudalistic" administrative units in the PRD has led to serious problems in coordinating road and railway networks, flooding controls and general planning. For instance, within a radius of 58 km, there are five airports of international standards. The Chinese ports of Chiwan, Shekou, Yantian, Ma Wan, Zhuhai and Dongjiaotou and Hong Kong are all within a 35-nautical mile circle (Ng, 2000, p. 74).

D. URBAN SYSTEM PLANNING IN THE PRD

According to Article 7 of China's City Planning Law [4] enacted in 1990, "[t]he comprehensive plan for a city shall be coordinated with territorial planning, *regional planning*, water space planning and comprehensive planning for the use of land" (my emphasis). And urban system planning is an important component of regional planning. As early as 1988, the Construction Commission of Guangdong Province had realized the problems of developments in the PRD and had commissioned a study on the PRD Urban System Plan. A plan was made in 1989 by the Geography Research Institute of the Guangdong Academy of Social Sciences, and the provincial government suggested that towns and cities refer to the plan for implementation (Construction Commission of Guangdong Province and the Planning Group of the Pearl River Delta Economic Region Urban System Plan, 1996, p. 105). However, like many other plans in China, it had no teeth and towns and cities only implemented those measures beneficial to their development (op cit., 1996, p. 105). With accelerated development problems in the PRD, at the end of 1994, the provincial government initiated the PRD Regional Plan, which was completed in 1995. Five themes were researched in the regional plan and the urban system plan was one of them. [5] Ten years later, frenetic development in the PRD prompted the Ministry of Construction and the Provincial Government to formulate a new Urban System Plan in 2005. These two Urban System Plans represent novel planning

practices that try to transform inter-city competition to fostering regional competitiveness in China's transitional economy. Let us first review the 1994 Urban System Plan.

1. Urban System Plan for the PRD: The planning for the urban agglomeration of PRD economic region—coordination and sustainable development (1994) [6]

a. Process, goals and principles

The 1994 Urban System Plan for the PRD was formulated by a team of 12 dedicated young planners after six months of intensive survey, research and deliberations. Planning expert groups, leaders and technical staff of various cities in the PRD had contributed to the finalization of the plan which had undergone six rounds of revisions. The objectives of the 1994 Urban System Plan for the PRD were to enhance economic growth and ensure environmental sustainability through forward coordinated planning and development among local authorities (Ng and Tang, 1999, p. 602). Four planning goals and four planning principles were put forward:

- To analyse the urbanization path of the PRD and to formulate a development strategy for the urban system;
- To control development of various land uses and to coordinate planning and construction;
- To use standards and guidelines to regulate planning and construction so that the level of urban development can be improved;
- To employ feasible administrative and legal measures to implement the plan
- The planning principles are:
  - Overall efficiency;
  - Complementarities of comparative advantages;
  - Sustainable development; and
  - Care for the people.

b. Development goals and strategy

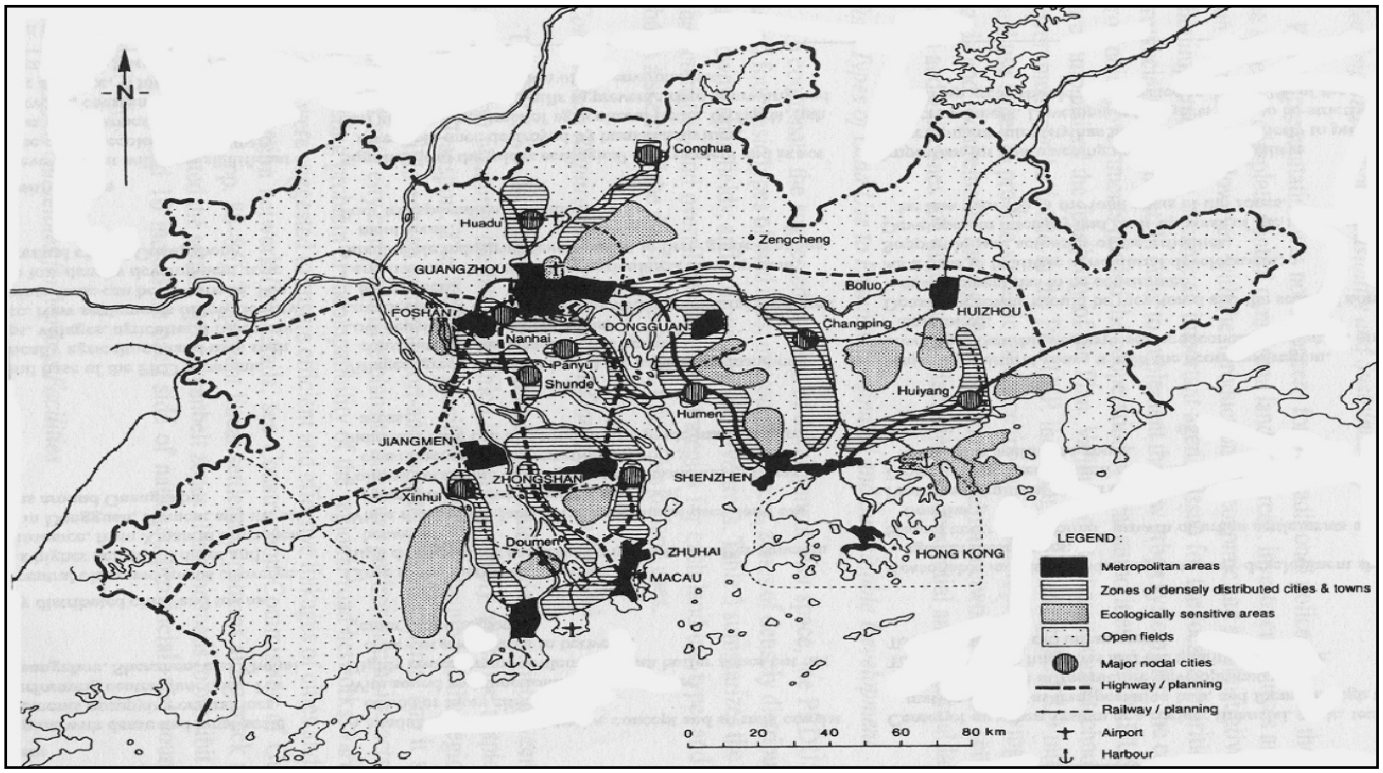
Similar to other regional plans, strategic visions were developed. Three major strategic goals were identified in the Urban System Plan for the PRD (CCGP, 1996, pp. 25-27):

- To develop the PRD as a major mega-urban region in Pacific Asia and to be the dragon head for socio-economic development in Southern China;
- To develop a modern urban system with an improved rank size distribution of different types of cities, a clear division of labor with complementary functions, and a rational and balanced distribution of transportation and communication networks; and
- To enhance rural-urban integration.

The whole strategy was plan-led rather than policy-led. The plan also exhibited a strong tradition of a centrally planned economy: population forecasts were used for allocating urban and rural lands. It was forecasted that by the year 2010, total population of the PRD would be about 34 million, 5 million of which would be temporary population. And within these 34 million, 75 per cent would be urban and 25 per cent would be rural population. And based on these population figures and assumptions on land requirements of urban, rural and temporary population, land requirements were predicted. Based on the forecasts and allowing for 25 per cent flexibility, a total of about 3,400 km^2 was planned for urban uses and about 1,000 km^2 were planned for rural settlements. This type of allocative planning was made redundant quickly because developments in the PRD have been unprecedented. In the 2000 Census, over 42 million people were found in the PRD, and about 20 million were floating population.

Figure 4 captures the development strategy proposed in the Urban System Plan for the PRD. To boost the role of the PRD as the "dragon head" of southern China, the Plan suggests that the cities of Guangzhou (provincial capital), Shenzhen and Zhuhai (special economic zones) should play a dominant role in the hierarchies of cities in the central, east and western metropolitan subregions. Guangzhou would be a core city, supported by Shenzhen and Zhuhai as sub-cores. These cities were given the role of stimulating growth of other cities within their sub-region to achieve "group championship."

Figure 4. Development strategy of the Urban System Plan for the PRD



Source: Ng, M.K. and Tang, W-S. (1999). "Urban system planning in China: a case study of the Pearl River Delta." *Urban Geography*. Vol.20, Issue 7, p.610, modified and synthesized from Construction Commission of Guangdong Province and the Planning Group of the Pearl River Delta Economic Region Urban System Plan (CCGP) (1996). *The Planning for Urban Agglomeration of the Pearl River Delta Economic Region: Coordination and Sustainable Development*. Beijing: China Construction Industry Press, pp.56, 63 (in Chinese).

The core and sub-core cities in the PRD will serve as radiation foci being linked up by infrastructure such as highways, railways or information superhighway corridors. Through coordination of large-scale infrastructure development, rural and urban spaces within the region would be integrated economically and spatially. As a result, two development axes and seven growth axes were proposed to

integrate the PRD. According to the Plan, the central metropolitan area should serve as a transportation hub, a comprehensive industrial base, a centre of trade, technological development and scientific research. Population should be kept under 10 million and population density under 1,000/km^2. The Eastern metropolitan area should serve as the export processing centre for industries in Hong Kong and develop international finance, trade and high-tech industries. However, there is a need to control population growth and to conserve the Dongjiang water. Comparatively speaking, the Western metropolitan area has underdeveloped external links. Hence it would focus on utilizing its rich cultural and natural resources for the development of tourist industries.

c. Implementation proposals

To achieve this Plan, the PRD was divided into various land use zones and standards and guidelines were set for urban facilities and residential and industrial land uses. The Plan also attempts to enhance coordinated development between land use and transport planning. Cities and towns in the PRD were divided into three types, with differing standards for the provision of urban facilities:

- Type "A": Guangzhou, Shenzhen and Zhuhai;
- Type "B": Foshan, Jiangmen, Zhongshan, Zhaoqing, Dongguan and Huizhou; and
- Type "C": local centre cities and satellite towns.

Various legal, management, fiscal, land supply, and transport policies and mechanisms had also been proposed to coordinate planning and implementation of the PRDUSP.

d. Comments

The Urban System Plan for the PRD represents the provincial government's efforts in coordinating unfettered and uncoordinated developments by various local authorities in an era of administrative decentralization and intense economic competition. However, for a variety of reasons, the Plan has remained a goodwill Plan which was not effectively implemented nor enforced. As the Plan was made within six months, one can imagine that local authorities, not to mention other groups, had limited time to contribute, respond or modify the Plan. If regional planning requires the participation of individuals "who know in detail where they live," the Urban System Plan for the PRD which was made without them was "a barren externalism" (Mumford, 1938).

In fact, little was said about sectoral policies or roles of the emerging "private" sector, implicitly suggesting that the local authorities then still had considerable control over developments within their territories. Instead of starting with a wider vision of China as a whole and explaining how developments in the PRD could help achieve the national vision, the Plan started with a discussion of population size and land use requirements. The legacy of a centrally-planned economy prevailed then and governments at every level, up to this date, are used to responding to social and economic targets set by the higher levels of government through various five year plans. The notions of sustainable and coordinated development were discussed but no strategy was put forward to realize this principle.

The strategic vision of developing the PRD into a major mega-urban region was only mentioned in passing. Indeed, there was inadequate diagnosis of the global and local nexus. What roles should China play in the international and regional contexts. The treatment of the then British colony was also not satisfactory. Hong Kong was not in the picture of the Plan. However, at that time, Hong Kong's GDP was six times that of the whole PRD. Putting Hong Kong in the picture then would have dramatically changed

the Plan's strategy, that is, having Guangzhou as the core and Zhuhai and Shenzhen as the sub-cores. One could imagine that this Urban System Plan had little teeth when it comes to implementation.

2. PRD Urban System Coordinated Development Plan 2004-2020 (Plan 2005)

The new regional plan aims at boosting the competitiveness of the PRD and is made according to the nation's City Planning Act, Methods of Plan Making, The Tenth Five-Year Plan of the Guangdong Province, Urbanization Framework of the Guangdong Province and Opinions on Promoting Urbanization, etc. and an understanding of real developments in the PRD (Guangdong Government, 2005, Article 1). To a very large extent, the Plan 2005 is still a "plan-led" rather than "policy-led" document. The spatial development strategy has continued to be premised upon the specifications of population size and the consequent land development areas. However, the process of plan formulation, the guiding thoughts and principles, development goals, proposals and implementation measures are more elaborate and operational. Nevertheless, the Plan 2005 continues to be basically a top-down document which is not formulated upon consensus.

a. Process, thoughts, goals and principles [7]

After two decades of rapid industrialization and urbanization, the PRD has become a world factory. Unlike 10 years ago, when localities were fiercely competing for growth and investments, the region as a whole has begun to realize that coordination after all may be necessary in face of keen competition from mega urban regions within and outside China. In July 2003, under the guidance of the Guangdong Provincial Government and the Ministry of Construction, the Construction Bureau of the Guangdong Province, a planning team comprising the China Academy of Urban Planning and Design, the Shenzhen Municipal Academy of Urban Planning and Design and the Guangdong Province Development Research Institute, was formed. The team started with a thorough survey of the region through over 30 interviews, forums, expert dialogue and consultations, an advancement over the previous Urban System Plan for the PRD. In January 2004, the Plan was thoroughly discussed in a conference on urbanization in Guangdong. The Plan was then revised and improved by May 2004. An expert meeting was called in July 2004 to deliberate and assess the Plan, which was further revised for approval by the Provincial Government in December 2004. The Plan 2005 was even mounted on the internet from September to November 2004 for public comments before it was sent for approval by the Guangdong Provincial Government and Guangdong People's Congress. The Plan was eventually enacted in April 2005.

While the Urban System Plan for the PRD was a path-breaking effort by planners in China to formulate a plan based on an understanding of developments on the ground, the Plan 2005 has further developed this new planning approach. After all, over 20 years of rapid growth has brought many problems to the PRD. Without a thorough understanding and assessment of these issues, no meaningful regional plan can be formulated. Unlike the previous plan, Plan 2005 also puts emphasis on understanding the relationships between the PRD, the wider pan-PRD region,[8] national development strategy and international developments. The Plan 2005 has a total of 106 articles in 10 chapters: overview; development goals and scale; spatial development strategy; overall spatial development planning; spatial support systems planning; sectoral polices and spatial governance; coordinated spatial planning of cities; important action plans; guarantee measures and supplementary clauses.

Regional polarization has worsened as the PRD develops and it is reflected in imbalanced development between the Eastern and the Western sides of the Delta, the inner and outer rings of the Delta and rural urban disparities. Non-stop fervent development in the PRD has posed serious sustainability issues for the region and serious contradictions can be seen: economic growth vs. shortage of resources; rising social demand vs. delayed public infrastructure; rapid growth of cities vs. worsening environmental stress. The overall goal of the Plan 2005 is therefore "to capture the opportunity to

spearhead and accelerate coordinated development to boost regional competitiveness and to build a dynamic urban system" (Article 1, Guangdong Government, 2005). Five development goals are listed from Articles 6 to 10 in the Plan 2005:

1. To be a champion of China's drive towards globalization through cooperation with Hong Kong and Macau.

2. To be a growth engine of the "Pan-PRD Region" and a hub between the global and domestic economies.

3. To be a showcase of civilised development: protecting heritage, stressing on cultural and educational enterprises, nurturing local character to promote the PRD spirit: focusing on competition and efficiency; promoting social justice; advocating mutual understanding and acceptance; building a "harmonious PRD" through policies, laws and institutions; and emphasizing on environmental management to build a "green" production system and a "green PRD."

4. Experimental ground for deepening reforms and institutional innovations at different scales in social management, government administrative and rural-urban and regional coordination.

5. Champion of regional, urban and rural cooperation – improving regional coordinative mechanisms, strengthening internal cooperation between towns and cities, between the Eastern and Western sides of the PRD and the mountainous areas, and between the PRD and the Pan-PRD region in terms of capital, technological development, human resources and market mechanisms to realize regional integration and commonwealth. At the same time, should strengthen agricultural modernization, promoting agricultural ecology and efficient agriculture to end "dualism" between urban and rural areas.

Sustainable development is the overarching principle in guiding the formulation of the Plan 2005: "to base in Guangdong with an eye of the nation and to face the world; to develop a path of economically sustainable development, with all round social progress, sustainable utilization of resources, environmental improvement and benign ecological cycles that will build the PRD into a champion of socialist modernization" (Guangdong Government, 2005, p. 3). Based on this guiding thought, four important planning principles are outlined:

- Rightly coordinate the relationships between the "whole" and "parts," "long-term" and "short-term" so that the long-term and macro benefits of the urban system will be complementary to the needs of different business and Government players in various parts of the region at different stages of development.

- Rightly handle the relationships between "market and government," "bottom-up and top-down" forces – using market forces as the basis for resources allocation while enhancing the control of the Government over public and strategic resources. Sustaining persistent regional economic growth while facilitating the government's ability to allocate important resources and core elements to enhance regional competition.

- Rightly handle the relationships between "advanced and lagging regions," "sensitive and normal regions" – guiding and facilitating economic restructuring in advanced regions; providing infrastructure and policy support for lagging areas; coordinating via higher level Government authorities the conservation of ecologically sensitive regions or resource areas of strategic

importance; and practice limited governance, reasonable guidance to allow local initiatives to take place.

- Rightly handle the relationships between "strictness and flexibility" and "higher level and lower level" authorities – specifying the respective roles of various Government departments at different levels of the Government. For strategic resources of regional importance, practice strict planning control via the higher level Governments. Specific guidelines and coordination mechanisms are put forward for regional infrastructure development crossing administrative boundaries. Flexibilities should be allowed with reference to the scale and nature of development of various cities and towns (Guangdong Government, 2005, p. 3).

b. The Development Strategy

The strategy is premised upon the control of a population of 65 million by the year 2020 though infrastructure planning will be based on a population figure of 80 million (Article 11). The annual rate of increase of land use requirement will be cut from five per cent to three per cent and per capita land use will be cut from 160m^2 to 140m^2. By year 2020, total land requirement will be capped at 93 million km^2, 22.3 per cent of the total land area. New development areas will amount to 26.6 km^2 (Article 12). At the same time, 83 million km^2 will be conserved, which is about 20 per cent of the total land area (Article 13).

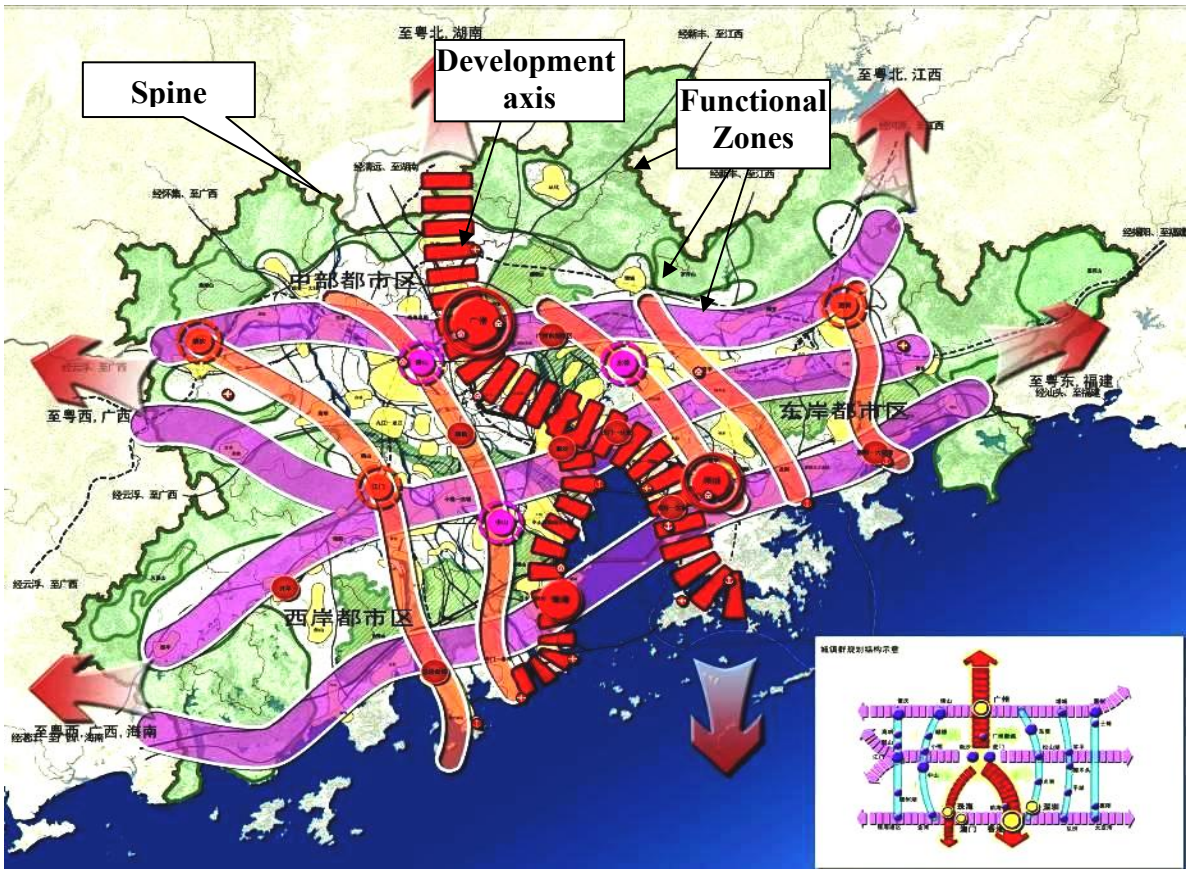
Five spatial development strategies are outlined: (1) strengthening the core, building the spines and boosting competitiveness in the regional core; (2) opening up the inner provinces, nurturing coastal regions to increase development spaces; (3) upgrading the west wing, enhancing the east wing to promote overall level of development in the PRD; (4) supporting the outer ring, integrating the inner ring to propel even development in the region; and (5) conserving nature, improving environment to realize harmonious development between man and nature (Articles 15 to 19).

Figure 5 summarizes the idea of "one spine, three zones and five development axes" system. "The 'spine' is centred at the Provincial capital Guangzhou: to the South it goes to Shenzhen and Zhuihai and even to Hong Kong and Macau; to the north it goes along the Guangzhou Peking Railway to link up with other provinces. Through high-level infrastructure development and efficiency cooperation among various governments, the 'spine' will line up important cities and towns, together with high-tech industries, high-end services and transport hubs to complement developments in Hong Kong and Macau to enhance the competitiveness of the greater PRD" (Article 22). The three East-West running "functional zones" help link the PRD with other provinces to share resources and promote economic cooperation (Article 24). The five north-south running "development axes" are city-town-production axes which aim to nurture different types and scales of production activities (Article 26).

According to Article 29, there will only be one major urban core (from Guangzhou to Shenzhen) and one sub-core (Zhuhai), together with local cities. The urban core stretches along the spine while the sub-core in Zhuhai will strengthen links with Hong Kong and Macau in order to trigger developments in the western part of China. Local cities are not only the social, economic and cultural centre but they should also lead county-level rural and urban developments. Figure 6 shows major industrial clusters in the PRD. Seven major zones are identified (Article 35):

- Major agricultural production areas: choice agricultural production sites such as aqua-products in Foshan, horticulture in Guangzhou and Foshan and vegetable bases in Huizhou and Zhaoqing; counties near cities; mountainous areas; and demonstration sites of agricultural modernization.

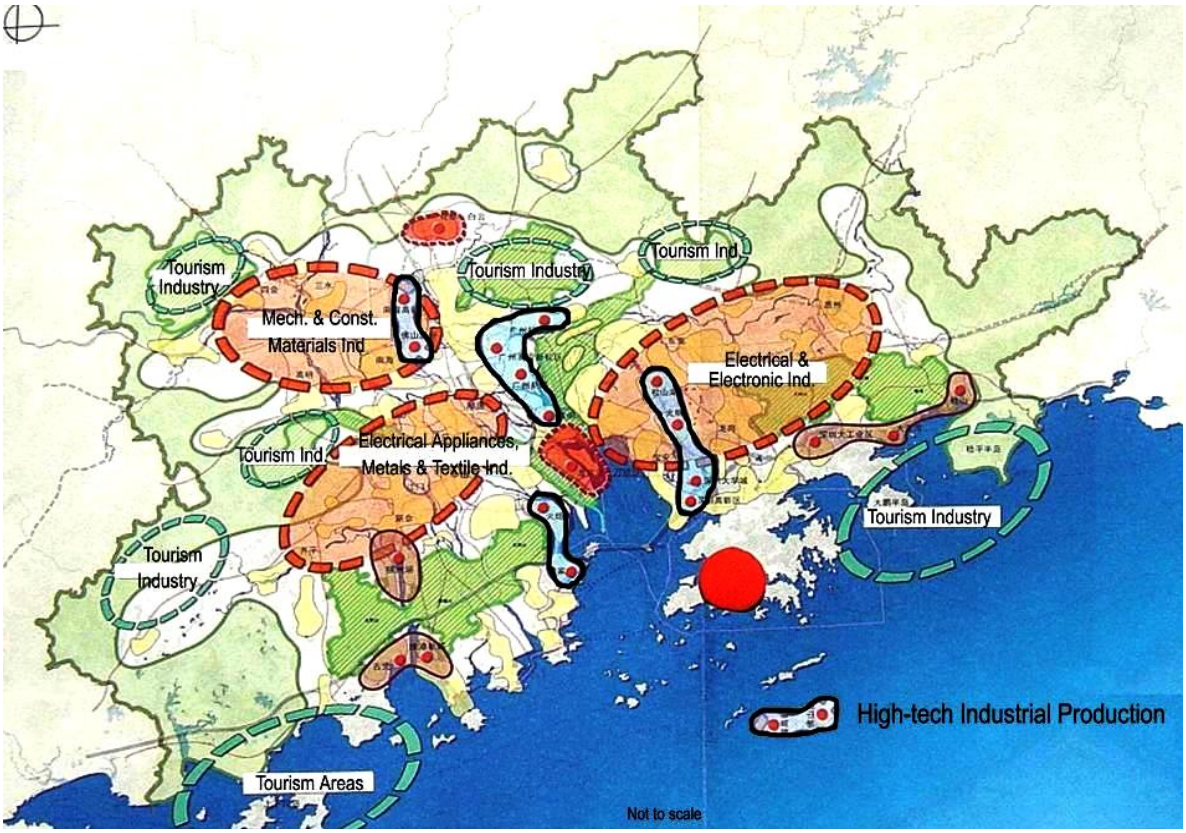
Figure 5. Spatial Development Plan: "One spine, three zones and five development axes"



Source: Modified from Guangdong Government (2004). *Pearl River Delta Urban System Coordinated Development Plan*. Ministry of Construction, Guangdong Government (in Chinese).

- Outward processing zones: mechanical, electrical and construction material industries in the middle of the PRD; electrical and electronic appliances industries on the eastern side of the PRD; and electrical, metals and textiles industries on the western side of the PRD. There are also stretches of outwards processing zones at the periphery of the PRD.
- Coastal basic production cluster: in Huizhou and Zhuhai.
- Heavy industry production sites: Nansha and Huangdu in Guangzhou.
- High-tech industrial zones: the areas along "the spine" will be upgraded into high-tech and high-end service areas – Science Park in Guangzhou, High-tech Districts in Foshan, Dongguan and Zhuhai.
- Logistics Centre in Guangzhou, Shenzhen and Zhuhai.
- Tourism industries around mountainous areas, coastal zones and heritage and cultural routes.

Figure 6. Industrial production clusters in the PRD



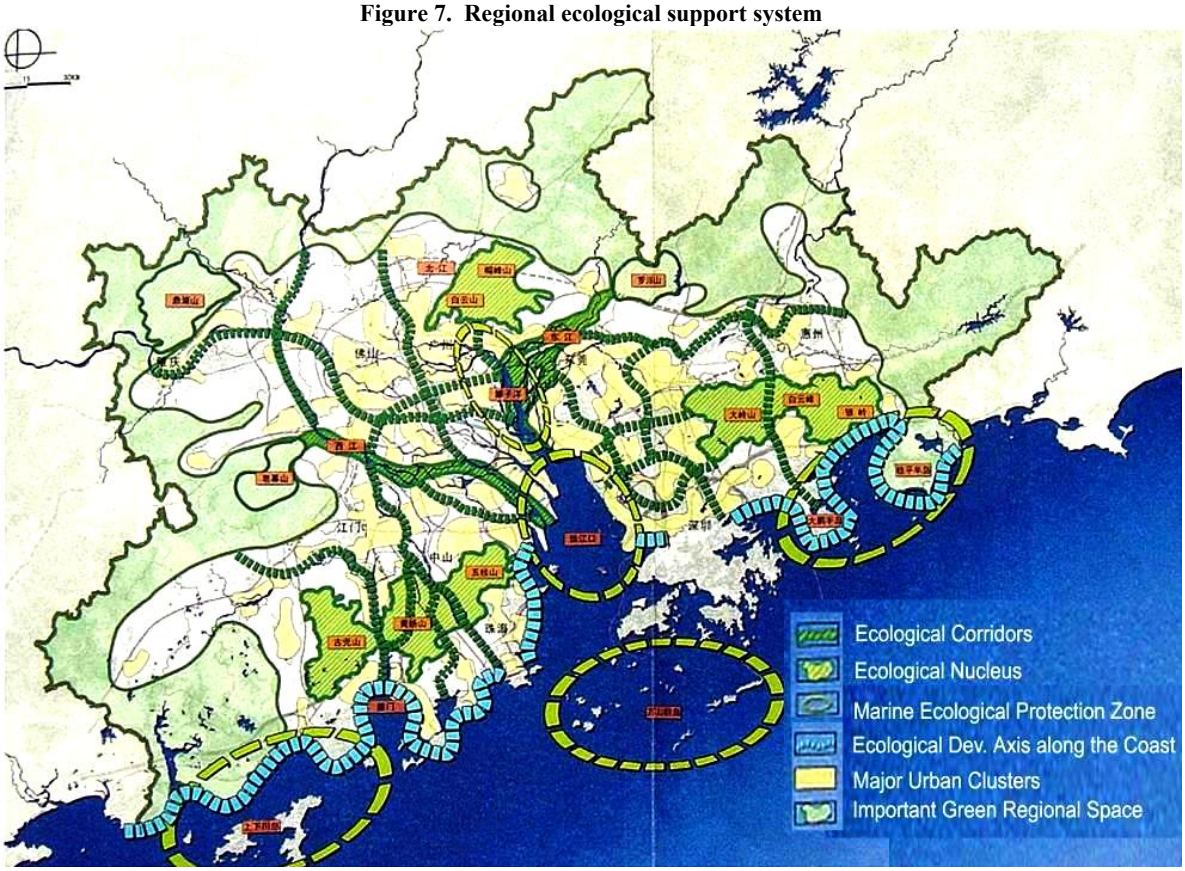
Source: Modified from Guangdong Government (2004). *Pearl River Delta Urban System Coordinated Development Plan*/ Ministry of Construction, Guangdong Government (in Chinese).

Based on the industrial production clusters, three metropolitan areas are identified (Chapter 4): the central metropolitan area surrounding Guangzhou, Foshan and Zhaoqing focusing on production services and tertiary industries to boost the competitiveness of the PRD. The eastern metropolitan cluster consists of Shenzhen, Dongguan and Huizhou focusing on value added manufacturing industries, coastal industrial development and high-tech industrial growth. There is also room for development of the tertiary industries so that the cluster can become a production and services centre. The western metropolitan areas include Zhuhai, Zhongshan and Jiangmen. It is anticipated that this area will grow considerably in manufacturing, tourism and logistics after the construction of the Hong Kong-Zhuhai-Macau Bridge.

Chapter 5 outlines different systems to support the spatial plan: section one focuses on the ecological system; section two is on the social environment; section three is about the communication system; and section four is about environmental and disaster management. In section one of Chapter 5, The Plan 2005 emphasizes on a sustainable regional ecological support system. A regional green plan based on "one ring, one zone, three nuclei and networked corridor" is put forward (Article 42) (Figure 7). The "ring" runs from the western side of the PRD to the mountainous areas in the north and eastern parts. The "zone" runs along the coastal areas of the PRD. The three "nuclei" are the three major ecological nuclei in the central, eastern and western parts of the PRD. They play a very important role in ameliorating the impacts of the dense urban system in the PRD. The networked ecological corridors link the rivers, water body, agricultural fields and green spaces together contributing to the stabilization and health of the ecosystem in the region. While all these green spaces will be carefully conserved and managed, agricultural land will also be strictly protected. Water resources and air quality will be

monitored with an aim to improving them. In order to better manage natural resources, recycling industries will be encouraged and local authorities will be charged for resources utilization. Environmental impact assessment will be strengthened and used to assess development projects and to avoid problems of cross-boundary pollution problems (Article 47).

Figure 7. Regional ecological support system



Source: Modified from Guangdong Government (2004). *Pearl River Delta Urban System Coordinated Development Plan*. Ministry of Construction, Guangdong Government (in Chinese).

Regarding the social aspects, the Plan 2005 discusses the importance of "protecting and discovering historical heritage and cultural resources; building community places with local character; nurturing the Guangdong spirit (dare to try; pragmatically progressive; open-mindedness, dutiful and willingness to sacrifice); building the PRD into a safe, comfortable, highly civilised, harmonious development zone that is full of character and charm" (Article 48). Article 49 stipulates the importance of handling the proper balance among economic growth, social development and preservation of historical cultural heritage. Articles 50 to 54 outlines the provision of social amenities; development of the cultural industries; specific guidelines to the building of city and townscapes that reflect the rich heritage of the region, as well as other related policies such as educating the whole population towards life-long learning, perfecting the social security system, promoting social justice, democracy and the legal framework to boost general capacity towards conflict resolution.

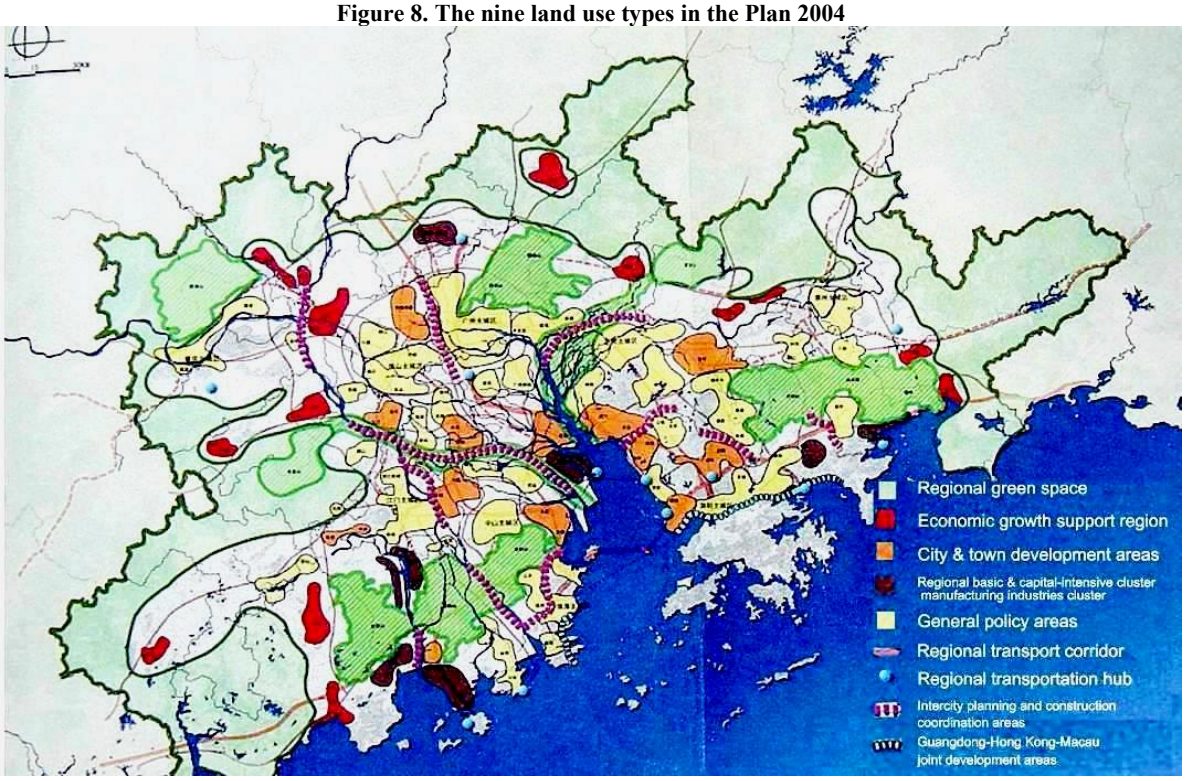
In section three of Chapter 5, the Plan 2005 contains a very comprehensive transportation network plan which consists of a highway network of "two rings, six horizontal links and 13 vertical links"; a railway network of "three horizontal links and seven vertical links"; an intercity railway network of "four horizontal and four vertical links," "three horizontal and three vertical" aviation routes, together with five major airports and four deep seaports which contribute to a well-connected and multi-modal sea, land and

water transportation network. The final section of Chapter 5 discusses the pressing importance in tackling environmental pollution issues and the need to undertake various environmental and anti-flooding engineering projects to ensure the safe operation of the region (Articles 61-64).

c. Spatial Governance

Instead of having only four land use zones as stipulated in the first Urban System Plan for the PRD, the Plan 2005 (Chapter 6) has a total of nine land use zones which are governed through four modes of governance. Figure 8 shows the nine types of land uses and Table 3 lists the mode of governance that should be adopted for different types of land uses. For important regional resources such as green spaces and major transportation network, a stronger mode of governance is adopted. However, for developments that require cooperation, partnership or guidance modes of governance are encouraged.

Figure 8. The nine land use types in the Plan 2004



Source: Modified from Guangdong Government (2004). *Pearl River Delta Urban System Coordinated Development Plan*. Ministry of Construction, Guangdong Government (in Chinese).

d. Implementation

Chapter 7 (Article 71-80) of the Plan 2005 outlines what individual cities has to do to coordinate planning and development whereas Chapter 8 (Articles 81-97) lists the major action plans: external connections, bay area (from Zhuhai to Shenzhen) development; control of the green zones; heavy industrial bases; integration of transport; fostering sunshine coasts; new towns development and building a regional information platform.

TABLE 3 – TYPE OF GOVERNANCE FOR DIFFERENT TYPES OF LAND USES

Level	*Scope*	*Measures*
Top-level Governance (Monitoring governance)	Regional green space Regional transport corridor	Provincial government or headquarter departments via administrative or legal means to specify "green" and "red" lines, which will be strictly observed by the city governments.
Second-level Governance (Controlling governance)	Regional basic & capital-intensive manufacturing industries cluster Regional transportation hub	Provincial Government specify development type, scale of construction, environmental requirements and construction standards. City governments to build and construct.
Third-level Governance (Coordinative governance)	Intercity planning and construction coordination areas Guangdong-Hong Kong-Macau joint development areas	Related cities work together to produce joint development plans to ensure coordinated provision of services and functions. Plans damaging neighbouring cities will be asked by the Provincial government to be changed.
Fourth-level Governance (Guidance governance)	Economic growth support region City & town development areas General policy areas	According to legal requirements, cities will formulate lower-level plans. All cities have to observe diligently the planning policies, regulations, standards and guidelines in producing their plans.

Source: Guangdong Government (2005). *Pearl River Delta Urban System Coordinated Development Plan.* Ministry of Construction, Guangdong Government, Article 70, pp. 33-34 (in Chinese).

In Chapter 9, the Plan 2005 specifies a lot of measures to ensure that the Plan will be taken seriously (Guangdong Government, 2005, Articles 98-102):

- Under the Provincial Ministry of Construction, an Office on PRD Urban System Planning and Management (Management Office from here onwards) was established to:

    1. Review periodically (principally every five years) the PRD Urban System Coordinated Development Plan;

    2. Participate in the evaluation and approval of sectoral planning in the region and assessing sites for locating regionally important infrastructure;

    3. Working together with local governments to coordinate and ensure that spaces are managed according to the specified mode of governance, and to resolve conflicts;

    4. Through information tracking and analysis, and observations by planning inspectorates, monitor the development and management of the PRD urban system and to propose policy or action changes, if necessary;

    5. Provide the general public with news of the PRDUSP and organizing public participation activities, while providing technical support to local authorities; and

    6. Based on the needs of the Government, undertake research work related to regional spatial development and city building.

- Enacting the "PRD Urban System Planning Regulations" to:

    1. Legitimize the statutory status of the PRD Urban System Coordinated Development Plan 2005 and specify the formulation, evaluation and approval mechanisms;

2. Specify the legal status and composition, functions and coordination measures of Management Office;

3. The division of power and responsibilities between the Leading Group and the Management Office and local governments in terms of planning and management; and

4. Legal responsibilities for breaching the PRD Coordinated Development Plan and the PRD Urban System Planning Regulations.

- Various measures to improve implementation:

  1. Policy measures: formulation of commonly executed property, land, population, environmental and fiscal policies so that macro control can be exercised over regional development projects and the mobilization and allocation of important resources;

  2. Planning measures: plan coordination will be emphasized to boost compatibility of coordinated district planning. The Management Office should be notified when plans involving intercity areas are under negotiations;

  3. Economic measures: use market forces to facilitate joint infrastructure development to ensure economic efficiency and economy of scale;

  4. Technological measures: provide a reliable information platform for better development decision making and cooperation among cities and towns.

- Providing both "sticks and carrot" measures to encourage partnership and win-win situations:

  1. Perfecting business cooperation mechanisms, for example, joint activities to attract foreign investment, co-developing or coordinated relocation of business to enhance economic structures;

  2. Developing and perfecting compensation mechanisms to improve natural resources utilisation and environmental protection to enhance environmental sustainability;

  3. Mercerization of social amenities and at the same time ensuing public interest and public safety; and

  4. Construction and management of integrated transportation facilities: policies on inter-city public transportation; standardization of fees for public transport; developing a "smart card" system to facilitate regionalization of the transportation network; multi-model operations and standardization of fees for highways, etc.

- Monitoring mechanisms:

  1. The Management Office will work together with provincial departments and cities to formulate planning goals and indicator systems to monitor the progress of plan implementation. Local governments should guide the work of different departments based on the specified goals and indicators.

2. The Management Office will send Planning Inspectors to different cities to monitor the implementation of the Plan 2005. Should the Planning Inspector spot irregularities or illegal actions, he/she will report to the Provincial Government for follow-up actions;

3. The Management Office will be responsible for the establishment of a data bank and one representative should be identified for each provincial department and local Government to help build this data bank;

4. The Management Office will regularly produce "Evaluation Report on the Implementation of the PRD Urban System Coordinated Development Plan" to the Provincial Government and the Leading Group. The approved report will be published publicly. All cities and towns need to report development progress made in the previous year before May each year;

5. Based on the monitoring work, the Management Office will adjust the period for Plan review; and

6. The Management Office and Provincial Departments and Local Governments will collaborate and research on specific issues.

E. CONCLUDING REMARKS

Economic capital can only be sustained with the support of rich and strong social and environmental capital. Unless people in the Hong Kong-PRD region treat the Delta as their life space, a region that can enrich and nourish their lives, rather than just a resource base to be exploited for economic growth, the region cannot be sustainable. In the rush to move away from a centrally-planned economy, various local entities in the PRD have tried to capitalize on the given policies and pursue economic growth at all costs. It is the right time for the region to rethink about its future development strategy. The Plan 2005 is moving in the right direction as sustainable development is identified as the guiding planning principle. The establishment of the Management Office is also very important though its effectiveness can only be seen as time goes by. If experience elsewhere serves as any indicator, a proper regional governance structure is essential and a management office with limited resources may not be adequate to monitor and review a development plan for a region with over 44 million population.

The Plan 2005 is still "plan-led" rather than "policy-led." Instead of developing a common vision through inclusive envisioning, dialogue and consensus building and taking stock of the region's strengths, weaknesses, opportunities and threats, the whole planning process though packed with consultations and interviews was still rather top-down and expert-driven. The Plan 2005 is imposed from above and outside local jurisdictions and depends a lot on administrative monitoring by the resource-strapped Provincial Government over the implementation process. As a spatial plan is formulated and there are few funding incentives for local authorities to work together, local authorities probably will not be very keen to respond to broad policy directives and come up with innovative and creative solutions to problems unique to particular localities.

Despite the rhetoric, the Plan 2005 is basically a physical plan rather than a plan that is carefully guided by the concept of sustainable development. Unlike the previous urban system plan, the Plan 2005 is much stronger in ensuring and monitoring implementation. However, similar to the 1994 Urban System Plan of the PRD, the Plan 2005 only focuses on the government sector. It reflects that even after more than two decades of economic reforms and open door policy, the Chinese political economy is still very much plan-ideological (Oi, 1995).

However, with progressive internationalization of China's transitional economy, other economic forces are bound to play increasingly important roles in the region's future development. Currently, the Plan 2005 relies on the Management Office and local authorities to review and modify it. However, mechanisms should be established to review the implementation and consequent modification of the Plan by more stakeholders in the PRD region. The Hong Kong-PRD region badly needs a more inclusive and transparent regional governance mechanism to envision its future development.[9]

The PRD is one of the three major life-supporting river deltas along the east coast of China. It is a life space for millions of people whose ecological footprints probably extend to many other parts of the world. It is important for the local authorities to realize the importance of long-term sustainability. Unless sustainable regional development is pursued to rationalize infrastructure development, coordinate development strategies and tackle social and environmental problems, the existing culture of cutthroat competition, if continued in the coming wave of economic expansion, will certainly create more harm than good. Long-term prosperity of the Hong Kong-PRD region will depend on how well different stakeholders in the Delta pick up the sustainable development mindset and hence willingly to engage collectively in nourishing the region not just as an economic space by also as their life space!

NOTES

[1] According to the Fifth National Population Census in 2000, the total population of the PRD reached 42.89 million The Fifth National Population Census adopted a de jure method (usual residents) and used midnight, November 1, 2000 as the reference time. The 2006 figure is listed in Guangdong Statistical Yearbook, http://www.gdstats.gov.cn/tjnj/table/04/e4_1.htm, accessed on 1 December 2007.

[2] Figure on per capita consumption expenditure of rural households: Guangdong Statistical Bureau, *Guangdong Statistics Bureau, Guangdong Statistical yearbook 2007*, http://www.gdstats.gov.cn/tjnj/table/10/e10_14.htm; Figure on per capital consumption expenditure of urban households: Guangdong Statistical Bureau, *Guangdong Statistics Bureau, Guangdong Statistical yearbook 2007*, http://www.gdstats.gov.cn/tjnj/table/10/e10_3.htm, accessed on 1 Dec 2007.

[3] See footnote 2 above.

[4] City Planning Law of the People's Republic of China, http://www.clapv.org/new/show_en.php?id=32&catename=L, accessed on 19 December 2007.

[5] The other themes were environmental protection, infrastructure, economic development and social development.

[6] Unless specified otherwise, the contents are extracted or synthesized from CCGP, 1996 and Ng and Tang, 1999.

[7] Unless specified otherwise, the following is extracted from Guangdong Government, 2004.

[8] The "Pan PRD Region" is made up of nine provinces and two districts: Guangdong, Fujian, Jiangxi, Guangxi, Hainan, Sichuan, Guizhou, Yunnan; and the Hong Kong and Macau Special Administrative Regions.

[9] The government of Hong Kong is currently undertaking a greater PRD study which examines the roles Hong Kong should play in the region.

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CLIMATE CHANGE AND URBANIZATIONS: EFFECTS AND IMPLICATIONS FOR URBAN GORVERNANCE [1]

David Satterthwaite, International Institute for Environment and Development, United Kingdom

A. INTRODUCTION

Urban governments have critical roles in adaptation to climate change in all nations as well as in mitigation (reducing greenhouse gas emissions). It can be argued that they have the central role in adaptation within their jurisdictions – although it is obvious that they need a supportive institutional, regulatory and financial framework from higher levels of government and, for most low- and middle-income nations, also from international agencies. This paper will focus on the effects of climate change on urban areas in low- and middle-income nations and the implications for urban governance. It will emphasize how most adaptation to the likely climate change-related dangers over the next few decades fit well within a local development agenda.

However, unlike most environmental hazards, local governments in low- and middle-income nations have no capacity to reduce the climate change-generated hazards that those within their jurisdiction will face. For many environmental hazards, local governments can reduce the hazard – for example, treat water before it is distributed, reduce breeding possibilities for disease vectors, reduce physical risks through better quality buildings and infrastructure, traffic management and reduce exposure to dangerous chemicals through pollution control and occupational health and safety. But hazard reduction from climate change in low- and middle income nations depends on major changes in lifestyles and consumption patterns among middle and upper income groups, most of whom live in high-income nations. There is a pressing need to address adaptation in urban areas in low- and middle-income nations as these nations have most of the world's urban population, most of the high-risk urban sites and the largest deficiencies in adaptive capacity. Urban areas in low- and middle-income nations are also projected to house almost all of the world's population increase in the next two decades (United Nations, 2006).

Low- and middle-income nations now have three-quarters of the world's urban population (ibid). They also have most of the urban population at greatest risk from the increased intensity and/or frequency of storms, flooding, landslides and heat waves that climate change is bringing or will bring. The very high concentration of global deaths from extreme weather-related disasters in low- and middle-income nations is well known; if more precise data were available, it is likely to show that a large and growing proportion of these deaths are in these nations' urban areas (UN-Habitat, 2007). Most of the nations that are likely to face serious constraints on climate change-related fresh water availability are also low- and middle-income nations. In regard to sea level rise, China and India alone have more than a quarter of the world's urban population and the world's largest urban populations within low-elevation coastal zones. Africa, long considered a predominantly rural continent, has a larger urban population than Northern America – and close to two-fifths of its population in urban areas (United Nations, 2006). It also has a high concentration of its largest cities in coastal areas. Without adaptation, climate change is likely to bring ever-increasing numbers of accidental deaths and serious injuries and increasingly serious damages to people's livelihoods, property, environmental quality and future prosperity.

The adaptive capacity of urban governments obviously has national importance too, given urban centres' economic and political importance – including their role as markets and service centres for

agriculture and rural development. Even predominantly rural nations generally have more than half their GDP derived from industry and service enterprises, most of which are in urban areas.

The need for action by city/municipal governments on climate-change adaptation is also urgent – and probably more urgent than that suggested by the International Panel on Climate Change's (IPCC) Fourth Assessment. This is because of new analyses of the vulnerability of urban populations to the increased risks or new risks that climate change is likely to bring in most low- and middle-income nations that were not available to the authors of IPCC Working Group II. These have begun to make clear the scale of this vulnerability – for instance in the analysis of the number and proportion of urban populations within the low-elevation coastal zone (McGranahan, Balk and Anderson, 2007) and in a range of detailed local, city and regional studies (de Sherbinin, Schiller and Pulsipher, 2007; Dossou and Glehouenou-Dossou, 2007; Alam and Golam Rabbani, 2007; Revi, 2008; Awuor, Orindi and Adwerah 2008 and Levina, Jacob and Ortiz, 2007).

B. Climate Change Impacts on Urban Areas

1. Introduction

Table 1, drawn from the IPCC's Fourth Assessment, lists the different aspects of climate change, the evidence for current impact, projected future impacts and the zones or groups most affected. It highlights the different kinds of impacts that arise from changes in extremes and changes in means; it also notes the need to consider the impacts of abrupt climate change, while also noting that its significance is less clearly established.

Among urban centres in low- and middle-income nations, perhaps the most obvious increased risk comes from the likely increase in the number and intensity of extreme weather events such as heavy rainstorms, cyclones or hurricanes. Of course, there are large differentials in the scale of such risks between urban centres in each nation. The urban centres most at risk are generally those where these events are already common and cause serious damage and disruption – although there is some evidence of the geographic range of some extreme weather events expanding. Coastal cities that are at risk from storms will be doubly at risk as sea-level rise increases hazards from coastal flooding and erosion.

For any city, the scale of the risk from these extreme weather events is much influenced by the quality of housing and infrastructure in that city, the extent to which urban planning and land-use management have successfully ensured risk reduction within urban construction and expansion, and the level of preparedness among the city's population and key emergency services. For small and large coastal settlements, the integrity of coastal ecosystems and in particular protective mangrove and salt marsh systems will also influence risk.

City dwellers in high-income nations have had risks in relation to injuries and deaths much reduced by decades of investment in housing and infrastructure – and economic/financial losses much reduced by insurance. But the devastation of New Orleans by Hurricane Katrina in 2005 is an example of how there are still exceptions – both in the lack of investment in flood defences coupled with degradation of the coastal environment, and in the inadequate institutional capacity of emergency services. This is also an example of deliberate local political choices to favour new development over risk reduction. New Orleans planned the expansion into the Lower 9th Ward (the lower part of the city that was devastated by Katrina); in 1999 the New Orleans Planning Commission stated that development in this area represented a significant potential employment for the city (Burby, 2006).

Hurricane Katrina also illustrated the higher vulnerabilities of many lower-income groups and this is an issue that is even more pressing in most urban centres in low- and middle-income nations. In

TABLE 1 – SELECTED EXAMPLES OF CURRENT AND PROJECTED IMPACTS OF CLIMATE CHANGE ON INDUSTRY, SETTLEMENT AND SOCIETY AND THEIR INTERACTION WITH OTHER PROCESSES

Climate-driven phenomena	*Evidence for current impact/ vulnerability*	*Other processes/ stresses*	*Projected future impact/ vulnerability*	*Zones, groups affected*
a) Changes in extremes				
Tropical cyclones, storm surge	Flood and wind casualties & damages; economic loses; transport, tourism, infrastructure (e.g. energy, transport), insurance	Land use/ population density in flood-prone areas; flood defences; institutional capacities	Increased vulnerability in storm-prone coastal areas; possible effects on settlements, health, tourism, economic and transportation systems, buildings & infrastructures	Coastal areas' settlements, and activities; regions and populations with limited capacities and resources; fixed infrastructures; insurance sector
Extreme rainfall, Riverine floods	Erosion/landslides; land flooding; settlements; transportation systems; infrastructure	Similar to coastal storms plus drainage Infrastructure	Similar to coastal storms plus drainage infrastructure	Similar to coastal storms
Heat- or cold-waves	Effects on human health; social stability; requirements for energy, water and other services (e.g. water or food storage), infrastructures (e.g. energy transport)	Building design and internal temperature control; social contexts; institutional capacities	Increased vulnerabilities in some regions and populations; health effects; changes in energy requirements	Mid-latitude areas; elderly, very young, and/or very poor populations
Drought	Water availability, livelihoods, energy generation, migration, transportation in water bodies	Water systems; competing water uses; energy demand; water- demand constraints	Water-resource challenges in affected areas; shifts in locations of population & economic activities; additional investments in water supply	Semi-arid and arid regions; poor areas and populations; areas with human-induced water scarcity
b) Changes in means				
Temperature	Energy demands and costs; urban air quality; thawing of permafrost soils; tourism and recreation; retail consumption; livelihoods; loss of meltwater	Demographic and economic changes; land-use changes; technological innovations; air pollution; institutional capacities	Shifts in energy demand; worsening of air quality; impacts on settlements and livelihoods depending on melt water; threats to Settlements / infrastructure from thawing permafrost soils in some regions	Very diverse, but Greater vulnerabilities in places and populations with more limited capacities and resources for adaptation
Precipitation	Agricultural livelihoods, saline intrusion, tourism; water infrastructures, tourism, energy supplies	Competition from other regions/ sectors; water-resource allocation	Depending on the region, vulnerabilities in some areas to effects of precipitation increases (e.g. flooding, but could be positive) and in some areas to decreases (see drought above)	Poor regions and populations
Saline intrusion	Effects on water infrastructures	Trends in groundwater withdrawal	Increased vulnerabilities in coastal areas	Low-lying coastal areas, especially those with limited capacities and resources
Sea-level rise	Coastal land uses: flood risk, water logging; water infrastructures	Trends in coastal development, settlement and land uses	Long-term increases in vulnerabilities of low-lying coastal Areas	Same as above
c) Abrupt climate Change	Analyses of potentials	Demographic, economic, and technological changes; institutional developments	Possible significant effects on most places and populations in the world, at least for a limited time	Most zones and groups

Source: Wilbanks, Tom and Patricia Romero Lankao with Manzhu Bao, Frans Berkhout, Sandy Cairncross, Jean-Paul Ceron, Manmohan Kapshe, Robert Muir-Wood and Ricardo Zapata-Marti (2007), "Chapter 7: Industry, Settlement and Society," in Parry, Martin, Osvaldo Canziani, Jean Palutikof, Paul van der Linden and Clair Hanson (editors) *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge and New York, pp. 357-390

2. Flooding

Urban areas always present some risk of flooding when rainfall occurs. Buildings, roads, infrastructure and other paved areas prevent rainfall from infiltrating into the soil – and so produce more runoff. Heavy and/or prolonged rainfall produces very large volumes of surface water in any city, which can easily overwhelm drainage systems. In well-governed cities, this is rarely a problem because good provision for storm and surface drainage is easily built into the urban fabric, with complementary measures to protect against flooding – for instance, the use of parks and other areas of open space to accommodate floodwaters safely from unusually serious storms. In most cities, there is also scope for land-use management and incremental adjustments to increase flood-water management capacity. But in poorly-governed cities, this does not happen. Most residential areas have no drainage system installed and rely on natural drainage channels - and it is common for buildings or infrastructures to be constructed that actually obstruct these drainage channels. For instance, in Dhaka, buildings often encroach on or fill in drains and many natural drains have been filled up to construct roads (Alam and Golam Rabbani 2007). Mombasa faces comparable problems (Awuor, Orindi and Adwerah 2008). In most urban centres in Africa, Asia and Latin America, a significant proportion of the population is not served by solid-waste collection services. In cities or neighbourhoods with inadequate solid-waste management or drain maintenance, garbage and plant growth can quickly clog drains, leading to localized flooding with even light rainfall. There is also a growing documentation on the inadequacies in drainage and flood protection for urban centres in Africa and Asia and of the trend towards increased numbers of deaths and injuries from flooding in urban areas. There are also many case studies highlighting the vulnerability of certain cities to floods and/or sea level rise including Alexandria (El-Raey, 1997), Cotonou (Dossou and Glehouenou-Dossou 2007), Dhaka (Alam and Golam Rabbani, 2007), Banjul (Jallow et al., 1999) and Port Harcourt (Abam et al., 2000). A recent study documents the lack of provision in six African cities for reducing flood risks or for managing floods when they happen (Douglas et al., 2008). Floods are already having very large impacts on cities and smaller urban centres in many African nations – for instance the floods in Mozambique in 2000 which included heavy floods in Maputo, the floods in Algiers in 2001 (with around 900 people killed, and 45,000 affected); heavy rains in East Africa in 2002 that brought floods and mudslides forcing tens of thousands to leave their homes in Rwanda, Kenya, Burundi, Tanzania and Uganda, and the very serious floods in Port Harcourt and in Addis Ababa in 2006 (UN-Habitat 2007, Douglas et al., 2008). Discussions with residents in informal settlements in various cities found that flooding is more frequent and intense and often occurring in locations previously not at risk. They also showed how little local government was doing to address these issues (Douglas et al., 2008).

Climate change has the potential to increase flooding risks in cities in three ways: from the sea (higher sea levels and storm surges); from rainfall – for instance, by heavier rainfall or rainfall that is more prolonged than in the past; and from changes that increase river flows – for instance, through increased glacial melt. The IPCC Working Group II noted that heavy precipitation events are very likely to increase in frequency and will augment flood risk and the growing evidence of increased runoff and earlier spring-peak discharges in many glacier- and snow-fed rivers (Adger, Aggarwal, Agrawala et al., 2007). In addition to flood hazards, more extreme rainfall events associated with climate change will also generate increased hazard from landslides in many urban centres.

The IPCC also noted the dramatic impacts on water supplies that are likely under extremes of weather that could arise as a result of climate change. Water supply abstraction and treatment works are sited beside rivers and are often the first items of infrastructure to be affected by floods. Electrical switchgear and pump motors are particularly at risk. In severe riverine floods with high flow velocities, pipelines may be damaged (Wilbanks, Romero Lankao et al., 2007). Sanitation can also be affected. Flooding often damages pit latrines (and most of Africa's and Asia's urban population relies on pit latrines) and floodwaters are usually contaminated by the overflow from pit latrines or septic tanks – and

often sewers too. Toilets linked to sewers become unusable without a water supply. But most urban centres in sub-Saharan Africa and in Asia have no sewers – or if they do, these serve only a very small proportion of the population (Hardoy, Mitlin and Satterthwaite, 2001). As the IPCC noted, the main significance of sanitation here is that sanitation infrastructures (or the lack of them) are the main determinant of the contamination of urban floodwater with faecal material, presenting a substantial threat of enteric disease (Ahern et al., 2005).

3. Storms, sea-level rise and coastal urban populations

It is difficult to estimate precisely how many people are at risk from the increased frequency and intensity of extreme-weather events and the sea-level rise that climate change will bring. The first detailed analysis on the number and proportion of urban dwellers (and total populations) living in the low-elevation coastal zone was published recently (McGranahan, Balk and Anderson, 2007). This zone – the continuous area along the coast that is less than 10 metres above sea level – represents two per cent of the world's land area but contains 10 per cent of its total population (i.e. over 600 million people) and 13 per cent of its urban population (around 360 million people). Almost two-thirds of the world's cities with more than five million inhabitants fall in this zone, at least partly. Low-income and lower-middle-income nations have a higher proportion of their urban population in this zone than high-income nations. The least developed nations, on average, have nearly twice the proportion of their urban population in this zone, compared to high-income nations. Figure 1 gives the 10 nations with the largest urban populations in the low elevation coastal zone and the largest proportion of their urban population in this zone.

Obviously, only a proportion of those within this zone are at risk from the sea-level rises that are likely within the next 30 to 50 years. Estimates for sea-level rise vary from 18 cm to 59 cm up to the end of the twenty-first century; these will certainly multiply the number of people flooded by storm surges. One estimate has suggested that 10 million people are currently affected each year by coastal flooding and that the numbers will increase under all the climate change-scenarios (Nicholls, 2004). The problems with coastal flooding will obviously be much more serious if certain potentially catastrophic events whose probability is uncertain were to happen – for instance the accelerated melting of Greenland's ice sheet or the collapse of the West Antarctic ice sheet (Adger, Aggarwal, Agrawala et al., 2007).

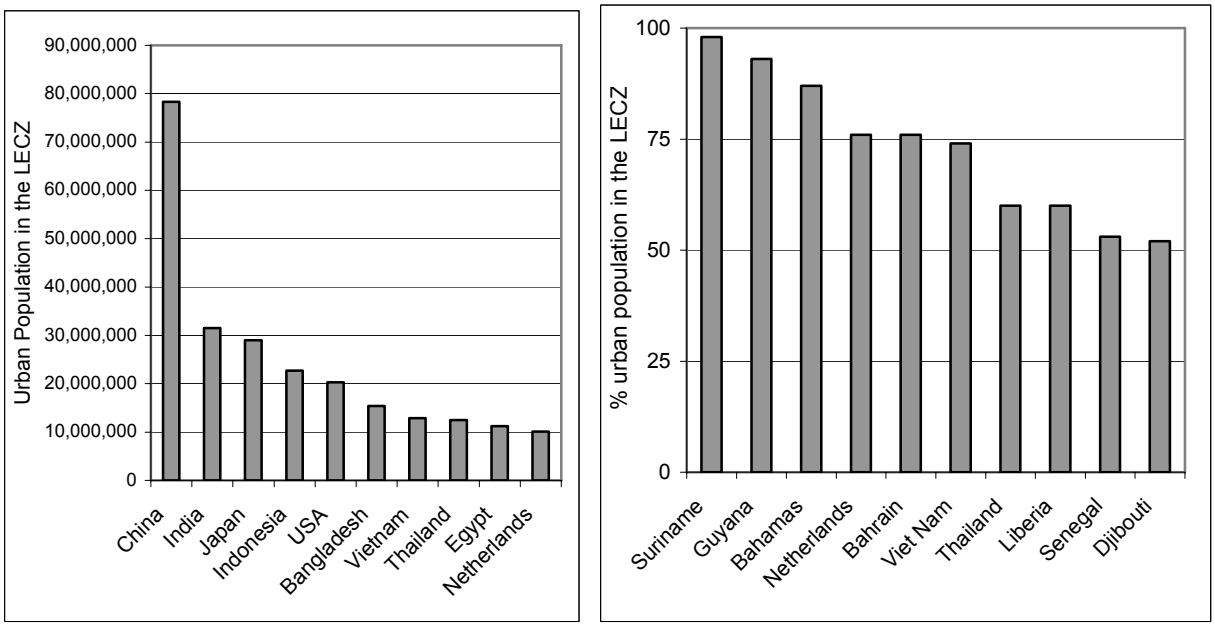
The latest IPCC Working Group II report notes the particular vulnerabilities to sea-level rise and changes in run-off of large sections of the urban and rural population in heavily populated Asian deltas such as the Ganges-Brahmaputra (that includes Dhaka), the Mekong, the Chang jiang (also known as the Yangtze, which includes Shanghai) and the Chao Phraya (with Bangkok). Many other deltas in Asia and Africa also have large urban and rural populations at risk, especially the Nile but also including the Niger (with Port Harcourt) and the Senegal (with Saint Louis – see Diagne, 2007–) and, of course, in the Americas the Mississippi (with New Orleans) (Nicholls et al., 2007).

There also appears to be increasing population concentrations in low-elevation coastal zones in most nations (McGranahan, Balk and Anderson, 2007). China provides the most dramatic example as it is the nation with the largest number of urban and rural dwellers in the low-elevation coastal zone and it still has a very strong trend towards increasing population concentration in this zone. Increasing trade and market-driven movements, often supported by government incentives, are still attracting people to the coast. The coastal provinces of China experienced a net in-migration of about 17 million people between 1995 and 2000, creating pressures in an already crowded coastal zone (ibid).

There is some evidence that hurricane-force winds will become more frequent and intense, and possibly also that the hurricane belt will move southwards. Highly urbanized coasts most at risk therefore

include Vietnam in Asia; Gujarat in western India and Orissa in eastern India, the Caribbean, including major urban settlements like Santo Domingo, Kingston, and Havana, and those on Mexico's Caribbean coast and Central America – as we have seen from Hurricane Mitch. A sea-surface temperature rise of 2–4^{o} C, as expected in the Indian Ocean over the century, is expected to induce a 10–20 per cent increase in cyclone intensity (Aggarwal and Lal, 2001). Since cyclone-formation frequency in the Bay of Bengal is about five times that of the Arabian Sea (India Metrological Department, 1966, 1979, TARU 2005) India's east coast is clearly at more risk. The high concentration of population, especially on the eastern coasts of India and Bangladesh, has led to extremely high vulnerability in this region, leading to very large loss of life and property (Revi, 2008).

Figure 1. Countries with the largest urban populations in the Low Elevation Coastal Zone and countries with the largest per cent of their urban population in this zone



Source: McGranahan, Gordon, Deborah Balk and Bridget Anderson (2007), "The rising tide: assessing the risks of climate change and human settlements in low-elevation coastal zones," *Environment and Urbanization*, Vol. 19, No. 1, pp. 17–37. For Figure 2, countries with an urban population of fewer than 100,000 were excluded.

4. Constraints on water supplies and other key natural resources

IPCC Working Group II noted that, in Africa, "by 2020, between 75 million and 250 million people are projected to be exposed to an increase of water stress due to climate change" (Adger, Aggarwal, Agrawala et al., 2007) (high confidence). In Asia, "Freshwater availability in Central, South, East and Southeast Asia, particularly in large river basins, is projected to decrease due to climate change which, along with population growth and increasing demands arising from higher standards of living, could adversely affect more than a billion people by the 2050s" (ibid) (high confidence). Any reduction in the availability of freshwater resources caused by climate change will be particularly problematic for those who live in areas already suffering water scarcity or water stress – with poorer groups likely to be most affected (Romero Lankao, 2006). During the last century, mean precipitation in all four seasons of the year has tended to decrease in all the world's main arid and semi-arid regions: Northern Chile, the Brazilian Northeast and Northern Mexico, West Africa and Ethiopia, the drier parts of Southern Africa, and Western China (Folland et al., 2001). If these trends continue, water-resource limitations will become more severe in precisely those parts of the region where they are already most likely to be critical (Rhode, 1999).

Many cities and their water catchments will get less precipitation (and have more constrained fresh water sources) – which is particularly problematic for growing cities and large cities already facing serious problems obtaining sufficient fresh water supplies (Anton, 1993; UN-Habitat, 2006). At least 14 African nations are already facing water stress or scarcity and many more are likely to join this list in the next 10 to 20 years (Muller 2007). There is already a failure to manage water resources well in much of this region, independent of climate change – where around half the urban population already lacks adequate provision for water and sanitation, although this is linked far more to inadequate governance than to water shortages (UN-Habitat, 2003).

5. Higher temperatures and heat waves

Most cities in Africa, Asia and Latin America and the Caribbean will experience more heat waves. Even small increases in average temperature can result in large shifts in the frequency of extremes (Kovats and Aktar 2008). For larger, higher-density cities, the temperatures in central "heat islands" can be several degrees higher than in surrounding areas; in tropical cities, the temperature difference can reach 10 degrees by the end of the night (ibid). Many cities will face more problems with certain air pollutants as concentrations of air pollutants change in response to climate change because a portion of their formation depends, in part, on temperature and humidity. This has particular importance for Asia and Latin America, which have most of the cities with the highest levels of air pollution. There is less information on the impacts of heat stress in Africa or Latin America but studies undertaken in North America, Asia and Europe found that heat waves are associated with marked short-term increases in mortality (Confalonieri et al., 2007). The European heat wave of 2003 claimed 20,000 lives, mostly among the poor and isolated elderly. In Andhra Pradesh, India, a heat wave killed more than 1,000 people – mostly labourers working outside in high temperatures in smaller urban settlements (Revi, 2008).

In regard to urban heat islands, higher temperatures occur in urban areas than in outlying rural areas because of diurnal cycles of absorption and later re-radiation of solar energy and (to a much lesser extent) heat generation from built/paved physical structures. These increase the frequency and severity of heat-stress events in cities and can affect the health, labour productivity and leisure activities of the urban population. There are also economic effects, such as the additional cost of climate-control within buildings, and environmental effects, such as the formation of smog in cities and the degradation of green spaces – and increased greenhouse gases if additional demand for cooling is met with electricity generated from fossil fuels.

There is some evidence that the combined effects of heat stress (for instance, urban heat-island effects) and air pollution may be greater than the simple additive effects of the two stresses (Patz and Balbus, 2003). There are again different vulnerabilities to the health impacts of climate-related extremes and air pollution within urban areas. Local factors, such as climate, topography, heat-island magnitude, income, access to health services and the proportion of elderly people, are important in determining the underlying temperature–mortality relationship in a population (Curriero et al., 2002).

6. Other health risks related to climate change

Climate change is also likely to bring an increased burden of diarrhoeal disease and altered spatial distribution of some infectious disease vectors – for instance as warmer average temperatures permit an expansion of the area in which many "tropical" diseases can occur. Expansion is likely in the area in which the mosquitoes that spread malaria, dengue fever and filariasis can survive and breed (Adger, Aggarwal, Agrawala et al., 2007; WHO, 1992). Note in particular the rapid spread of dengue fever in many nations in recent years, as the *aedes* mosquito adapts to urban conditions. In India, malaria is expected to expand its range horizontally and vertically, from its currently endemic range in eastern and

northeastern India to western and southern India (Bhattacharya et al., 2006). Given that Indian cities have become major reservoirs of vector-borne diseases such as malaria and dengue fever, it can be expected that the morbidity risks will increase. However, all the above health risks are present for much of the urban population without climate change.

Extreme weather events can generate new health hazards and cause disruption to public health services that lead to increased disease incidence. Hurricane Mitch in Central America in 1998 resulted in increases in cases of malaria, dengue fever, cholera and leptospirosis (Vergara, 2005). Populations with poor sanitation infrastructure and high burdens of infectious disease often experience increased rates of diarrhoeal diseases, cholera and typhoid fever after flood events. The transmission of enteric pathogens is generally higher during the rainy season (Nchito et al 1998; Kang et al., 2001).

Other health risks that need attention are those related to the lack of disaster-preparedness (to limit the impact of the extreme weather event when it occurs) and the inadequacies or poorly-designed and managed responses after the disaster event.

C. WHO IS MOST AT RISK?

Hazards combine with vulnerabilities for extreme weather to produce direct impacts on health, living conditions and incomes/livelihoods/assets. The main impacts of climate change on urban areas, at least in the next few decades, are likely to be increased levels of risk from existing hazards. For poorer groups, some of the impacts are very direct – for instance, more frequent and more hazardous floods. Some are less direct – for instance, reduced availabilities of fresh water supplies for whole cities that reduce supplies available to poorer groups (or that increase prices). Some are indirect – for instance, as the impacts of climate change-related weather events increase food prices or damage poorer households' asset bases or disrupt their incomes.

It is well known and well documented that, in most cities, the urban poor live in the most hazardous urban environments – for instance, on floodplains or other areas at high risk of flooding or unstable slopes (Hardoy, Mitlin and Satterthwaite, 2001). These are also usually the sites most at risk from climate change, as discussed above. In addition, in most cities, the urban poor also have problematic relationships with local governments yet local governments are meant to be the institutions that act to reduce these risks. In part, this is because most of the urban poor live in informal settlements (including many on land occupied illegally) and work within the informal economy (and thus not within official rules and regulations). In part, it is because of the "anti-poor" attitudes among Government officials and elites, so often based on misconceptions. For instance, officials and politicians often assume that those living in informal settlements are unemployed when they work long hours within the informal economy, or that they are recent migrants when they have long worked and lived within the urban centre (or, in many cities, may well have been born there), or that migrants would have been better off if they had not moved (when so many migration studies show that migration flows are logical responses to changing patterns of economic opportunity). One added vulnerability faced by large sections of the urban poor is that Governments may bulldoze their settlements to clear them off land-sites deemed to be vulnerable to (for instance) floods, with very inadequate or no provision for finding alternative accommodation that meets their needs. Even more responsible and accountable urban governments face difficulties in addressing this issue, because low-income groups need central locations in relation to income-earning opportunities and if they have to be moved from hazardous sites, it is difficult to find appropriate alternative sites.

In general, in any urban area, the people most at risk from climate change are those who are:

- least able to avoid the direct or indirect impacts (for example, by having good quality homes and drainage systems that prevent flooding, by moving to places with less risk or by changing jobs if climate-change threatens their livelihoods);

- likely to be most affected (for instance infants and older groups who are less able to cope with heat waves);

- least able to cope with the illness, injury, premature death or loss of income, livelihood or assets caused by climate change impacts.

Poorer groups get hit hardest by this combination of greater exposure to hazards (for instance, a high proportion living in makeshift housing on unsafe sites), lack of hazard-removing infrastructure and less capacity to cope (for example, lack of assets and insurance), less adaptive capacity, less state provision to help them cope, and less legal protection or protection from insurance. Low-income groups also have far less scope to move to less dangerous sites; indeed, the more dangerous sites are often the only sites where lower-income groups can find housing they can afford or can build their own homes.

Wealth allows individuals and households to reduce risks – for instance, by having safer housing, choosing safer jobs or locations to live in, having assets that can be called on in emergencies and protecting their wealth by insuring lives and assets that are at risk. Although it should be through good governance that provision for risk reduction is ensured for the whole city population and disparities in risk between income-groups reduced, wealthier groups often have more influence on public expenditures – and it has long been common for middle- and upper-income groups to be the main beneficiaries of Government investment in infrastructure and services. If the Government does not provide these, higher-income groups have the resources to solve most of these problems themselves – for instance by developing their own provisions for water, sanitation and electricity, or moving to private developments which provide these. Indeed the reconstruction process, post-disaster, can offer real opportunities for private gain and it has been argued that this is one reason why disasters are managed through post-disaster reconstruction rather than pre-disaster risk management that would favour more socially progressive policies to reduce the vulnerability of the poor and enhance city-wide critical infrastructure such as drainage and sanitation.

The quality of Government – both at national level and, as crucially, at local (district or municipal) level – influences the levels of risk from climate change facing those with limited incomes or assets in several ways:

- *quality of provision for infrastructure for all areas* (which should limit risks of flooding for the whole city area, not just for the wealthier areas) and land-use management (to limit or make more resilient settlements in high-risk areas);

- *quality of provision for disaster-preparedness* (including warnings, measures taken to limit damage and, if needed, good provision to help people move to safer areas quickly);

- *quality of planning for and coordinating disaster-response* (for instance rescue services and appropriate emergency and health care services) and reconstruction (to help those who have lost their homes and livelihoods) which should aim to improve resilience, but seldom achieves this;

- *extent to which poorer groups can buy, build or rent "safe" housing in "safe" sites*;

- *degree to which local government creates an enabling environment for local civil-society action* to contribute towards addressing the practical aims identified above.

D. How Adaptation Relates to the Core Functions of Municipal Governments

1. The lack of adaptive capacity

City and municipal governments have the main responsibilities for planning, implementing and managing most of the measures that can diminish risks (and the high vulnerabilities of sections of the population) from the direct and indirect impacts of climate change – through provision of infrastructure and services, disaster preparedness and the planning and regulatory framework.

The IPCC's Fourth Assessment noted the high adaptive capacity that is inherent within well-governed cities (Wilbanks, Romero Lankao et al., 2007). In high-income nations, urban populations have become so accustomed to a web of institutions, infrastructure, services and regulations that protect them from extreme weather/floods that these are taken for granted. Many of the measures also serve everyday needs as well as protection from extreme weather – for instance, through health care services and storm and surface drainage. Early warning for approaching storms are expected, as is a rapid emergency response from the police, health services and fire services, if or when needed. In high-income nations, it is very rare for extreme weather events to cause a large loss of life or to seriously injure many people. Occasionally, they cause serious damage to property in specific locations, although for most property owners, the economic cost is much reduced by insurance. All this adaptive capacity is also underpinned by almost all buildings conforming to building regulations and to health and safety regulations and served by piped water, sewers, all-weather roads, electricity and drains 24 hours a day. The cost of such infrastructure and services represents a small proportion of income for most citizens, whether paid direct as service charges or within taxes. City and municipal governments have great importance in most or all of these – although within very different systems in terms of what roles are taken by local government in the planning, provision and financing of these and in terms of the nature of local government relationships to higher levels of government. Private companies or nonprofit institutions may provide some of the key services, but the framework for provision and quality control is provided by local government or local offices or national or provincial government. For the most part, most citizens engage very little in the management of these because it is assumed that Government systems will ensure provision, although there are channels for complaints if needed – for instance local politicians or lawyers, ombudsmen, consumer groups and watchdogs. Thus, the vast majority of urban dwellers are protected from extreme weather without them having to engage in the institutions that ensure such protection. While coverage for some services may be sub-standard and some groups ill-served or excluded, a high proportion of the urban population are well served and well protected. At least for the next few decades, this "adaptive capacity" can certainly deal with most of likely impacts from climate change in most urban centres in high-income nations. However, there may be some locations that are judged to be too expensive to defend – and obviously, the possibilities of adaptation being able to keep down risks depends on effective mitigation.

Whether this high adaptive capacity will actually produce appropriate adaptation is another issue; a detailed assessment of the possibilities and constraints on adaptation around the Gulf of Mexico gave many examples of local governments in the United States of America not fulfilling their responsibilities on risk reduction and allowing buildings and enterprises in high-risk zones; it also gave examples of perverse public policies and subsidies that acted to increase development in high-risk zones (Levina, Jacobs, Ramos and Ortiz, 2007). One post-Katrina assessment noted that municipal governments in the

United States of America were still instrumental in increasing population concentration on coasts. "They can disregard federal flood maps, have key decisions over zoning and land use, can facilitate drainage and landfill projects, reduce taxes in locally defined enterprise zones… In hazard prone areas, pro-growth initiatives typically outstrip disaster mitigation and these processes erode wetlands, forests and other natural buffers to hurricanes. Coastal regions become more dangerous not just in terms of growing numbers of people and properties but also in terms of the increasingly outdated and receding protections from hazards generated by over investment in growth and under investment in environmental sustainability and disaster mitigation" (Elliott, 2008).

But the institutional basis for municipal adaptation is so much weaker in all low-income nations and most middle-income nations. Large sections of the urban population and the urban workforce are not served by a comparable web of institutions, infrastructure, services and protective regulations. It is common for between a third and half the entire urban population to be living in illegal settlements formed outside any land-use plan. These include "squatter settlements" (where the land occupation is illegal) and illegal sub-divisions (where occupation is legal in the sense of involving an agreement with the land-owner but municipal sub-division and infrastructure regulations are not followed). These settlements also tend to concentrate in areas at high risk from extreme weather, precisely because this high-risk lowers the value of the land and increases the inhabitants' chance of avoiding eviction.

If one examines the roles and responsibilities of city and municipal governments in low and middle-income nations (UNCHS Habitat, 1996; Stren 1991; Davey, 1992; Shah with Shan, 2006), they generally have the primary role in a great range of infrastructure and service provision that is essential for good quality living standards and for livelihoods – for instance, provision for water, sanitation, drainage and solid waste collection – and often for some schools and health care facilities and for fire and other emergency services. They also generally have the primary role in implementing the regulatory framework essential for ensuring public health and safety (for instance through building and sub-division regulations, occupational health and safety, pollution control, traffic control and police) and in theory, a key role in urban planning (and within this land-use management). Of course, there are many variations in the form of local government intervention in these, including what is done or what is contracted out and the extent to which some infrastructure and service provision within their jurisdiction are the responsibility of higher levels of Government. But the extent to which city and municipal governments actually meet their responsibilities has very large implications for living standards and the quality of life (including the quality of the urban environment) – and obviously, for adaptive capacity.

Almost all city and municipal governments in low- and middle-income nations fail to meet many of their responsibilities or only meet them for particular sections of their population. This can be seen in the scale of the inadequacies in provision for the infrastructure and services that they are meant to provide (or ensure provision through other providers) and in the extent to which the homes, neighbourhoods and livelihoods of their population fall outside their regulatory framework (UN-Habitat, 1996; Hardoy, Mitlin and Satterthwaite, 2001). However, the scale of these inadequacies varies greatly. At one extreme, there are cities and smaller urban centres where most of the population live in homes and neighbourhoods that are illegal and informal with very inadequate or no public provision for infrastructure and services. For instance, most urban centres in low-income nations in Africa and Asia have no sewers at all, including many major cities and much of the population have no water supply piped to their home and no official solid waste collection service (UN-Habitat, 2003, 2006; Hardoy, Mitlin and Satterthwaite, 2001). These inadequacies reflect local governments lacking the resources to meet their responsibilities – and often with very limited capacities to invest (as almost all local revenues go to recurrent expenditures or debt repayment). These inadequacies often reflect local governments that are unrepresentative, unaccountable and anti-poor – as they regard the population living in informal settlements and working within the informal economy as "the problem." At the other extreme are examples of cities and smaller urban centres that still have some inadequacies and deficiencies in provision for infrastructure and services but

these affect a much smaller proportion of the population. This often reflects city and municipal governments that are more accountable to the citizens in their jurisdiction and within national government structures that have strengthened and supported this level of government – with stronger local democracies in many instances. In many urban centres in Latin America, the quality and coverage of provision for water and sanitation has improved very considerably over the last two decades; there are also many urban centres with close to 100 percent coverage (UN-Habitat, 2006; Heller, 2006). Several nations have also had constitutional or legal changes that have increased the revenues of city and municipal governments and strengthened local democracies (Campbell, 2003; Fernandes, 2007; Cabannes, 2004). There are also an increasing number of local governments that have developed successful partnerships with low-income groups and their community organizations which demonstrate cheaper, more effective ways in which they can meet their responsibilities for infrastructure and services (D'Cruz and Satterthwaite, 2005; Hasan, 2006).

Many reasons can be given for the inadequacies in local government. In many nations, these include institutional legacies from colonial rule and centralization in post-independence governments. There is also the application of imported models of urban planning and government that proved inappropriate to local contexts and possibilities. For instance, the utility of housing sub-division standards that have minimum lot-sizes and infrastructure standards that make it impossible for most of a city's population to get land for housing is obviously questionable. If half a city's population is living in illegal settlements and most new housing units are being built in illegal settlements, it suggests that the law is at fault, not the illegal housing and settlements.

But in the last two decades or so, other factors have had importance including the external pressures for dismantling or weakening the state and support for deregulation and privatisation (Rakodi, 1999). This was driven by the hope that this would help underpin stronger economies. It can be argued that the lack of progress in most urban centres in improving provision for water and sanitation over the last 20 years was the result of many international agencies greatly overestimating the potential role of privatisation to improve and extend provision (Budds and McGranahan 2003; Warwick and Cann, 2007). In addition, although international agencies began to recognize the importance of supporting "good governance" in the early 1990s, their "good governance" programmes were generally at national level with little attention paid to increasing the competence, capacity and accountability of local governments (Satterthwaite, 2005).

There is also the fact that most bilateral aid agencies and many international NGOs refused to work in urban areas, underpinned by a (usually mistaken) belief that urban populations benefited from "urban bias." There may be evidence of particular cities benefiting from urban bias in government policies and expenditures but in general this bias brings little or no benefit to the majority of those living and working in these cities – especially low-income groups. Just because hospitals, universities and investments in piped water supplies and sewers are concentrated in particular cities, it does not mean that their low-income population get any benefit from them. In addition, in most nations, there is little or no evidence of policy or expenditure biases benefiting most urban centres (Satterthwaite, 2007b; Corbridge and Jones, n.d.). The backlog in the population lacking provision for infrastructure and services continues to grow in most urban centres in low-income nations, as the powers and resources available to city or municipal governments bear little relation to their responsibilities.

2. The roles and responsibilities of urban governments

It is important to understand the scale and scope of local government involvement in urban centres, if their role in adaptation to climate change is to be understood. Urban governments typically have a range of roles that can be ordered under the eight headings listed below – although with many differences as to how these are arranged (or combined) within each urban centre and how lines of

authority and accountability are structured between politicians and civil servants. Of course, there are also very large differences in the scope of their responsibilities within each of these and the competence with which these are fulfilled.

Generally there are divisions of departments for:

Finance**:** Budget/accounts management (which may also manage local government tenders) and revenues (managing the collection of whatever taxes or charges permitted to local governments; these may include a range of licenses that are important for control too).

Engineering/Public works**:** usually includes road repair and maintenance within their jurisdiction, street lights, management of government buildings and perhaps of some public housing stock.

Development planning and development control**:** building control/inspection, land use planning and management (including regulation), property registration and urban plans.

Environmental health**:** water, sanitation, storm and surface drainage (although this may be lodged within public works), implementation of environmental health regulations within certain enterprises (for instance restaurants, cafes and hotels, slaughterhouses, markets) and public areas (although some of these may be lodged in other divisions).

Public health**:** Medical services (including hospitals and health care centres), solid waste collection and management.

Social/community/safety services**:** Some of the items listed above under environmental and public health may be within this. Often traffic management and management of social housing, libraries, some role in public transport, some role in schools and kindergartens (although usually with responsibilities shared with higher levels of government), youth policy, sport and recreation, parks; sometimes local police.

Emergency services: fire services, ambulances, some of the responsibility for disaster response.

Administration**:** usually including human resources and often includes the registration system for births and deaths and marriages.

Many city governments also have departments for promoting local economic development and some also have roles within electricity production or distribution.

It is easy to list a set of local government responsibilities for infrastructure, buildings and services that have great importance for the four critical aspects of adaptation: long term protection, pre-disaster damage limitation, immediate post-disaster response, and rebuilding (see Table 2). It is also easy to point to large inadequacies in what is provided. Perhaps the main use of Table 2 is to highlight just how many areas of local government should be active in adaptation. But there is such diversity in the forms of local government and their relationships to higher levels of government that it is impossible to generalize in regard to: 1- how much of these fall to local governments to fulfil; and
2- the extent of local government engagement with each of these in terms of who has responsibility for planning, constructing and maintaining the buildings and infrastructure or providing the services, coordination, finance, monitoring and regulation.

There are also no obvious generalisations in regard to the “best” local government structures. For instance, it can be argued that local governments with a high reliance on intergovernmental transfers for funding infrastructure and services are at a disadvantage because this reduces the link between local needs

and local resources – but some nations with cities with high adaptive capacity have such a high reliance. The need to root adaptation in local contexts and realities suggest primary roles for local governments, yet local governments often focus on short-term goals and often prioritize economic growth over longer-term risk reduction.

Clearly, adaptation involves changes in policies and practices within many parts of local government. The key question – is there a mechanism by which these can be encouraged and integrated? For instance, if there is a strong local development plan that provides the framework for future investments and land use management, then it is possible to incorporate adaptation measures into this. But for so many urban centres, there is no such development plan – or if there is, much new investments, urban developments and buildings fall outside it.

TABLE 2 – THE ROLE OF CITY/MUNICIPAL GOVERNMENTS IN ADAPTATION

Role for city/municipal government	*Long term protection*	*Pre-disaster damage limitation*	*Immediate post-disaster response*	*Rebuilding*
Built environment				
Building codes	High		High[1]	High
Land use regulations and property registration	High	Some		High
Public building construction and maintenance	High	Some		High
Urban planning (including zoning and development controls)	High		High[1]	High
Infrastructure				
Piped water including treatment	High	Some	High	High
Sanitation	High	Some	High	High
Drainage	High	High[2]	High	High
Roads, bridges, pavements	High		High	High
Electricity	High	Some?	High	High
Solid waste disposal facilities	High	Some?		High
Waste water treatment	High			High
Services				
Fire-protection	High	Some	High	Some
Public order/police/early warning	Medium	High	High	Some
Solid waste collection	High	High[2]	High	High
Schools	Medium	Medium		
Health care/public health/environmental health/ambulances	Medium	Medium	High	High
Public transport	Medium	High	High	High
Social welfare (includes provision for child care and old-age care)	medium	High	High	High
Disaster response (over and above those listed above)			High	High

Source: Satterthwaite, David (2007), Integrating Adaptation to Climate Change in Decision-making at the Urban/Municipal Level in Low- and Middle-income Nations, (first draft), prepared for the OECD Development Assistance Committee, OECD, Paris, 33 pages.

[1] Obviously it is important that these do not inhibit rapid responses.

[2] Clearing/desilting drains and ensuring collection of solid wastes has particular importance just prior to extreme rainfall; many cities face serious flooding from extreme rainfall that is expected (for instance the monsoon rains) and this is often caused or exacerbated by the failure to keep storm and surface drains in good order.

3. Formulating and implementing adaptation policy

Most urban governments in low- and middle-income nations have not considered adaptation seriously. For instance, in India, Chile, Argentina and Mexico, the central Government is beginning to take an interest in adaptation, but this interest has yet to engage the interests of the larger, more powerful national ministries or agencies or city and municipal governments (Satterthwaite, Huq, Pelling et al., 2007). It is likely that there is considerable confusion among many local government politicians and civil servants in regard to climate change and to what responses they should make. Even among the cities in high-income nations with the greatest awareness of climate change – and that have made substantial efforts to reduce emissions – there has been no move on adaptation (Ligeti, Penney and Wieditz, 2007). Of course, this lack of attention to adaptation is not helped by the lack of locally relevant data on the likely direct and indirect impacts of climate change in each urban area. The city of Durban in South Africa is unusual in having developed an adaptation programme as described below in Box 1.

Box 1: Durban's adaptation – Debra Roberts

Durban established an Environmental Management Department in 1994. Much of the initial work of the Department was to see how the municipality's strong developmental orientation could also incorporate pressing environmental concerns. Durban was one of the few cities in Africa to have a Local Agenda 21, in line with what the world's governments agreed to at the UN Earth Summit in 1992. Various departments within the municipal government also became aware of the need to factor climate change into their plans – for instance for water supply and health care. But municipal officials are unlikely to act if they have little idea of what climate change means for their city. To address this, the Environmental Management Department initiated the development of a Climate Protection Programme in 2004. The roll-out of this programme has occurred in three phases:

Phase 1: Reviewing and developing an understanding of the global and regional climate change science and translating this into an understanding of the implications of climate change for Durban. Key impacts include increases in temperatures, changes in the distribution of rainfall (long periods of no rainfall punctuated by short periods of intense rainfall), decreased water availability, increased range of water and vector borne diseases, sea level rise, and the loss of biodiversity.

Phase 2: Developing a "Headline Climate Change Adaptation Strategy" for the city to highlight how key sectors within the municipality should begin responding to unavoidable climate change. Interventions look to enhance and expand existing initiatives (such as the modelling of vector-borne diseases and their relationship to climate change) or stimulate new activity such as the "climate-proofing" of the city's open space system through matrix management (i.e. the management of the urban landscapes surrounding natural areas in a way that assists the survival and dispersal of indigenous species) and the creation of north-south dispersal corridors.

Phase 3: Incorporating climate change into long-term city planning, which includes developing a model enabling the simulation, evaluation and comparison of strategic urban development plans within the context of climate change. This seeks to understand the effects of climate change in Durban and allow a model-based assessment of the effectiveness of alternative approaches to mitigation and adaptation. This will involve the use of greenhouse gas emissions accounting (i.e. producing an inventory or all the greenhouse gases produced by activities within the Municipal area) together with an assessment of the city's vulnerability in key sectors such as health, water and sanitation, coastal infrastructure, disaster management and biodiversity.

Source: Roberts (2008)

Perhaps the two key messages that will get the attention of city/municipal governments are:

1: The very large overlap between most of the measures needed for adaptation and local development (especially improving and extending provision for piped water, good sanitation and drainage, solid waste collection, garbage disposal, prevention-focused health care and support for upgrading within informal settlements);

2: The very large overlaps between climate-change adaptation and building resilience to extreme weather/disasters (regardless of whether the extreme weather or other catalysts for disasters are related to climate change).

The key to adaptation in most instances is competent, capable, accountable urban governments that understand how to incorporate adaptation measures into most aspects of their work and departments. Many needed measures may seem to be quite minor adjustments to current practices – for instance in adjusting building codes, land sub-division regulations, land-use management and infrastructure standards – but the sum of all the minor adjustments over time can build greater resilience without high costs. The urban centres that face the greatest challenges are those in the more high-risk sites that lack competent, capable, accountable local governments – and very often have very large backlogs in protective infrastructure and services.

As Table 2 makes clear, good adaptation will need to involve a great range of urban Government divisions and departments – some of which may be semi-autonomous public agencies. It will often need to involve many Government agencies that work within sub-city or municipal levels and at higher (provincial/state and national) levels. It is difficult to specify the most appropriate intervention points within local government structures. First, this depends on the structure of the city or municipal government and often also on higher levels of government (which may control or have a major role in many city-level aspects of government). Super- or supra-government levels are often important – for instance for many urban centres, there are key functions managed at sub-municipal level (for instance, district or ward level). Many large cities are also formed by many separate municipalities with serious constraints on inter-municipal cooperation (for instance, as they are governed by different political parties) and with great variation in the extent of functions managed at a higher (metropolitan or provincial) level. There is also the need to engage a great variety of local government staff – from elected councillors to technical discussions with particular specialists and specialist departments.

4. The interventions needed to adapt to climate risks

1. Develop an information base on current conditions. An important part of this is considering the impact of past extreme weather and other disasters on each city or municipality. This should seek as much detail as possible, drilling down to include "small disasters" (disasters that do not get included in international disaster databases).[2] This can draw on the DesInventar methodology developed in Latin America and now widely applied elsewhere which looks more intensively at disasters in any locality and includes "small disasters." For instance, a database in Cape Town that sought to record all events registered over 12,500 incidents which contrasts with the 600 identified large events and declared disasters (Bull-Kamanga et al., 2003). Almost half of these occurred in informal settlements. An analysis of disaster events in Mexico, 1970 to 2001, sought to document all events with at least one mortality and found that floods were the most common disaster, and a quarter of all deaths from flooding came from events with fewer than four deaths – i.e. much too small to be included in international disaster datasets (see Awuor, Orindi and Adwerah 2008 for an example of this for Mombasa).

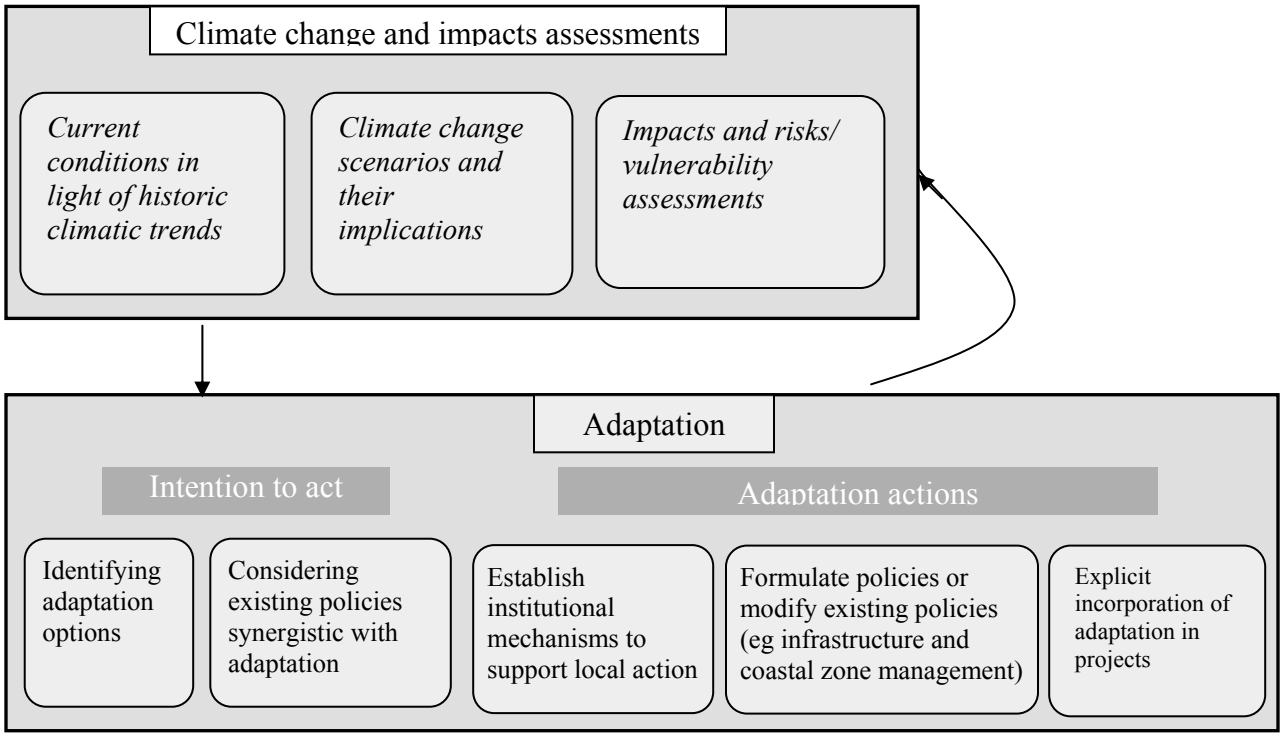
2. *Initiate risk/vulnerability assessments for the city* with as much geographic detail as possible; this needs to link hazard maps with details of what is currently located within the hazardous zones – including identifying population groups or settlements most at risk and activities that may pose particular risks (for instance water treatment plants vulnerable to flooding). From this, an assessment can be developed of whether the infrastructure and buildings will be able to withstand extreme events.

3. Based on the above, discuss how addressing the above can be incorporated into the different aspects of local government.

This whole process should be seen as useful far beyond climate-change adaptation as it documents and maps other key environmental hazards and who is most at risk from them.

There may need to be a "prequel" to the above – to convince urban governments of the need to initiate this. A review of progress in countries of the Organization for Economic Cooperation and Development (OECD) on adaptation to climate change produced a useful figure, showing key stages in moving from assessing impacts to intention to act and finally implementing adaptation options (see Figure 2). Although this diagram was intended to reflect national processes, it can equally be applied to city governments. In most low- and middle-income nations, it is likely to need innovation and leadership from local governments not only to demonstrate what is possible but also to help set or improve national policies.

Figure 2. Moving from assessment to intention to act and finally adaptation actions



Source: Based on Figure 6 in Gagnon-Lebrun, Frédéric and Shardul Agrawala (2006), *Progress on Adaptation to Climate Change in Developed Countries; An Analysis of Broad Trends*, ENV/EPOC/GSP(2006)1/FINAL, OECD, Paris, 59 pages.

E. Good Local Governance and Development Assistance

It could be argued that there needs to be a very large increase in the international funding available for investment in addressing the backlog in urban infrastructure and this is an important part of what new or expanded funding for climate change adaptation should be spent on. If international donors want to focus such funding specifically on adaptation, this would be problematic – not least because of a need for so many cities to adapt to climate variability when the role of climate change in such variability is not known. From a development perspective, it makes no sense to separate funding and implementation for adaptation to climate change risks from funding and implementation to improve and extend provision for infrastructure and services to reduce other environmental risks (including those arising from climate variability and earthquakes). It may be necessary to distinguish between the responsibility (and hence liability) of high-income countries to pay for adaptation in low- and middle-income nations to protect against the increased risks from climate change. Thus, funding for climate change needs to be in addition to existing development assistance flows – even if the funding it provides needs to be strongly integrated within development investments.

But increasing funding flows for adaptation will not achieve much unless there is the local government capacity to use it well and to work well with groups most at risk. This presents many more difficulties for official development assistance agencies than the actual funding. Developing more competent and accountable city and municipal governments is a complex and usually highly contested process. It is very difficult for any external organization, however well informed, to know how best to support this. In addition, official development assistance agencies have to work with and through national governments – which often strongly oppose needed changes, especially for the decentralization of decision-making and revenue-raising powers. There are also obvious political difficulties – for instance as national governments do not want resources channelled to city governments in which opposition parties predominate. In addition, official development assistance agencies are not set up to support the kind of long-term local engagement that supports the enhancement of local adaptive capacity. The boards or governments that oversee official development assistance agencies bring strong pressures to minimize staff costs (seen as a key measure of efficiency), produce tangible measurable results and limit the duration of any initiative. There is often a strong pressure to spend – or for the development banks to increase their loans. This is not the appropriate financial framework to support them working with national and local governments to build the competence, capacity and accountability of city and municipal governments and local government-grassroots organizations partnerships. To do this is likely to be a slow process in most nations; it needs a long engagement. It is difficult to measure its effectiveness with conventional quantitative indicators. Ironically, in most instances, good practice would be to minimize the amount of external funding needed, because to sustain this process and to allow it to expand to reach a high proportion of all urban centres, it needs to develop models that can be sustained primarily by local resources.

If development assistance agencies accept the need to support more competent, effective, accountable pro-poor city and municipal governments – for climate change adaptation and also for more effective development – it will need some significant changes in how they structure development assistance. It will need their long-term engagement with supporting this and innovative financial systems that allow support to flow rapidly and easily to a multiplicity of locally-determined initiatives. What is possible and what should be prioritised in any nation obviously depends on the competence, capacity and accountability of local governments. Table 3 illustrates this by highlighting the different local government contexts with which external donors would have to work, if consideration is given to these.

TABLE 3 – DIFFERENT LOCAL CONTEXTS THROUGH WHICH NATIONAL GOVERNMENTS AND INTERNATIONAL AGENCIES CAN PURSUE "GOOD GOVERNANCE" FOR ADAPTATION

	The quality of local government/governance	
Resources available to local government	From democratic and accountable local government structures…	…to undemocratic, unaccountable and often clientelist local government
From relatively well-resourced, local government institutions with the needed technical competence…	Local government can be well served by external funding, including funding to support adaptation by households and private enterprises, and funding for needed infrastructure and support services (whether provided by community organizations, NGOs, private enterprises or government agencies)	Long-term support needed for governance reforms at all levels of government; also support needed for local private and community provision both to improve conditions and to build local pressure on government for better governance
...to poorly resourced local governments lacking funding, a strong local revenue base and technical capacity	Need for a strong focus on capacity building for local government and support for its partnerships with civil society and local private-sector infrastructure and service providers (including informal providers)	As above but with strong support for local private providers and community provision within a long-term goal of supporting more competent, accountable and transparent local government

Source: Satterthwaite, David (2007), *Integrating Adaptation to Climate Change in Decision-making at the Urban/Municipal Level in Low- and Middle-income Nations*, (first draft), prepared for the OECD Development Assistance Committee, OECD, Paris, 33 pages.

An important part of building local adaptive capacity is supporting adaptation that serves low-income groups, especially those that live in homes and locations most at risk from the direct and indirect impacts of climate change. There are good experiences on which to draw on "slum and squatter upgrading" in which local governments have worked with the inhabitants of informal settlements to provide infrastructure and services and improve the quality of housing (see for instance Boonyabancha, 2005). There are also many examples of "upgrading" and of new housing developments undertaken by federations formed by "slum" or "shack" dwellers themselves that are both more effective and less costly than those supported by international agencies – and where these receive support from local government, these have demonstrated a very considerable capacity to "go to scale" (as in, for instance, India, South Africa, Thailand and Malawi) (ibid; Burra, 2005; D'Cruz and Satterthwaite, 2005; Manda, 2007; Muller and Mitlin, 2007). But these kinds of grassroots initiatives also require donor support. And this should not be seen as funding alternatives to local government but as central to building the competence, capacity and accountability of local governments.

Thus, in conclusion, support for adaptation to climate change needs to think through the financial systems and mechanisms that will allow support for a multiplicity of city or municipal innovations by local governments and by grassroots organizations – and that reinforces and works with "good local development" and "good local governance." The current focus on National Adaptation Programmes of Action (NAPAs) and on community-based adaptation leaves out the key role of local government (although some community-based adaptation has involved local governments). There need to be local LAPAs and city CAPAs to underpin and drive innovations in NAPAs.

It is also important to stress that in almost all instances, there needs to be development+adaptation**.** Even competent and accountable national and local (city and municipal) governments will not engage with adaptation to climate change unless it is seen as supporting and enhancing the achievement of development goals. This also implies drawing on the knowledge of the few official development assistance agencies with experience in urban development.

Obviously, consideration needs to be given as to how urban adaptation can also contribute to mitigation in all nations and there are some obvious complementarities between the two. But some care is needed in this, especially in assumptions that measures that reduce greenhouse gas emissions necessarily serve adaptation or development. Because mitigation in high-income nations focuses so strongly on

increasing energy efficiency, there is often an assumption that the measures used to achieve this should be transferred to low and middle-income nations – even as some of these nations have 1/50th or even 1/100th of the carbon emissions per person of high-income nations. In most urban centres in low- and middle-income nations, adaptation priorities need to focus on the expansion and improvement of protective infrastructure and services, not on energy efficiency.

Finally, there is also an obvious need to draw on the "disaster-preparedness" community of scholars and activists who have transformed our understanding of what causes disasters and the extent to which "natural" disasters are preventable (because the actual disaster is so much to do with inadequate planning and infrastructure and lower-income groups having no alternative but to live in high risk areas). It is surprising that they have not had a more central role in adaptation, given how much they can contribute to understanding the possibilities and constraints on adaptation that reduces risks from disasters.

NOTES

1. The text of this paper draws on a collaborative work programme on possibilities and constraints in regard to adaptation to climate change in urban areas in low- and middle-income nations that involves many individuals and institutions. In particular, it draws on the author's work with Saleemul Huq and Hannah Reid (IIED's Climate Change Group), Mark Pelling (Kings College, University of London), Aromar Revi (TARU) and Patricia Lankao Romero (National Center for Atmospheric Research, USA). It also draws on material prepared by Debra Roberts (case study on Durban's adaptation strategy), Jorgelina Hardoy and Gustavo Pandiella (background paper on Argentina), Karina Martínez, E. Claro and Hernando Blanco (background paper on Chile), Cynthia B. Awuor, Victor A. Orindi and Andrew Adwerah (background paper on Mombasa), Mozaharul Alam (background paper on Bangladesh/Dhaka), Sheridan Bartlett (background paper on the impacts of climate change on children) and Sari Kovats. As such, it also draws heavily on two previous papers: Satterthwaite, David (2007), *Integrating Adaptation to Climate Change in Decision-making at the Urban/Municipal Level in Low- and Middle-income Nations* (first draft), prepared for the OECD Development Assistance Committee, Paris and Satterthwaite, David, Saleemul Huq, Mark Pelling, Hannah Reid and Patricia Lankao Romero (2007), *Adapting to Climate Change in Urban Areas; The possibilities and constraints in low- and middle-income nations*, IIED Working Paper, IIED, London, 107 pages.

2. The Centre for Research on the Epidemiology of Disasters (CRED), which holds the only publicly accessible global disaster database, defines disaster as "a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance." To be entered into the EM-DAT database, at least one of the following criteria has to be fulfilled: 10 or more people reported killed; 100 people reported affected; a call for international assistance; and/or declaration of a state of emergency; CRED EM-DAT; see http://www.em-dat.net/. See also International Federation of Red Cross and Red Crescent Societies 2002.

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URBAN POPULATION DISTRIBUTION AND THE RISING RISKS OF CLIMATE CHANGE

Deborah Balk, Baruch College, School of Public Affairs, New York

Future population growth will not only be predominantly urban and in Asia and Africa (United Nations, 2006), it will also face new challenges from a changing environment (McGranahan et al., 2005; Montgomery et al., 2003). In the twenty-first century, urban centres will not only need to provide safe water, sanitation, housing, health services and infrastructure, they will also need to do it in a manner that is compatible with current climate change scenarios. In particular, coastal cities—with increased risk of seaward hazards due to cyclones and flooding, not to mention longer term expected sea level rise—may experience different challenges than cities in other environments (McGranahan et al., 2007). Large dryland cities will face new, perhaps more complex, challenges in the future than smaller counterparts in the past. The community of demographers, planners, and development agencies need to embrace these new complexities if their efforts are to be of practical value to the well-being of urban dwellers of the twenty-first century.

A few years back, perhaps confirming ample casual evidence, the first systematic assessment of the distribution of human population found that people tend to live at low elevation and near sea-coasts and rivers (Small and Cohen, 2004). We further refined these estimates to show that nearly one in five persons globally lives in close proximity to a coast (i.e., within a coastal ecosystem) and that unlike any other ecological zone, 65 per cent of the coastal population lives in urban areas (McGranahan et al., 2005). More than a quarter of the global urban population—or about 745 million persons in 2000—live in a coastal city (McGranahan et al., 2005). More than a quarter of the global urban population—or about 745 million persons in 2000—live in coastal settlements of more than 5,000 persons (with 90 per cent of these residents in settlements of 100,000 persons or more) (McGranahan et al., 2005). In further work, we found that 75 per cent of countries with populations of at least one million persons have their largest city at close coastal proximity and at least partly situated at low elevation, i.e., below 10 metres (McGranahan et al., 2007). Furthermore, of the world's cities with more than five million inhabitants, at least one-fifth of their population and one-sixth of the land area are situated in a low elevation coastal zone.

The recent assessment by the International Panel on Climate Change (IPCC, 2007) finds that climate change is largely a consequence of anthropogenic factors; people – and the environments that they live in – will also be the prime recipient of the consequences of climate change. Unlike prior assessments, in the 4th assessment, urbanization is clearly identified as a cause for concern, particularly in Africa and Asia, where the bulk of future population growth is expected to occur: In Africa, the IPCC anticipates that "towards the end of the twenty-first century, projected sea-level rise will affect low-lying coastal areas with large populations. The cost of adaptation could amount to at least five to 10 per cent of gross domestic product" (IPCC, 2007, Table SPM.2, p. 10). In Asia, "coastal areas, especially heavily populated mega-delta regions in South, East, and Southeast Asia, will be at greatest risk due to increased flooding from the sea, and in some mega-deltas, flooding from the rivers." The IPCC expects this to raise morbidity and mortality due to diarrhoeal diseases. Furthermore, "climate change is projected to compound the pressures on natural resources and the environment, associated with rapid urbanization, industrialization, and economic development" (IPCC, 2007, Table SPM.2, p. 10). The climate science community has clearly put urbanization on its agenda. Now it is time for the demographic community to put climate change on its own (agenda).

This paper will focus on issues of urbanization and climate change primarily in coastal zones. This is not to suggest that urbanization in other ecological zones is not important. To the contrary, dryland ecosystems, especially in Africa, contain a large urban population, and they may experience climate change much differently, but no less challengingly, than coastal cities. Differences in the patterns of urbanization by ecological zone have been addressed elsewhere and should be the subject of future research (McGranahan et al., 2005; Balk et al., forthcoming).

Human settlement by definition leads to environmental transformation. It is safe to assume that coastal settlement is environmentally damaging (it may accelerate coastal erosion, development of misplaced landfill, and so on). It is also clear that coastal localities are environmentally vulnerable due to seaward hazards such as storm surges, coastal flooding and erosion. Climate change, which will bring sea-level rise and greater storm intensity, amplifies the risks to coastal settlements. Yet coastal zones are densely populated and appear to have experienced more growth than other ecological zones (Balk et al., forthcoming).

To address the potential consequences of urbanization with respect to climate change, a spatial framework is a necessary (but not sufficient) component.[1] In McGranahan et al. (2007), low elevation coastal zones (LECZ) are defined as contiguous coastal land less than 10 metres in altitude. All data, including population and urban extent (sources noted below), are spatially defined.

A. METHODOLOGY

McGranahan et al. (2007) integrated recently-developed spatial databases of finely resolved global population distribution, urban extents, and elevation data to produce country-level estimates of urban land area and population in LECZ. By overlaying geographic data layers, the population and land area within the LECZ were calculated and summarized by country, region, and economic grouping. Shuttle Radar Topography Mission (SRTM) data were used to delineate a low elevation coastal zone, including land area, contiguous with the coast up to 10 metres in elevation. Urban extents were taken from Columbia University's Center for International Earth Science Information Network's Global Rural Urban Mapping Project (GRUMP). These urban extents were primarily delineated using NOAA's night-time lights satellite data (city lights 1994-1995) verified with additional settlement information, and represent urban agglomerations including surrounding suburban areas. Population and land area were also taken from GRUMP, which provides these data as gridded surfaces globally based on geo-referenced census data with population allocated between urban and rural areas as delineated by the urban extents. All data are expressed at one km resolution. Figure 1 illustrates the data layers with which the calculations were made for the Bay of Bengal region of Bangladesh.

B. FINDINGS

The LECZ approximately accounts for only two per cent of the world's land area, but contains 10 per cent of the population, and 13 per cent of the urban population. As illustrated in Table 1, about two-thirds of the population living in LECZ is in Asia. Yet even in Africa, which has only one per cent of its land in the zone and has a comparatively high share of its population engaged in in-land agriculture, seven per cent of the total population and 12 per cent of the urban population live in these zones.

Figure 1. Map of Bangladesh identifying low elevation coastal zone and urban extents

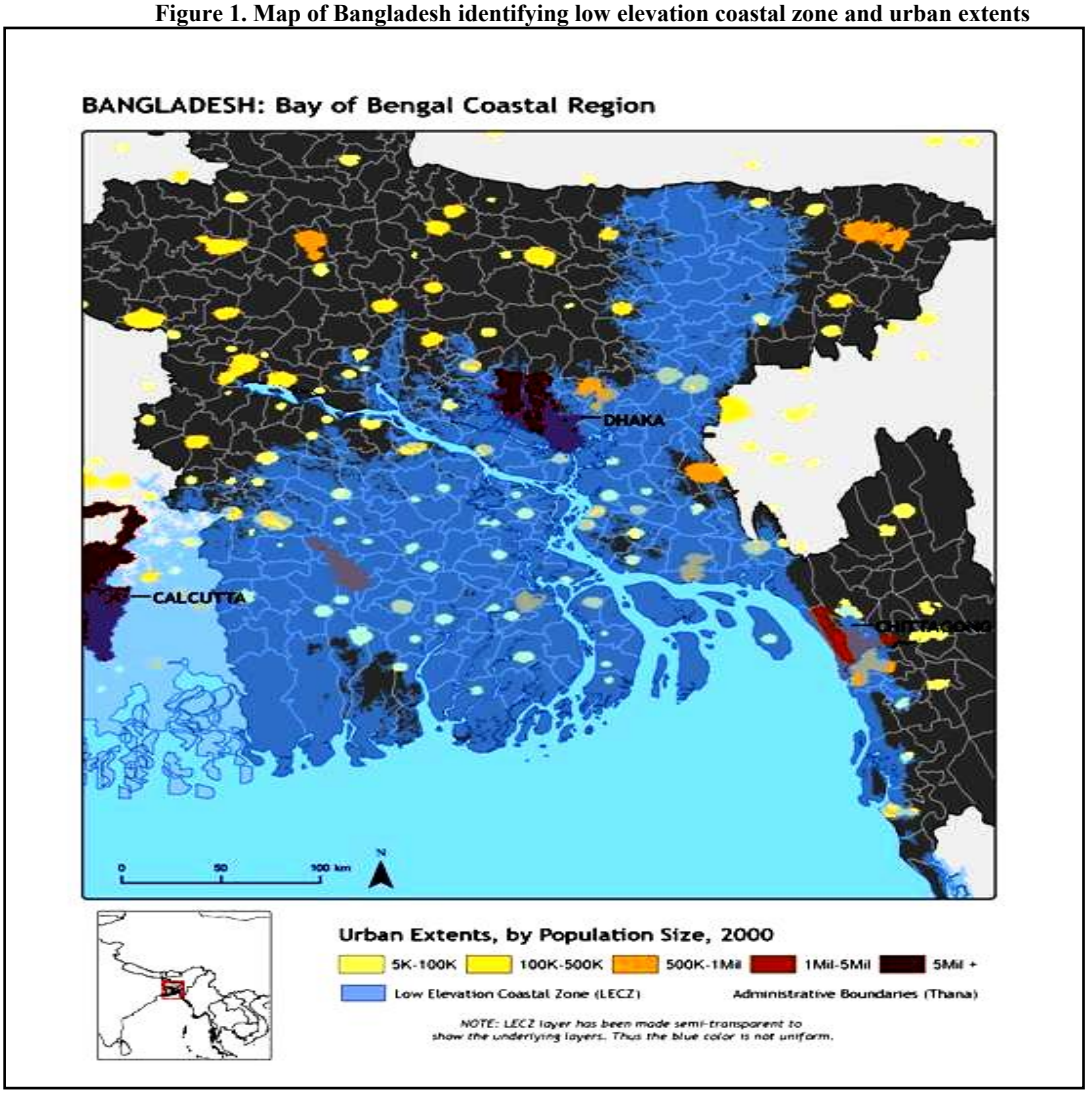


TABLE 1 – POPULATION AND LAND AREA IN LOW ELEVATION COASTAL ZONE BY REGION – 2000

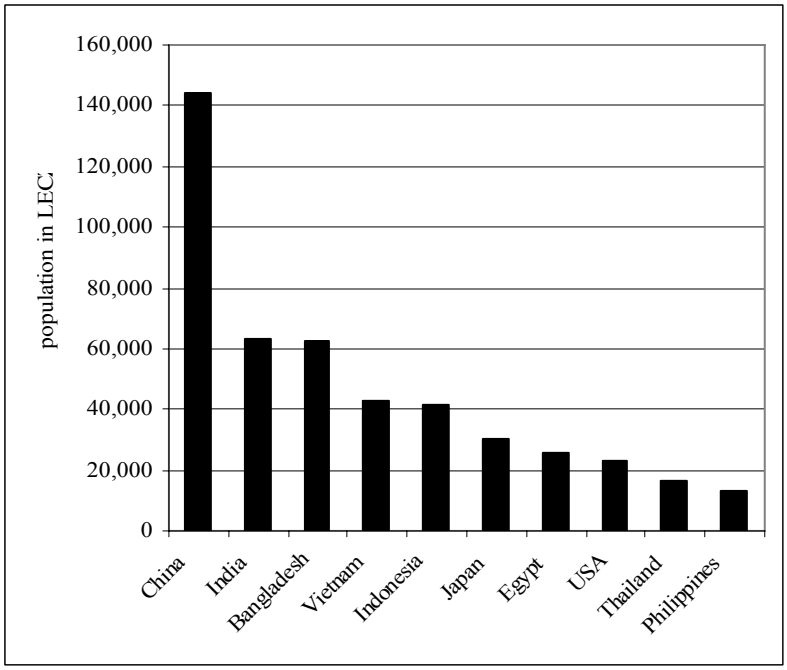
	Region's populations and land areas in LECZ				*Shares of region's population and land in LECZ*			
Region	*Total Population*	*Urban population*	*Total Land*	*Urban Land*	*Total Population*	*Urban population*	*Total Land*	*Urban Land*
	(millions)	(millions)	(thousand km^2)	(thousand km^2)	(per cent)	(per cent)	(per cent)	(per cent)
Africa	56	31	191	15	7	12	1	7
Asia	466	238	881	113	13	18	3	12
Europe	50	40	490	56	7	8	2	7
Latin America	29	23	397	33	6	7	2	7
Australia and New Zealand	3	3	131	6	13	13	2	13
North America	24	21	553	52	8	8	3	6
SIS	6	4	58	5	13	13	16	13
World	634	360	2 700	279	10	13	2	8

Source: McGranahan, Balk and Anderson, 2007

While the small island States have by far the largest share of land in these zones, the population percentages are not exceptional. This is in part because some of the most populous small island States have comparatively little settlement in the low elevation areas. It is also because small island States do not have large rivers, creating flat and fertile deltas where populations would otherwise locate.

Regional averages hide considerable national variation. The 10 countries with the most people living in the LECZ (Figure 2) together account for about 463 million people, or about 73 per cent of the total population living in the zone globally. Most of these countries have big populations and contain large and densely populated delta areas, many of which are also susceptible to subsidence, and already have large populations at risk from storm surges.

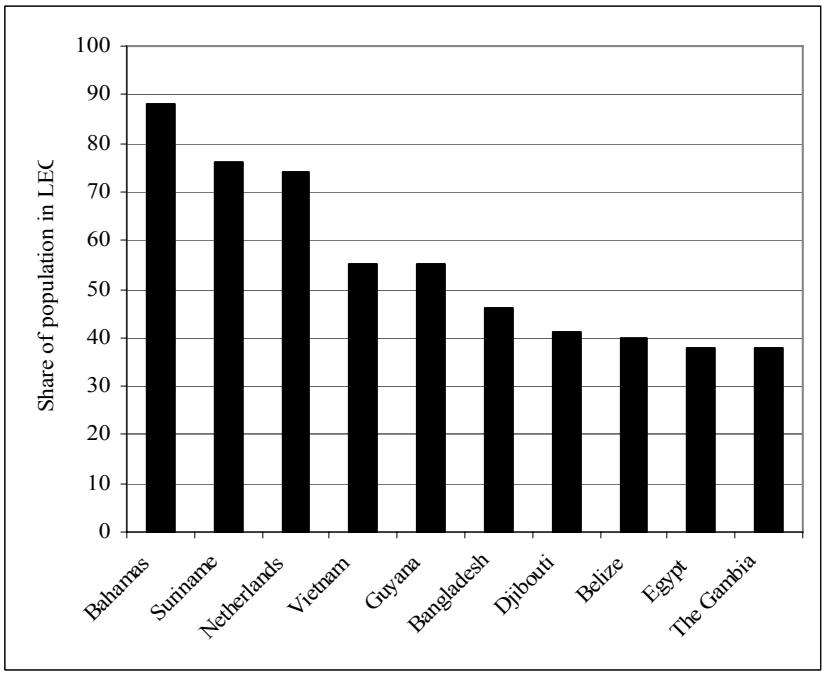
Figure 2. Ten countries with the largest populations in the LECZ



Source: McGranahan, Balk and Anderson (2007).

The countries with the highest population shares in the zone (excluding those with total populations of less than 100,000 or land areas less than 100 square kilometres) are shown in Figure 3. Three of these countries, Vietnam, Bangladesh and Egypt, are also among the countries with the largest overall populations in the zone. Only one of them is a small island State – although there would have been several more had the very small countries with populations below 100,000 been included in this figure. Even more so than the countries with large populations in the LECZ, those with high percentages of their population in these zones are overwhelmingly deltaic.

Figure 3. Ten countries with the highest population shares in the LECZ



Source: McGranahan, Balk and Anderson (2007).

In the world as a whole, but most notably in Asia, not only are urban populations more likely to be in the LECZ than rural populations, but larger urban settlements are more likely to overlap with the LECZ than smaller urban settlements. While only 13 per cent of urban settlements with populations under 100,000 overlap with the LECZ, 65 per cent among cities of five million or more do. Seven of the 10 largest cities identified in 2005 by the United Nations (Tokyo, New York, Bombay, Shanghai, Kolkata, Jakarta and Buenos Aires) extend into the zone. Indeed, more than 55 million people in these cities and their contiguous urban areas live in the LECZ.

In Asia and Africa—the continents that will be home to the bulk of future urbanization – much different patterns are already evident. Asia has 91 cities of more than one million persons within the LECZ: China alone has 26 cities over one million persons in the LECZ and Japan and Indonesia have 11 cities each. Despite this, most of the urban population in the zone lives in cities of 500,000 residents or less. In Japan, 78 per cent of urban LECZ dwellers live in these smaller cities, while in China 91 per cent of urban LECZ do (the city-state of Hong Kong is an exception to this pattern). In Africa, as in Asia, most of the urban population in the LECZ is found in cities of 500,000 or less inhabitants. Africa has 22 cities of more than one million persons in the LECZ. Although Egypt alone has 11 cities with over 500,000 persons, 79 per cent of urban LECZ dwellers are in smaller centres. Similarly, South Africa, Algeria, Libya and Morocco each have three cities over 500,000 persons, but the majority of urban dwellers – from 73 per cent in Libya to 81 percent in Morocco – live in smaller urban centres.

Table 2 shows the top 10 countries in terms of the urban population residing within the LECZ in Africa and Asia. Asia has seven countries where the urban population residing within the LECZ is greater than 10 million persons; Africa has one (Egypt). In both regions, these top-10 lists include the region's most populous country as well as its most urban country (in terms of urban residents). In Asia, total population, urban population and urban population in LECZ conform closely. Yet in Africa, the pattern is much more mixed. The list of countries with the largest urban population in the LECZ, apart from Egypt

and Nigeria, includes some countries with relatively small total population (Libya, Benin, Tunisia, and Senegal) as well as countries that are not particularly urban (for instance, Benin and Libya).

TABLE 2 – TOP TEN COUNTRIES BY NUMBER OF URBAN PERSONS IN THE LECZ, 2000

Panel 1: Africa

Top Ten	*Country*	*Population rank within continent*	*Urban population rank within continent*	*Total population (thousands)*	*Number of urban persons in the LECZ (thousands)*	*Share of total population that is urban and in the LECZ (%)*
1	Egypt	3	1	67 285	11 444	17.0
2	Nigeria	1	2	117 606	4 927	4.2
3	Senegal	24	16	10 343	2 400	23.2
4	Morocco (includes Western Sahara)	10	5	29 530	1 457	4.9
5	Tunisia	25	13	9 563	1 191	12.5
6	Benin	29	24	7 197	1 129	15.7
7	Mozambique	13	15	17 910	1 118	6.2
8	Ivory Coast	14	14	16 735	942	5.6
9	Algeria	9	4	30 462	727	2.4
10	Libyan Arab Jamahiriya	33	19	5 306	726	13.7
	Total urban population in LECZ				32 390	
	Total urban population				282 143	

Panel 2: Asia

Top Ten	*Country*	*Population rank within continent*	*Urban population rank within continent*	*Total population (thousands)*	*Number of urban persons in the LECZ (thousands)*	*Share of total population that is urban and in the LECZ (%)*
1	China	1	1	1 256 446	101 241	8.1
2	India	3	2	1 021 084	38 256	3.7
3	Japan	7	3	127 180	27 521	21.6
4	Indonesia	2	4	209 139	22 135	10.6
5	Bangladesh	5	9	128 916	13 063	10.1
6	Vietnam	4	13	78 666	12 613	16.0
7	Thailand	10	12	61 410	10 571	17.2
8	Philippines	6	10	75 290	6 808	9.0
9	Myanmar	8	18	47 724	4 280	9.0
10	Taiwan	9	11	21 638	3 898	18.0
	Total urban population in LECZ				262 779	
	Total urban population				1 532 853	

Source: Author's calculations based on GRUMP (Ciesin et al., 2004) and Isciences (2003)

The global picture is no less striking: Of the 183 countries with people living in the zone, 130 (or about 75 per cent) have their largest urban area extending into the zone. The world's large cities – those with more than five million residents – have, on average, one-fifth of their population and one-sixth of their land area within the zone. On one hand, these proportions suggest that the urban population is at greater risk than the urban land; and on the other hand, they may suggest that for climate adaptation,

migrating or resettling within existing cities but outside of the zone is an option for the population living in these zones.

Continued urbanization is in danger of drawing still greater populations and population shares into the LECZ. In China, where export-driven economic growth has been associated with very rapid migration toward the coast, national population growth in 1990-2000 was approximately one per cent, while growth in the LECZ was 1.9 per cent, and urban populations in the zone grew by 3.4 per cent. Even in Bangladesh, where urbanization is not so clearly a driver of economic development, movements towards the coastal zone are evident. For example, the country's total population growth rate is 1.2 per cent, while the growth rate in its LECZ is 2.1 per cent and growth in the urban population living within that LECZ is 2.8 per cent (McGranahan et al., 2007).

C. IMPLICATIONS

The above analysis shows that the pattern of urban settlements in the LECZ is remarkably varied. Deltas clearly stand out as one common factor that many of these regions share (McGranahan et al., 2007), yet whether they alone can act as a unifying agent for policy directives in small and large cities alike is not clear. Governance structures are not oriented towards physiographic entities like deltas and regions, yet climate change may make regional alliances of this sort a necessity.

Looking to the future, the responses to the growing risks brought on by climate change in coastal settlements will need to include climate mitigation, human migration and modification (including adaptation)—all of which have a long lead-time. Cities tend to have short-term planning horizons. Though some cities are actively engaged in regional planning, and some have sustainability plans that are medium-term in nature, such plans are not the norm, especially in poorer countries of Africa and Asia. Equity issues will also require attention, particularly because low-income groups often settle along the flood plains and are most at risk. At the same time, these same groups are most at risk from hastily constructed government policies.

D. DEMOGRAPHIC TOOLS AND METHODS

Urbanization and climate change are unavoidable features of the future, yet our ability to predict effectively future urban population growth—and locational implications such as those associated with climate change—is hampered both by methodological and data constraints. Thus, this final section makes recommendations on some of the necessary data and tools to improve future urban population estimates.

Urban areas are spatially delineated. Spatial data, therefore, would be extremely valuable to understanding future urban change. To be most useful, these data should be spatially explicit at the city-level (so that it is possible to determine how cities expand and contract) and within cities (so that it is possible to determine compositional differences between neighbourhoods). In the future, more of the urban world will be faced with issues that require a spatial framework. Three broad areas of inquiry are identified below.

To understand *where* cites are growing, and more generally to consider urbanization in an environmental context, a spatial framework is necessary. For example, it is impossible to understand the likely implications of growth for urban areas that are situated near coasts or in a dryland vis-à-vis climate change, if one does not know where cities are located, and how they are changing in spatial and demographic terms. There is ample relevant, spatial geophysical data (for instance, on rainfall, temperature, climate scenarios, ecosystems, hydrology and elevation) that could be accessed with a spatial framework, so much of the onus to foster this integration is on the demographic side – to render demographic data on cities in a spatial framework. At a minimum, estimates of total current and projected

future population of cities is vital. Preferably, data that describe the age-structure, the fertility, mortality rates, as well as other related socio-economic variables of cities would be an important addition. These data need to be specified by city or for sub-city units, not simply tallied for all urban areas within a country.

To understand *how* cities grow—horizontally or vertically—and by which causes—natural increase, *migration*, and *administrative reclassification*—requires a systematic spatial view. Though case studies and some evidence (Chen et al., 1998) have been offered on these questions in the past, these issues cannot be fully understood in the absence of analysis of spatial coded demographic data. Towards this end, it is not only important that we have a system of population estimates associated with urban boundaries (such as those from the GRUMP project) but an understanding of how they nest within smallest available administrative boundaries with their associated population estimates (Champion and Hugo, 2004). To be most valuable to planners, these data should be collected, or at least estimated, more than once per decade.

Finally, recent evidence clearly finds that level of urbanization does not affect the rate of economic growth (Bloom et al., 2008), yet it also appreciates that many demographic and economic processes—migration, trade, and growth itself—implicitly occur along some sort of gradient of urbanization. One small and understudied part of the urban transformation is the relationship among cities of different sizes, and the role of small and medium-sized cities in general (Montgomery, 2008). It is clear that the primate-city model of yesterday is now an outmoded means of understanding urbanization. Yet, whether the demographic and economic growth of the present and the future will occur by the transformation of already large cities into to mega-urban regions, or by improved social and economic network of small and medium-sized cities, or any of a number of possibilities, is an open-ended question. Without embracing a spatial framework, this question will remain unanswered. Yet the answer to this question is closely linked to future economic development and sustainability throughout the world.

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NOTE

[1] Not sufficient because policy development and implementation, while requiring jurisdiction, may or may not require a spatial paradigm. 62).

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DEMOGRAPHIC ASPECTS OF CLIMATE CHANGE, ENVIRONMENTAL DEGRADATION AND ARMED CONFLICT

Henrik Urdal, Centre for the Study of Civil War, The International Peace Research Institute, Norway

A. INTRODUCTION

Demographic and environmental pressures have featured prominently in the debate over the new security challenges in the aftermath of the Cold War. In the *resource scarcity* literature, high population growth and density are seen as major causes of scarcity of renewable resources like arable land, fresh water, forests, and fisheries. Arguably, such scarcities may trigger armed conflict over resource access. The claim of a relationship between population growth, resource scarcity and conflict emerged with the increasing environmental awareness of the late 1960s (see, for instance, Ehrlich, 1968). After the end of the Cold War, population growth and resource scarcity became subjects of both popular accounts of violence (Kaplan, 1994), as well as of large academic research programs (see, for example, Homer-Dixon and Blitt, 1998; Baechler, 1999). This paper summarizes the findings of a doctoral project aimed at systematically investigating the relationships between population pressure, resource scarcity and armed conflict. The project encompasses a set of cross-sectional time series analyses conducted both at the State and sub-State levels (Urdal, 2005; Raleigh and Urdal, 2007; Urdal, 2008).

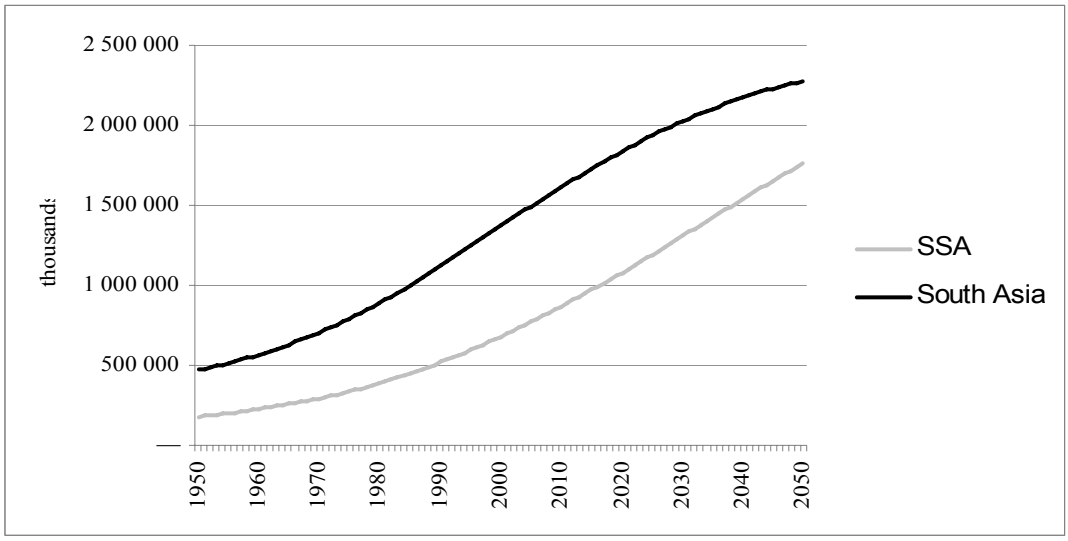
Population-induced resource scarcity has particularly been argued to pose a security threat in developing countries with low capacity to prevent and adapt to scarcities (see, for example, Homer-Dixon, 1999). Generally, one of the most robust findings in the quantitative conflict literature is that impoverished and institutionally weak countries, usually measured by low GDP per capita, have an exceptionally high risk of armed conflict and civil war (Collier and Hoeffler, 2004; Fearon and Laitin, 2003; Hegre and Sambanis, 2006). Two key trends arguably contribute to extend the relevance of population pressure and resource scarcity into the coming decades. First, despite declining population growth rates globally, low-income countries particularly in parts of Asia and sub-Saharan Africa will continue to experience very significant population growth rates in the near future. Second, these areas are also the ones expected to face the most severe consequences of global climate change (Stern et al., 2006).

1. Population trends

The total world population has increased from 1.6 billion to 6.1 billion over the course of the twentieth century. Population growth accelerated after World War II, when many developing countries entered into the early phase of the demographic transition with decreasing mortality and continued high fertility. The rapid population growth in most developing countries spurred concerns in the 1960s and 1970s that food production would not keep up, and that burgeoning populations would seriously deplete natural resources. The gloomiest scenarios proved unfounded as food production has kept pace with population increases in most parts of the world, and fertility is now declining in all world regions. The latest medium projection of the United Nations Population Division (United Nations, 2007) suggests a total world population of almost 9.2 billion by year 2050 (Figure 1.1). The United Nations projection does not go beyond 2050, but predicts some level of population growth also in the following period. Another projection expects world population growth to level off during the coming decade, with the most likely predictions suggesting a global population peak between 8 and 9 billion around year 2070 (Lutz et al., 2004, p. 40). While world population growth is losing momentum, there are substantial regional differences. Lutz et al. (2004, p. 45) expects population growth to be highest in sub-Saharan Africa, even with the toll claimed by HIV/AIDS. Here, the total population is expected to peak around year 2080 at about 1.5 billion, almost two and a half times the population in year 2000. The combined population of

South Asia[1] and sub-Saharan Africa has grown from 649 million in 1950 to 2.3 billion today (2008), and will continue to grow up to around 4 billion in 2050 (Figure 1, United Nations medium projection). In relative terms, the population of South Asia and Sub-Saharan Africa has grown from 26 per cent of the total world population in 1950 to 35 per cent today (2008), projected to reach 44 per cent in 2050 (United Nations medium projection).

Figure 1. Total population size in South Asia and Sub-Saharan Africa 1950-2050



Source: UN (2007), medium projection.

2. Climate change, forced migration and conflict

Global climate change represents the ultimate resource scarcity perspective, and is argued to be a future source of conflict (see, for instance, Renner, 1996; Homer-Dixon and Blitt, 1998; Rahman, 1999; Klare, 2001; Brauch, 2002; Pervis and Busby, 2004). Population issues are at heart of this concern. First, increasing temperatures, precipitation anomalies and extreme weather is expected to aggravate situations in areas already experiencing high population pressure and resource scarcity. Second, increasing sea levels, more extreme weather, and local resource depletion could force millions of people to migrate, arguably leading to increased risks of inter-ethnic tensions and higher pressures on resources in destination areas.

Some of the most alarming accounts grossly exaggerate the security implications of climate change. In a report for the Pentagon, Schwartz and Randall (2003) foresee a worst-case scenario where a collapse in carrying capacity "could make humanity revert to its ancient norm of constant battles for diminishing resources" (p. 16). Although warning against overstating the relationship between climate change and armed conflict, Barnett (2001, p. 6) and Pervis and Busby (2004, p. 68) accept that the depletion and altered distribution of natural resources likely to result from climate change could, under certain circumstances, increase the risk of some forms of violent conflict. Climate change is generally not seen as a likely major or sufficient cause of conflict, but is argued to contribute to a mounting environmental challenge (Brauch 2002, p. 23; Tänzler and Carius 2002, p. 8). Although climate change is usually regarded as a potential future threat, some argue that global climate change has already been a contributing factor in recent conflicts such as Darfur (Byers and Dragojlovic, 2004, p. 2).

The issue of "climate refugees" as a source of conflict is one of the more contentious issues. Because of rising sea levels and increased risks of flooding, climate change is expected to contribute to migration from coastal and riverine settlements (IPCC, 2001, p. 36). Extreme weather events and general resource degradation is argued to add to what is generally referred to as "environmental refugees." There are estimates putting the current stock of "environmental refugees" at around 20 to 25 million, but the term is highly contentious (see, for example, Suhrke 1997; Castles, 2002). The Stern Review on economic consequences of climate change (Stern et al., 2006) States that by 2050, "200 million more people may become permanently displaced due to rising sea levels, heavier floods, and more intense droughts, according to one estimate" (p. 56). The review received considerable attention, and the claim about the 200 million climate refugees has been widely cited. The estimate is often attributed to the IPCC, but the IPCC Fourth Assessment Report is very cautious, and does not provide any migration estimates. The original source is a 1995 report by a British ecologist, Norman Myers (Myers and Kent, 1995). Stern et al. (2006, p. 77) acknowledge that "this estimate has not been rigorously tested," but claim that it is a conservative estimate that "remains in line with the evidence presented throughout this chapter that climate change will lead to hundreds of millions more people without sufficient water or food to survive or threatened by dangerous floods and increased disease." A recent report from the NGO "Christian Aid" drew considerable attention to its dramatic number of one billion displaced by 2050 due to war, disasters, development schemes, and climate change (Christian Aid, 2007). Although the vast majority (645 million) are thought to become displaced due to "development projects such as dams and mines," the report also provided a revised estimate by Norman Myers who in an interview with Christian Aid reveals that he "now believes that the true figure will be closer to 250 million" (Christian Aid, 2007, pp. 5-6; 48).

The potential for and challenges related to migration spurred by climate change should be acknowledged, but not overemphasized. Some forms of environmental change associated with climate change like extreme weather and flooding may cause substantial and acute, but mostly temporal, displacement of people. However, the most dramatic form of change expected to affect human settlements, sea-level rise, is likely to happen gradually, as are processes of soil and freshwater degradation. Improved forecasting skills will make adaptation easier and reduce the problem of population displacements (Chimeli et al., 2002, p. 213). So while abrupt displacements may happen, climate change is primarily expected to result in gradual migration. Furthermore, capable governments may in some cases be able to prevent or at least drastically reduce large-scale migration in the first place, and government capability is also crucial in determining the pace and conditions for the return of temporarily displaced populations. Finally, individuals respond differently to changes in their environment, and coping and adaptation mechanisms involve a range of options short of permanent migration.

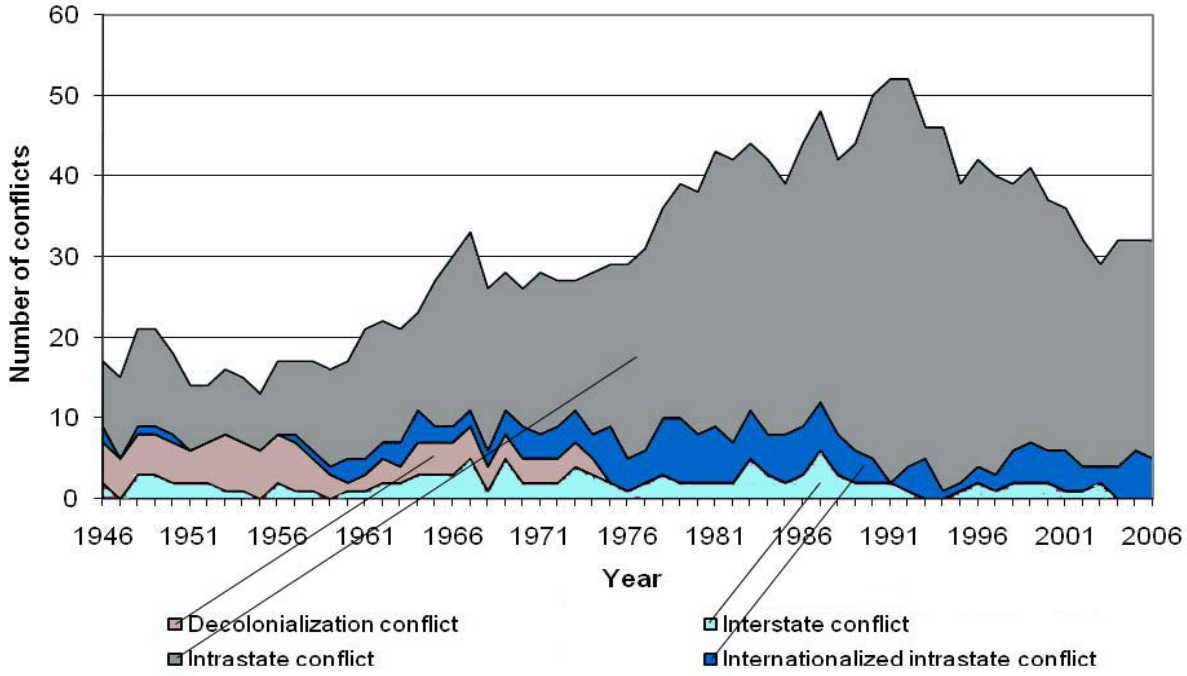
Crucial to understanding potential security implications of climate-related migration relates to where the migrants are moving to. Very few of these migrants are likely to move across international borders, and many will presumably become part of the historically unprecedented migration current from rural to urban areas that is taking place globally. According to the 2005 World Urbanization Prospects, only between 2005 and 2015, "a total of 250 million to 310 million people in developing countries would be expected to become urban dwellers (...) either because they would migrate from rural to urban areas or because their rural settlements would become urban" (United Nations, 2006).

3. Global conflict trends

The PRIO–Uppsala dataset (Gleditsch et al., 2002) is published annually in the *Journal of Peace Research*, and contains information on the start date, actors, and intensity levels of all armed conflicts since 1946. The dataset defines a relatively low threshold for conflict, a minimum of 25 battle-related deaths per year. According to the PRIO–Uppsala criteria, an armed conflict is further defined as a contested incompatibility concerning government and/or territory, between at least two parties, of which

one is the government of a State, using armed force (Gleditsch et al., 2002, p. 619). The dataset distinguishes between (low intensity) conflicts (at least 25 battle-related deaths per year, but fewer than 1,000) and wars (at least 1,000 battle-related deaths per year). In this paper, the terms internal armed conflict and civil war are used interchangeably. Figure 2 provides an overview of global conflict trends. The number of ongoing conflicts reached a peak of 53 in 1992-1993, and has declined to a level of just above 30 in the past few years.

Figure 2. Global conflict incidence by type, 1946-2006



Source: Gleditsch et al. (2002). Map produced by Halvard Buhaug.

B. THEORETICAL FRAMEWORK

Resource scarcity is seen as a product of three different factors interacting – population growth, resource degradation, and the distribution of resources between individuals and groups. Homer-Dixon has called this *demand-induced*, *supply-induced* and *structural scarcity* respectively (Homer-Dixon and Blitt 1998; Homer-Dixon 1999). The distributional aspect is central in all the most influential frameworks of the resource scarcity tradition (Baechler 1999; Homer-Dixon 1999; Kahl 2006). The three sources of scarcity may exert different impacts from case to case, and frequently interact. Homer-Dixon (1999) argues that two types of interactions are particularly common. *Resource capture* occurs in a situation of resource degradation and population growth, providing incentives for powerful groups to take control over scarce resources on the expense of weaker and poorer groups. *Ecological marginalization* denotes a situation where great land inequality and population growth leads people to move into more ecologically fragile areas. While many countries have the ability to adapt to environmental change, some countries, particularly poor and institutionally weak States, are likely to be more vulnerable to environmentally related violence (Baechler 1999, p. xvi; Homer-Dixon 1999, p. 181). Resource scarcity arguably also has the potential to aggravate social segmentation (Homer-Dixon 1999, p. 96). While demographic and environmental pressures are seen as unlikely causes of international wars, it is claimed that such factors may spur local violent low-intensity disputes (Baechler 1999; Homer-Dixon 1999; Kahl 2006).

While it is generally agreed in the environmental security literature that the effects of resource scarcity is modified through political, economic and social structures, the resource scarcity and conflict scenario has been theoretically underspecified. Attempting to rectify this problem, Kahl (2006) has identified two alternative causal pathways from demography and environment to violent conflict. Kahl (2006) identifies two distinct "State-centric" causal pathways from resource scarcity to internal violent conflict; the *State failure* and the *State exploitation* hypotheses. Both start from the premise that resource scarcity, or what he terms *demographic and environmental stress* (DES), may put severe pressure on both society at large and on State institutions. When the interaction between resource degradation, population growth and unequal resource distribution leads to lower per capita availability of land resources and expansions into more marginal land, this is assumed to put a greater pressure on agricultural wages and contribute to economic marginalization as a first-order effect. Such hardship can, as a second-order effect, lead both to rural-to-rural migration, potentially causing inter-ethnic conflicts over land, and to rural-to-urban migration. While urban populations generally enjoy material standards above those in rural areas, urbanization often puts a pressure on a State's ability to provide vital services such as housing, clean water and health services. Further, the social consequences of DES may produce absolute deprivation, meaning that people do not get what they need in order to survive, as well as relative deprivation, a situation in which they do not get what they feel they are entitled to. Both forms of deprivation may produce grievances among rural and urban populations.

The novelty in Kahl's (2006) approach lies in the way he differentiates between the potential roles of the State. Like Homer-Dixon (1999), he sees DES as a factor that can produce severe strains on a State. DES is argued to potentially weaken a State's *functional capacity* by placing costly demands on the State for development projects in the agricultural sector or social improvements for burgeoning urban populations, but also by generally undermining overall economic productivity and potentially also the ability to finance a coercive capacity (Kahl 2006, pp. 40-42). The other aspect of State strength, *social cohesion*, may also be weakened by DES. Alternative elites within the State may compete over how to use strained resources either geographical or sectoral, and they may disagree over the best way to respond to the challenges posed by DES (Kahl 2006, p. 43).

The weakening of the State is seen as an intermediate factor between resource scarcity and violent conflict. While the resource scarcity literature is often seen as belonging to the "motive" tradition, the State-centric perspective identifies important opportunity factors in both the possible causal trajectories. The State weakness hypothesis posits that the impact of resource scarcity will weaken State institutions and provide opportunities for potential rebels to challenge the State authority. Conflict may arise when the potential gains from a rebellion are higher than the costs that a State can inflict on the rebels. Waning State authority produces a "security dilemma" where social groups are "left to fend for themselves" (Kahl 2006, p. 47). Episodes of regime collapse and regime transitions may thus provide particularly great opportunities for DES-generated violent conflict. However, even when demographic and environmental factors are *not* the primary drivers of State failure, relatively weaker States are presumably more likely to experience resource scarcity conflicts firstly because they are less capable of mitigating the effects of resource scarcity, and secondly because they are generally more likely to be militarily challenged by opposition groups. If the State failure hypothesis is an important pathway to armed conflict, we should expect to see that statistical controls for low State capacity and State failure should capture some of the explanatory power of the demographic and environmental variables.

The State exploitation hypothesis suggests another important opportunity aspect, namely the opportunity for weakened States to bolster their support base through mobilizing ethnic groups to capture scarce resources. When regimes experience increased grievances and opposition due to resource scarcity, they may be likely to instigate interethnic violence as a means to divert attention from their inability to meet these demands at the same time as they consolidate support among groups that may capture resources on the expense of contending groups. While theoretically appealing, the State exploitation

hypothesis is difficult to empirically test in a statistical model. Kahl (2006, p. 50) posits that State exploitation "can occur at levels of State weakness far short of total collapse," but he does not offer suggestions for what characteristics we may expect to see among regimes that would engage in State exploitation. So while we may be able to test whether domestic armed conflicts are overrepresented in resource scarce areas of poor countries, we will not be able to conclude whether a possible statistical relationship between resource scarcity and conflict that is not well captured by the context of failed or very weak States may be due to a "State exploitation" explanation.

1. Critiques of the resource scarcity perspective

The major challenges of the resource scarcity perspective come from the three different traditions of neoclassical economy, political ecology and institutionalism. Neo-classical economists, often also referred to as cornucopians or resource optimists, have posed three different sets of arguments that challenge the view that resource scarcities are likely to cause armed conflict. First, they argue that the situation is not as bleak as portrayed in some of the environmental scarcity literature. Most renewable resources are not scarce at the global level, and markets, technological developments, and resource substitution are factors that are likely to help us adapt to situations of local scarcity (Maddox, 1972; Lomborg, 2001). Furthermore, in virtually all areas of the world, people are responding to lower mortality by reducing their fertility, albeit at different speeds. Within the next 60 to 70 years we are likely to see the end of world population growth (Lutz et al., 2004).

A second argument is that high population pressure and resource scarcity may be a vehicle for development. High population growth and increasing scarcity of resources provide incentives for people to search for ways to mitigate scarcity by means of technological development and resource substitution (see, for instance, Boserup and Schultz, 1990; Simon, 1989). Hence, a high population pressure will eventually lead to less resource dependence and decreasing problems of scarcity. Boserup holds that the historically low level of population pressure in sub-Saharan Africa is one important factor behind the continent's low agricultural effectiveness and underdevelopment (Boserup and Schultz, 1990). Furthermore, countries with high population densities are likely to have more effective production systems due to lower per capita investments in infrastructure and generally greater availability of human resources in any location.

The third neoclassical argument is that it is resource abundance that causes conflict, not scarcity. This claim has two different bases. First, the honey-pot hypothesis contend that the availability of rich natural resources like diamonds, gemstones, oil, other valuable minerals or tropical timber may motivate rebels to capture the resources either as a way to enrich themselves or as a means to finance conflict activities. Second, resource abundance may work indirectly by weakening State institutions. Resource rents may lead to the crowding out of other forms of economic production, to economic stagnation and to corruption, known as the "Dutch disease." "Rentier States" may also use resource rents to quell dissatisfactions and hence avoid demands for structural reforms and democratization.

While there is much empirical research pointing to a relationship between resource abundance and conflict (see, for example, Collier, 2000; LeBillon, 2001; de Soysa, 2002; Lujala et al., 2005), the scarcity and abundance perspectives are by no means theoretically exclusive, although often portrayed as competing hypothesis. Renner (2002) argues that they may sometimes be complimentary, as resource extraction can lead to the degradation of renewable resources. The other two perspectives challenge the assumptions of the resource scarcity perspective more directly. The argument that renewable resources are not globally scarce and that markets, technological innovations and demographic adaptation may mute local scarcities is not entirely rejected by scholars associated with the resource scarcity perspective. In fact, Homer-Dixon (1999, p. 108) acknowledges that what he terms "technical and social ingenuity" is likely to help many societies overcome resource scarcities. However, in many developing countries,

markets, property rights, government structures, infrastructure and human capital "are imperfect, absent altogether, or distorted in ways that actually compound resource problems" (Kahl, 2006, p. 17), increasing the "ingenuity gap" (Homer-Dixon, 1999, p. 108; Homer-Dixon, 2000). Hence, resource scarcity is more likely to cause conflict where adaptation mechanisms are particularly weak, and may in particular pertain to regions within countries to where State penetration does not extend. Similarly, the argument posed by Boserup and Simon does not necessarily contradict the resource scarcity perspective, it may primarily speak to different temporal effects. The long-term consequences of population pressure in the form of high population densities may very well be greater adaptive capacity and peace. But scarcities of renewable resources, which both Boserup and Simon see as a consequence of population growth, can still be a source of conflict in the short run.

The second tradition challenging the resource scarcity perspective, political ecology, sees resource distribution as the primary issue of the relationship between the environment and conflict. Political economy has its root in Marxian political economy and sees scarcity primarily as a product of local and international structures of power and wealth, and downplays "natural" sources of scarcity like population growth and degradation. Political ecology "provides tools for thinking about the conflicts and struggles engendered by the forms of access to and control over resources" (Peluso and Watts, 2001, p. 25). While political ecologists argue that local cases of "scarcity" may very well happen in the context of local abundance, they also argue that the resource scarcity perspective mostly ignores what they see as the most important sources of resource degradation, namely resource extraction like mining and logging, dam construction and other forms of industrial activity (Peluso and Watts, 2001, p. 26).

Implicit in the critique from political ecologists is a claim that proponents of the resource scarcity perspective are blaming the poor for causing scarcity and violence. Under the heading "localizing blame," Hartmann (2001, p. 50) criticizes Homer-Dixon for failing to acknowledge the role of economic and political factors that create structures of exploitation. Arguing that Homer-Dixon is primarily focusing on internal stresses that create outward pressures, she claims that "the outside is rarely seen to be pressing in" (ibid). Commenting on scarcity and violence in Ogoniland, Nigeria, Hartmann (2001, p. 60) asks why Homer-Dixon focuses "on the violence of local acts of resistance and not on the much larger violence of State and corporate enforcers?" Also claimed to be missing from the picture are "the consumers of the extracted products" – for instance, consumers of paper in developing countries playing a major role in the deforestation of developing countries (Hartmann, 2001, p. 61).

While it is true that Homer-Dixon's case studies mainly address local violent responses, it is not the case that external factors and resource distribution is absent from the analysis. The expansion of the ranching industry and neo-liberal economic reform plays an important role in the analysis of the Chiapas conflict (Howard and Homer-Dixon, 1998), the Israeli occupation is seen as an important cause of water scarcity and economic stagnation in Gaza (Kelly and Homer-Dixon, 1998), and the political economy of apartheid is considered the main driver behind resource scarcity in South African "homelands" (Percival and Homer-Dixon, 1998b). Resource distribution plays a major role in many of Homer-Dixon's cases, and for this reason he has been criticized for diluting the concept of resource scarcity (see, for example, Gleditsch and Urdal, 2002). In Chiapas, Gaza and South Africa the major problem appears to be resource distribution, not lack of renewable resources per se. But population growth and resource degradation may play an aggravating role, a fact often overlooked by political ecologists.

Finally, the resource scarcity perspective has been challenged by "institutionalists," claiming that scarcity is more likely to lead to cooperation over resource management than conflict (see, for instance, Wolf, 1999; Wolf et al., 2005). Armed conflicts are costly, and fighting over renewable resources rarely pays. Rivalry over access to resources may instead provide opportunities for neighboring groups or States to enter into a dialogue over institutional arrangements for resource sharing. Cooperation over resource management may further lead to cooperation in non-resource related area through trust-building and

development of institutional capital. Cooperation over resources can exist even in the context of violent conflict, such as water sharing agreements between Palestinians and Israelis, and it can follow cyclical trends, with cooperation happening primarily during periods of scarcity. While much of the focus has been on water agreements, for which there were twice as many cooperative events as conflictual in the 1945-1999 period (Wolf et al., 2005, p. 81), the concept of "environmental peacemaking" extends much further, including for instance establishment of "peace parks" (Conca et al., 2005). Meier et al. (2007) have found some local-level support for cyclical patterns of conflict and cooperation linked to rainfall.

2. Previous studies

Previous quantitative studies have found mixed evidence for the resource scarcity and conflict nexus. The two larger studies in the field, the State Failure Task Force Report (Esty et al., 1998) and Hauge and Ellingsen (1998) reported slightly different results. Esty et al. (1998) found no effects of soil degradation, deforestation and freshwater supply on the risk of State failure. Hauge and Ellingsen (1998), on the contrary, concluded that the same factors as well as high population density were indeed positively associated with civil war, but that the magnitude of the effects was secondary to political and economic factors. Theisen (2006) was unable to replicate their results using the same dataset, and found very limited support for the resource scarcity perspective in his own data. Assessing the issue of land scarcity, de Soysa (2002) found a significant effect of population density on domestic armed conflict. For an overview of quantitative studies on population and internal armed conflict, see Appendix A.

C. THREE EMPIRICAL STUDIES ON POPULATION AND ARMED CONFLICT

1. Global cross-national effects of population pressure 1950-2000

Do countries differ in their conflict propensities as a result of their overall population pressure on renewable resources? In an article published in the *Journal of Peace Research* (Urdal, 2005), I study the relationship between national-level demographic factors – population growth, per capita availability of potentially productive land, and their interaction – and the onset of internal armed conflict. While some case studies linking environmental factors and political violence address local environmental issues and disputes, many also focus on the country level. Arguably, the State is a highly relevant political unit in the study of the environment-conflict nexus, as local resource scarcity within a country may be ameliorated by better resource management, resource transfers or population movements. Hence, local resource scarcity in an overall resource abundant country may be seen as governance failure. If so, local conflict over scarce resources is a product of government actions or inactions, rather than of scarcity per se.

The unit of analysis is the country-year, and the dependent variable is internal armed conflict onset using conflict data from the PRIO–Uppsala dataset (Gleditsch et al., 2002). The study includes all sovereign States and all politically dependent areas (colonies, occupied territories, and dependencies) for the whole 1950–2000 period, applying a standard logistic regression design. An armed conflict onset is consequently coded 1 for the first year of a domestic conflict. Subsequent years in conflict (including new conflict onsets when a previous conflict is still active) as well as years in peace are coded 0.

Population data are primarily collected from the *World Population Prospects, The 1998 Revision* (United Nations, 1999). *Population density,* or *potential cropland,* is defined as total population relative to all of a country's land that fall into the following land use categories: arable land, permanent crops, permanent pastures, and forests and woodland. Land that is excluded from this definition includes, but is not limited to, urban areas, mountains, roads, and deserts. The population density variable is log-transformed in order to reduce the huge variation. Control variables include level of development, proxied by the infant mortality rate (IMR), regime type, economic growth, total population size and previous conflict. For exact references and operationalizations, see Urdal (2005).

The results of the study (see Table 1 for the two basic models) indicate that national-level aggregate demographic pressures do not seem to be strongly related to armed conflict. The interaction between population growth and density is not robustly associated with armed conflict onset. In fact, in countries with negligible population growth, high population densities seem to lower risk of conflict somewhat. But also this result is vulnerable to different model specifications. Nor is urban growth rates statistically associated with conflict onset. When considering the relationships between population pressure and conflict in temporal sequences, I find the interaction of population growth and density to be clearly associated with an increased risk of conflict in the 1970s (not shown here; for all models see Urdal (2005)). Also, the frequent claim that resource scarcity has become more pertinent as a driver of armed conflict in the post-Cold War era receives no support. In fact, urban growth is statistically associated with lower risk of conflict onset in this period (Table 1).

TABLE 1 – RISK OF ARMED CONFLICT BY POPULATION PRESSURE VARIABLES

	Basic Model	*Expanded Model*	*Post-Cold War*
Population growth	Not significant	Not significant	Not significant
Population density	Lower risk (weak)	Not significant	Not significant
Growth * density	Not significant	Not significant	Not significant
Urban growth		Not significant	Lower risk

NOTES – Logit model for conflict onset. Results for control variables not shown here. For all results, see Urdal (2005).

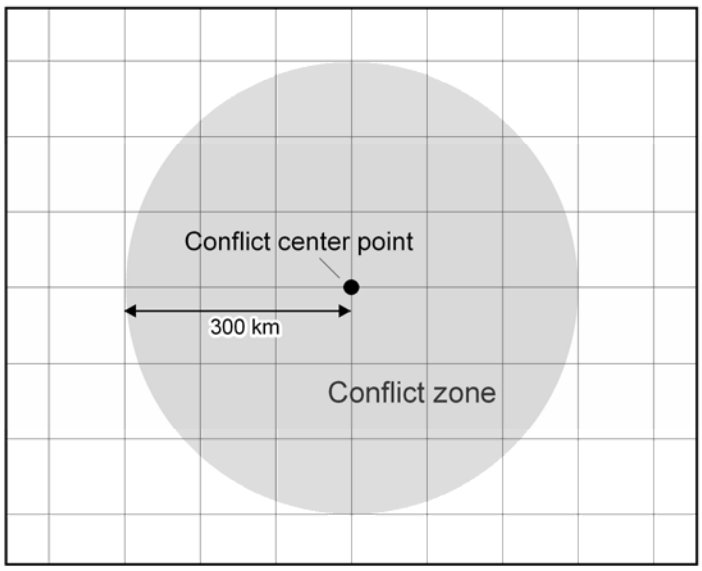
2. A global sub-national study of population and environmental pressures

Going below the State level, Raleigh and Urdal (2007) investigate whether demographic and environmental factors determine the location of armed conflict. The coverage is global, but the units of analysis are geographical squares of 100x100 km at the equator. In particular, we are investigating stressors that are assumed to become more common as a consequence of global warming. The study addresses three different demographic and environmental concerns, population pressure, land degradation and water scarcity and departs from the assumption that high population density, degradation and water scarcity should be more strongly associated with conflict in areas with increasing population pressure. For this sub-national study, data are created from geospatial information. The dataset has three main differences from typical county-year analyses: the unit of observation is considerably smaller; the dependent variable is positioned to have occurred at a particular location and associated with values from that location; and independent variables are derived from a geospatial dataset, including shape and raster files. A shape file stores and map and attributes of a point, line or polygon unit. Raster graphics are digital images created or captured (for example, by scanning in a photo) as a set of samples of a given space. For a description of the creation of the dataset, see Buhaug and Rød (2006) and Raleigh and Urdal (2007).

The data covers all countries with populations over 100,000, and the full dataset is comprised of 13,199 polygon squares. The study is limited to the civil conflicts observed from 1990 to 2004 as the geospatial explanatory variables used were collected during or after 1990. The Uppsala/PRIO location information is an aggregate measure of the center of the larger conflict, so the actual location of the fighting is not directly represented (see Buhaug and Gates, 2002). We chose a radius of 300 km from the

conflict point, assuming that this would properly denote a "conflict zone" and therefore account for the majority of definite fighting locations. All 585 conflict point coordinates are automatically assigned a radius of 300 km, resulting in 1,907 conflict squares. Figure 3 displays a hypothetical conflict zone set upon grid square.

Figure 3. Conflict zones upon grid squares



Human Induced Soil Degradation: the measure of soil degradation throughout the world was commissioned by The International Soil Reference and Information Centre (ISRIC) for the United Nations Environment Programme in 1990. The information of soil degradation is based on questionnaire answers from numerous soil experts throughout the world. Each measure combines type, degree, extent, cause and rate of soil degradation, recoded into a set of four dummy variables indicating no or very low, low, medium to high or very high level of degradation. *Easily Available Fresh Water* measures the amount of stored soil moisture easily available to crops, and the variable is coded into five different categories of very high, high, medium, and low access to available water, and finally dry land. Geo-referenced data on *population density* from The Center for International Earth Science Information Network (CIESIN) provides population measures from two points in time (1990 and 1995) at a 1 km level. Population count of people per square kilometer is represented as an increasing density score (see Appendix 1 in Raleigh and Urdal, 2007). Differences between 1995 and 1990 estimate determined population growth during this time. All three variables are also interacted with population growth to assess whether areas of high population or environmental pressures are particularly susceptible to conflict when population growth is high. We further control for country level GDP per capita and regime type, political instability and direction of political change. The analysis method is ordinal logistic regression, where the dependent variable is conflict and the unit of observation is the grid square.

Table 2 summarizes the main findings from the article, for all results see Raleigh and Urdal (2007). For the full global sample, we find robust effects on conflict for the interactions of population growth and density, as well as population growth and water scarcity. We do not find empirical support for any mediating effects of the proxies we use to measure State capacity or governance. When looking exclusively at the poorer half of the globe, which presumably should be more susceptible to conflict generated by demographic and environmental factors, we only find consistent and robust effect of the interaction between population growth and density. Again, the assumed mediating effect of State capacity and governance is not captured by the empirical model. The positive effects of degradation seem to be

driven by a handful of conflictual States in the higher income sample. The results are extremely sensitive to country omissions. If Russia is omitted from the high income models, low and medium degradation as well as water scarcity become clearly insignificant, and interaction terms retain their insignificance. The positive influence of high degradation is driven by twenty-nine high degradation squares in Iraq, Serbia and Mexico. Further, if either Spain or Mexico is omitted, the water scarcity variable becomes insignificant.

TABLE 2 – DEMOGRAPHIC AND ENVIRONMENTAL STRESS FACTORS AND INTERNAL ARMED CONFLICT

	High Income	*Low Income*
Low degradation	Higher risk	Lower risk
Medium degradation	Higher risk	Not significant
Very high degradation	Higher risk	Not significant
Water scarcity	Higher risk	Higher risk (weak)
Population density	Higher risk	Higher risk
Population growth	Higher risk	Higher risk
Pop growth *density	Not significant	Higher risk
Pop growth *water scarcity	Not significant	Higher risk (weak)
Pop growth * degradation	Not significant	Not significant

NOTES – Logit model for conflict incidence. Results for control variables not shown here. For all results, see Raleigh and Urdal (2007).

It is clear that the impact of population growth is mediated via other variables, most notably population density. At the highest levels of both, the risk of conflict more than doubles. The interaction between population growth and high levels of water scarcity also significantly increases the risk of conflict. This result, along with other demographic and environmental results for this model, should be considered with two caveats. Grid squares in Niger are driving the result between water scarcity and population growth; its omission from the model renders this interaction clearly statistically insignificant. Furthermore, although the additional risk from population growth interacting with environmental variables varies from insignificant to pronounced, squares with the combination of high population growth and the highest levels of degradation, scarcity and density are unlikely or rare occurrences, calling for considerable caution when interpreting the results.

It remains that all low-income sample models show very consistent results despite the gradual inclusion of interaction terms and control variables. Growth interacted with water availability and population pressures increase the risk of conflict, while the traditional national-level explanations of GDP, political institutions and the sub-national population density account for a considerable amount of conflict across States. The inclusion of economic and political control variables do not alter the impact of any of the demographic and environmental variables. This runs counter to the expectation that State weakness variables would capture some of the variance explained by resource scarcity variables. For all intents and purposes, models on the low-income sub-sample speak to the relative insignificance of demographic and environmental pressures for conflict behaviour in those areas that should, according to the resource scarcity perspective, experience the most pronounced effects.

3. A sub-national study of India

An alternative disaggregated approach is to study whether variations in demographic and environmental factors are associated with variations in levels of political violence within one State, implicitly controlling for aspects of type and strength of government. A study of regions in India (Urdal, 2008) addresses the relationships between demography, environment and political violence among 27 Indian States for the 1956 to 2002 period. A great advantage of such design is the availability of relevant data that are comparable over time and space. Data from Indian censuses and other regular national surveys allow for cross-sectional time-series comparison due to highly similar methods and procedures for the collection and dissemination of information. The detailed and diverse data provide for better opportunities for testing more specific hypotheses derived from the literature on demography and conflict.

There are three different and independently collected measures for political violence analysed in the study. Data on *internal armed conflict* is based on the PRIO/Uppsala dataset (Gleditsch et al., 2002). The second data source is a count measure of *political violence events* collected from news sources covering the 1960 to 2000 period (Marshall, 2001), and the violence indicator is a count measure of *Hindu-Muslim riots* (Varshney and Wilkinson, 2004). Demographic explanatory variables are based on data from Indian census publications, and data on rural and urban inequality and poverty, as well as agricultural wages originate from a World Bank project on poverty in India (Özler et al., 1996).

The results generally provide more support for the resource scarcity and conflict scenario than cross-national studies (summaries of the main findings are provided in Table 3, for all results see Urdal (2008)). Scarcity of productive rural land is associated with higher risks of political violence, particularly when interacting with high rural population growth and low agricultural yield. High growth in agricultural wages is associated with a lower risk of armed conflict. But other central aspects of the resource scarcity scenario are not supported. Structural scarcity (measured by rural inequality) and high urbanization rates do not increase the risk of political violence. Hindu-Muslim riots, a predominantly urban phenomenon, do not seem to be related to population pressure, not even to high urbanization rates.

TABLE 3 – POPULATION, RESOURCES AND ARMED CONFLICT IN INDIA, 1956-2002

	Armed conflict	*Political violence*	*Riots*
Rural pop growth	Not significant	Not significant	Not significant
Rural pop density	Higher risk	Not significant	Not significant
Rural growth *density	Not significant	Higher risk	Not significant
Urban growth	Lower risk	Not significant	Not significant
Rural inequality	Not significant	Not significant	Not significant
Agricultural yield	Not significant	Higher risk if high density	Not significant
Decline in agricultural wages	Higher risk (long-term)	Not significant	Not significant

NOTES – Logit model for armed conflict incidence, negative binomial regressions for political violence and riots event data. Results for control variables not shown here. For all results, see Urdal (2008).

D. SUMMARY

The motivation behind this larger project was to provide more systematic research on the relationship between demographic factors and internal armed conflict in order to supplement and transcend the broad case-study literature in the field. The principal research question has been whether countries that experience demographic pressures are generally at a higher risk of experiencing armed conflict and other forms of political violence. In order to try to answer this question, a set of statistical studies, both global cross-national studies as well as disaggregated studies, were conducted (see Appendix A for a summary of these and previous studies).

A main conclusion from the project is that high levels of population growth and high population to productive land ratios do *not* make countries more susceptible to armed conflict. Furthermore, there is no indication that the conflict proneness of poor countries results from greater population pressure on natural resources. These findings resonate well with previous cross-national studies that have found little support for the resource scarcity perspective. In addition, there seems to be little reason to fear that the rapid and massive urbanization that we currently witness in many developing countries is something that generally will lead to destabilization and armed conflict. Hence, security does not appear to be a valid rationale for reducing global population growth.

A second main conclusion is that the disaggregated studies provide greater support for the relationship between population pressure on natural resources and conflict than the cross-national study, albeit with some important qualifications described above. These findings suggest that environmental scarcity and conflict relationships should be studied at the local level. The combined findings of cross-national and disaggregated studies indicate that while overall demographic pressures and resource scarcity does not seem to make a State conflict prone, the internal resource distribution and resource management seem to contribute to explain the geographical distribution of political violence. In other words, relative regional differences in access to natural resources seem to impact conflict risk, even in the absence of any "absolute" scarcity in the country as a whole. While it may be argued that this result is in accordance with the distributional aspect of the resource scarcity argument, it is notable that structural inequalities among rural people and groups internal to Indian States do not appear to affect the risk of political violence. This observation may be compatible with a centre-periphery motive perspective, assuming that groups in relative resource scarce regions may be more likely to challenge State governments. But it may also be compatible with the opportunity perspective if resource scarcity leads to lower alternative costs for potential rebel recruits through lower wages or higher unemployment rates. Furthermore, the relationship between regional resource scarcity and conflict may be seen as originating from either the lack of ability or willingness by central governments to address relative resource scarcity between regions, from inability by regional and local governments to adopt measures to reduce resource scarcity, or from low adaptability and mobility of people.

Two caveats should be added to the conclusions about the impact of population pressure as a source of resource scarcity and conflict. The first is that the detailed test for Indian States of propositions derived from the resource scarcity perspective cannot be reproduced for a global sample of States. Comparable data on rural land availability, rural and urban inequalities, agricultural productivity and growth in agricultural wages are not widely available across countries and over time periods. Hence, there is a possibility that the discrepancies in results may be a consequence of the inability to test more detailed aspects of the resource scarcity hypothesis globally. The other caveat relates to the data availability in the global disaggregated study of geographical squares. There is no established standard methodology in this field, and data are not available for very long time-series. Hence, we have to be cautious when interpreting the results. Our most robust finding in support of the resource scarcity perspective is the interaction between high population growth and density. But we are not yet able to empirically assess whether the result is driven by urbanization, growth in populous agrarian areas, or inter-rural and possibly

cross-border migration. Ongoing efforts to collect comparable time-series data on population and environment will eventually provide opportunities for better tests of the resource scarcity perspective. Future studies of regional or local population pressure and political violence will show whether the results obtained in the India study can be replicated for other political contexts. As more data becomes available, more detailed studies using geographical units of analysis could shed more light on the regional and local population-conflict nexus. In particular longer time-series of demographic and environmental data, as well as geo-referenced data on ethnicity, poverty and State penetration may provide more detailed insights. Substantively, the issue of migration should be prioritized. A recent global study suggests that conflict-related refugee movements play a role in the diffusion of conflict (see, for example, Salehyan and Gleditsch, 2006), but migrants responding to environmental change may not necessarily pose a similar threat (Gleditsch et al., 2007). The development of better data may provide opportunities to test more specific hypotheses on the relationship between migration and political violence at the sub-national level. Finally, the discrepancy in findings between scarcity at the State and sub-State levels calls for more detailed case studies of sub-national areas that have peacefully succeeded in addressing high levels of population pressure and resource scarcity. Such studies will enable us to answer to what extent adaptation and coping is facilitated by the State, by local and regional governments, or by the local population itself.

NOTE

[1] South Asia includes Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

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Appendix A: Summary of quantitative studies on population and internal armed conflict

Variables	Cross-national studies	Sub-national studies
Population density, growth, and their interaction	Hauge and Ellingsen (1998), de Soysa (2002): positive effect of population density. Collier and Hoeffler (1998; 2004), Esty et al. (1998), Hegre and Sambanis (2006), Theisen (2006), Urdal (2005): no effect of population density. Urdal (2005): no effect of the interaction of high population density and growth, except positive for the 1970-79 period.	Buhaug and Rød (2006): no effect of population density for sub-Saharan Africa. Raleigh and Urdal (2007): a positive effect of density and growth combined, for low-income countries only. Urdal (2008): High rural population density is associated with a higher risk of armed conflict, and high rural density and population growth combined with increasing levels of violent political events. Rural population pressure is unrelated to Hindu-Muslim riots
Secondary Effects: Rural inequality, agricultural productivity and growth rates of agricultural wages	Not previously tested in cross-national studies	Urdal (2008): No effect of rural inequality, some effect of low agricultural yield and declining agricultural wages
High urban population growth	Urdal (2005): no effect, except negative for the post-Cold War period.	Urdal (2008): Urban growth negatively affects the risk of armed conflict, unrelated to other forms of political violence