Working Paper

Sustainability oriented urban development
A general introduction with case studies from Gaborone, Johannesburg and Santiago de Chile

Author(s):
Keiner, Marco

Publication Date:
2005

Permanent Link:
https://doi.org/10.3929/ethz-a-004995703

Rights / License:
In Copyright - Non-Commercial Use Permitted
1. THE CHALLENGE OF GLOBAL URBANISATION GROWTH

The world is currently undergoing an urban demographic revolution: Between 1950 and 2000, the world’s population grew from 2.5 billion to 6 billion. The UN Population Division (2001) estimates that in 2050, between 8 billion and 13 billion people will live on Earth. Today, more than 50% of the world’s population lives in urban areas. By 2030, this rate will presumably increase to 60%. In developing countries, only 40% of the population currently lives in urbanized areas but an expected population growth rate of 2.3% in developing countries by 2030 (UN 1999) will lead to an even sharper rise in the urbanization level. Whereas in 1990, 1.4 billion people lived in the urban areas of the Third World, this number will increase to 3.8 billion in 2030. This means (i) that 80% of global growth of the urban population will take place in the poor countries of the southern hemisphere (UN 2001), and (ii) from 2000 to 2030, the urban population in developing countries will grow by 60 million people a year, effectively doubling in the period from 2000 to 2030. From 2020 onward, the majority of people in developing countries will live in metropolitan areas. Currently, Africa is the continent with the lowest urban population level worldwide at 37% (UN 2001). Despite the threat of a HIV/AIDS pandemic Africa is simultaneously experiencing the fastest population growth rate and especially the fastest urban population growth rate. For example in 2020, Africa’s sub-Saharan urban population will approach 440 million or 46% of its projected total of 952 million (Moor and Warah 2001). Thus, in 2025, more than 70% of the African population is expected to live in cities (Toepfer 2002). In contrast to Africa and most Asian countries, the urbanization rate in Latin American countries has grown earlier. In 1960, half of the population of Latin America was already urban and by 2000, 72% were urban dwellers, with as much as 85%
in Argentina, Venezuela, and Chile (Coy 2002). The UN forecasts that by 2030, 84% of Latin Americans will live in cities (UN 2001).

This ongoing urbanization in Latin America is a result of falling mortality rates, rapid internal migration, economic development, and advances in technology. However, Gilbert (1998) points out that metropolitan growth has slowed markedly in recent years, mainly because of declining fertility rates.

Figure 1 (see at the end of the paper) illustrates the “explosive” urban growth experienced in developing countries.

Reducing the negative impacts of ongoing urbanization in developing countries appears to be one of the key challenges for the future of mankind (Brockerhoff 2000, Keiner 2004). Mitigating the effects of accelerated socioeconomic globalization and their threat to the natural environment is not only the responsibility of developing countries. In actuality, the destruction of the environment is mainly caused by activities in the urban regions of the highly developed world.

2. CITY SIZE AND GOVERNANCE

According to UN (1999), there are 28 cities worldwide that exceed the number of 8 million inhabitants or 19 cities with more than 10 million inhabitants each. These large cities are called “mega cities.” Most of these mega cities are located in developing countries, mainly in Asia. Africa’s mega cities are Lagos and Cairo. São Paulo, Mexico City, Buenos Aires, and Rio de Janeiro represent Latin America’s mega cities. The UN (1999) expects that by 2015, there will be 325 cities with more than one million inhabitants and 27 “10+-million” cities worldwide, 23 of them in developing countries.

In the last decade, a lot of research has been done on mega cities (see, for example, Perlman 1993, Fuchs et al. 1994, Gilbert 1996, Rakodi 1997, Bugliarello 1999, Fu-Chen and Marcotullio 2001). The authors have analyzed the driving forces for urbanization (demography, labor force change, etc), and their current and future impact on the city’s ability to achieve sustainable development. The environmental and socioeconomic problems that need to be solved are central to these studies.

Two facts should be mentioned. First, grouping cities by their size alone (for example as “mega cities”) does not make a lot of sense: Cairo, Tokyo, and Mexico City, for example, are mega cities. But what do they have in common? These cities vary substantially in every respect. What is more interesting than the cities’ size is how they deal with the issues associated with it. Thus, a second issue is governance capacity. There are large cities that have been run well, have overcome environmental challenges and are in-
creasingly clean, as there are smaller cities that are poorly managed and have terrible living conditions.

“A small city poorly managed is bad, a large city poorly managed may be as good (or as bad) as a small city well managed, but a large city well managed is definitely best.” (Prud’homme 1996)

Indeed, some have argued that neither the size of the city nor the speed of growth is most important in producing poor urban environments, but rather the main culprit is a lack of good governance (Satterthwaite 1996, Gilbert 1998).

Generally, large cities are more difficult to manage than smaller cities. Due to their huge size and the multitude and complexity of associated problems, achieving sustainable development in the mega cities of the developing part of the world seems to be a Sisyphean task. However, there are several examples of innovative projects leading to improved sustainability in big cities (Satterthwaite 1996, UN-HABITAT 2002). The prerequisite for their success has been good governance, i.e. the participation of individuals, households, communities, voluntary associations, and NGOs.

If not only the size of a city but also the city’s governance capability are important to achieve sustainable urban development, the focus of sustainable development should not only be on mega cities but also on smaller cities with less successful governance. Data from the United Nations (UN 1999) show that in 1995 only 10.8% of the global urban population lived in cities of 8 million or more. This proportion will rise to 12.2% in 2015. The global share of the urban population living in cities of 5 to 8 million inhabitants in 1995 was 3.4% and will rise to 3.9% in 2015. On the other hand, those living in cities of between 1 and 5 million accounted for 23.5% of the global urban population in 1995, although this proportion is projected to decrease to 22.4% by 2015. The rest of us live and will continue to live in cities smaller than 1 million (over 60% of the urban population for both 1995 and 2015).

Although mega cities generally have a concentration of major universities and the best skilled technocrats as well as the most money, brainpower, and research attention, the much larger number of cities with less than 5 million inhabitants should not be ignored (Keiner and Schmid 2003).

3. **CHALLENGES FROM URBANIZATION IN DEVELOPING COUNTRIES**

For Africa, where fertility levels remain high and economies are weak, Brockerhoff (2000) stipulates that from 1960 to 1990, 75% of urban growth
had been fueled by a natural population increase, compared with 51% in Asia. However, urbanization is not only characterized by natural population growth, but also by rural-urban migration (McGee 1998) and subsequent urban expansion. Big cities attract people from rural areas who hope to find work and better living conditions. In Latin America, for example, young women migrate to cities trying to diversify the overall family income by working in factories or in domestic and other services (Prothero and Chapman 1985, Bilsborrow 1996). In general, they stay in the cities, which leads to an impact on the gender-ratio both in rural and urban areas. However, migration is not necessarily a one-way process. In the case of Africa, there is a temporary or circular migration of mostly young men who try to find paid work after the harvesting season. After some months, they go back to their villages to till their fields. Such seasonal labor migration between urban and rural areas can lead to large swings in the population sizes of cities and the countryside.

Permanent migration can be observed through people who try to escape social control, the impacts of natural hazards like flooding or drought, and man-made disasters – most commonly in Africa – such as desertification, tribal conflicts, war, and social destabilization. For example, since 1970, more than 30 wars have been fought in Africa, the vast majority of them intra-State in origin. These armed conflicts account for more than 8 million refugees (Andam 2004).

Especially young people are pulled into the cities with the attraction of a modern lifestyle and better educational opportunities. However, this gain in individual freedom is linked to an erosion of traditionally strong social relationships and to a loss of social cohesion in the case of need (Chidester, Dexter and James 2003), even if kinship networks sometimes help to accommodate the new immigrants (Chabal and Daloz 1999). Moreover, mainly in Africa, rural to urban-bound migration leads to a loss of workforce in rural agriculture, entailing lower overall income in the rural areas, and if not compensated by higher grades of mechanization and use of fertilizers, a net reduction in agricultural productivity and possibly food scarcity.

In-migration leads to increased urban density, often combined with degradation of existing slum or “favela” quarters or the creation of new illegal settlements (“self-help housing”) at the urban fringe. In some cases, as in Johannesburg after the end of the apartheid regime, even the city centers had been transformed into downgraded places where houses were illegally occupied and insecurity and crime were commonplace.

Indeed, if not properly managed, urban growth may become the source of a broad variety of problems (Liddle and Moavenzadeh 2002):
– Poor standards or even progressive decay in basic public infrastructure (energy supply, access to safe water, sewerage, schools, roads, preventive and curative health treatment, etc)
– Malnutrition, food scarcity, and diseases (HIV/AIDS, malaria, etc)
– Loss of fertile urban agricultural land for settlement purposes
– Lack of sanitation, which leads to groundwater pollution by nitrates and bacteria and causes infections from cholera to tuberculosis
– Poor drainage and poor waste management, entailing the contamination of rivers and streams by sewage outflows and waste disposal, which in turn leads to fresh water scarcity and consequently diseases
– Deforestation of the city’s surroundings because of the need for fuel (of mostly low-income households), leading to an entire depletion of the vegetation and the start of gully erosion
– Air pollution and increased greenhouse gas emissions because of increasing traffic, industrial activity, and firewood and litter burning mixed with dust
– Pressure on land use, poor land tenure security, and lack of affordable housing leading to unplanned settlements in the urban periphery and the mushrooming of nearby urban villages
– Poor urban design, neglected public parks and greenways (León 1998) as well as pressure on urban agriculture (Mosha and Cavric 2001)
– Inequality and urban poverty in general, combined with unemployment and low educational levels

Beyond the ongoing process of urban transition, at least three other major urban trends can be observed worldwide. The first is urban deconcentration, or the tendency of urban areas to expand outwards, most typically at rates faster than the overall population growth (producing net declines in overall densities of metropolitan built-up areas; see WBCSD 2001). The second trend that apparently accompanies urbanization and general economic growth is the increasing economic importance of service industries, which comprise a major share of economic activities in cities of industrialized countries and increasingly those in the developing world (Hall and Pfeiffer 2001). Finally, the continuously growing awareness of urban environmental problems, for example air pollution from increasing motor vehicle use, poor water quality, and their links with economic and social problems and challenges – now often referred to with the term “urban sustainability” – is a major factor influencing urban growth trends, interventions, and planning policies.

The problems listed above are among those well known to almost all large and rapidly growing medium-sized cities in the developing world. They lead directly to subsequent problems often associated with strategies
for survival such as crime (drug use, robberies, sexual abuse), as well as the inner-urban segregation between rich and poor, and so forth.

Urban poverty in the developing world is already at a high level, and still it continues to increase. Cairncross et al. (1990) estimated that 600 million urban residents, 42% of the urban population, live in life- and health-threatening homes or neighborhoods. By 2025, half of the poor in Africa and even two-thirds of the poor in Latin America will be urban.

“Poverty” means more than only lack of income. It is also a lack of accessibility to public health services and other basic infrastructure; it is the exposure to environmental and social problems without any alternatives (McGranahan and Murray 2003).

Another danger for sprawling and densely populated cities in developing countries is their vulnerability to natural disasters, such as floods, hurricanes, mudslides, and earthquakes (Mitchell 1999, Pelling 2003). The more concentrated people are at any one place, the higher the risk of large losses of human life in the case of natural and also man-made disasters, for example, accidents in chemical industry and terrorism. Regarding ongoing global climate change and rising sea levels, flooding catastrophes such as those experienced lately in Bangladesh will also have to be taken into consideration; Cairo, Lagos, and most of all, a huge number of Asian cities are also located on coastal areas (World Bank 2003).

The fact is, not only do the aforementioned problems exist, but also it has not been possible to hinder them. Moreover, the intensity and dimension of these problems overwhelm the ability and capacity of local authorities to steer urban development into a desirable direction. Few time and money is available to resolve the problems, and as a result, there is few chance to come to workable solutions at all.

In many Latin American cities, urbanization problems appear to be unsolvable. The insufficient ability to manage urban growth was accompanied by the 1980’s debt crisis, economic recession, structural adjustment policies, and hyperinflation — factors together leading to unemployment, low national investment, and declining living standards (Gilbert 1996).

In Africa, the boom of urbanization started only since the time of decolonization when new capital cities were founded. Unlike in Asia and Latin America, where large-scale investment created an impressive volume of new jobs in the manufacturing sector (for example, the “maquila” plants in Mexico), only a relatively small number of urban employment opportunities were created for city-bound migrants (Rogerson 1997). Today, black Africa’s part in global trade as well as in industrial production is negligible (Le Monde Diplomatique 2003), its access to global markets is restricted, and its terms of trade are worsening (UNCTAD 2003). Net income from trade is very often used to service the debt payment, constraining investment and develop-
ment. Thus, due to the lack of financial resources and foreign investment, the future freedom of action for Africa’s national and urban governments will be very limited. Also, in many African states, there is the problem that political victory assumes a “winner takes all” form (Andam 2004), leading to changes in distribution and a lack of institutional sustainability. Moreover, African planning authorities very often suffer from mismanagement, because they are involved in corruption, lack efficiency and know-how, and tend to react instead of being proactive (Rakodi 1997, Chabal and Daloz 1999). Simultaneously confronted with the world’s highest urban population growth rates, low economic growth, and political instability, Africa’s mushrooming cities will face unprecedented challenges.

4. URBANIZATION AS DEVELOPMENT FACTOR

If we admit the historical comparison to Europe and North America, cities during the Industrial Era were motors of economic development, innovation, and interaction (Jacobs 1969 and 1984, Perlman et al. 1998). Urbanization in developing countries today may also lead to local clusters of entrepreneurial enterprise, and in compact cities (de Roo and Miller 2000), the efficiency of infrastructure investments is increased.

Southworth (1995), Prud’homme (1996) and Heinrich (2001) summarize the most outstanding aspects of agglomeration economies that benefit from the proximity between producers, suppliers, consumers, and workers:

– A larger urban labor market allows for the sufficient availability of a relatively inexpensive workforce, enhances the division and diversification of labor with new job opportunities, and leads to new skill combinations.
– Firms have access to a relatively big urban market without long transportation needs. There are opportunities for specialization and for innovation as well as the ability to react to changes in consumer’s demands and potentials for sharing common inputs (warehousing, power etc).

According to the World Bank in 1989, about 60% of the GDP of developing countries was created in cities, and 80% of future GDP growth is estimated to occur there (World Bank 1990). Other related benefits of urbanization that accrue directly to people include issues of education, interaction, and transfer of know-how (Glaeser 1998). Indeed, big cities continue to be celebrated centers of culture and “social advancement.”

Also, better health care facilities in cities are expected to augment the quality of life. However, HIV infection is higher in urban than in rural areas because of prostitution and liberal sex practices (UN 1994). Also, even if urban dwellers have spatial access to health treatment services, they often
cannot afford them. On the other hand, if preventive and curative health treatment can also be made accessible for the poor, life expectancies will rise. The resulting aging of society may, in turn, engender new economic challenges to social security and welfare systems.

The opportunities of urbanization outlined above offer several keys to a successful continuation of urban development. However, other prerequisites are necessary in order to achieve a kind of urban development that moves towards sustainability.

5. ACHIEVING SUSTAINABLE URBAN DEVELOPMENT IN RAPIDLY GROWING CITIES

5.1 Different Understandings of Sustainable Development

Due to its importance to global sustainability, the idea of urban sustainability is, of course, not new. For example, the Rio 1992 World Summit was quickly translated into Local Agenda 21 initiatives around the world. The HABITAT II conference (Istanbul 1996) proclaimed the right to appropriate living space for all people, and the world conference URBAN21 (Berlin 2000) showed “best practice” examples of the sustainable development of cities. Sustainable urban development was also treated as a crosscutting theme in the JOHANNESBURG SUMMIT 2002.

Discussing sustainable development is like discussing other imprecise terms like “democracy,” “human rights,” and so forth. Although the Brundtland Commission has a standard definition for sustainable development (WCED 1987; see Figure 4), this definition has been subject to several modifications and was reformulated according to different points of view. Thus, the many definitions of sustainability vary considerably. A broad range of authors have proposed various principles, and strategies for achieving sustainable urban development (for example, Perlman et al. 1998, Haughton and Hunter 1994, Mitlin and Satterthwaite 1996) based on the overall definition of sustainable development given by the Brundtland Commission report (see Figure 4).

Today, more than ever, disagreement exists as to the precise meaning of the terms sustainability and sustainable development. Bartlett (1997) examined different reports dealing with these terms. He concludes that the use of sustainability and sustainable development is often careless and contradictory. Thus, these terms are arbitrary and user-defined, and have lost their clear meaning. However, most definitions in use refer to the viability of
natural resources and ecosystems over time, and to the maintenance of human living standards and economic growth. Depending on the specific historical, geographical, economic, and cultural context, the original and all subsequent definitions of sustainable development can be understood and interpreted in different ways.

Very broadly, we can group the many different interpretations into two ways of understanding sustainability: protection of the environment, and economic growth. The most obvious conflict since the World Summit 1992 in Rio is that developed countries mainly call for more respect of the environment and finite natural resources, whereas developing countries still claim economic development as the most important issue. The need to protect the environment and human living space is also recognized by the governments of poorer states, but not as a priority.

Consequently, the inherent conflict between (economic) development and maintaining the environment still exists in the conception of sustainability:

- Those who emphasize the first part of the definition proposed by the Brundtland Commission, that is, “development that meets the needs of the present [...]” remind us that our societies are far from responding in equal measure to the needs of all, be it on a world, regional or local scale. The question raised here predates the concept of sustainable development. It refers to the issue of equality among men, which dates from the 18th and 19th centuries, and emphasizes the foundations of the legitimacy of urban politics.

- Those who stress the second part, that is, “[...] without compromising the ability of future generations to meet their own needs,” focus on limiting the negative consequences that decisions in the present could have over the long run. This concern could translate into legislation, which seeks to ensure the “protection of the city” as a material entity, or into the evaluation of impacts on the environment.

In this context, sustainable development challenges economic development, raising the question of the long run. In some cases, the concern centers on the conservation of the material base of the natural and constructed space, while in other cases, the central issue is the equity of distribution of its benefits, giving sustainability a socio-political focus.

5.2 Urban Sustainability in a Regional and Global Context

The aim of the concept of sustainable development is to meet people’s needs in a way that the environment does not suffer. Meeting people’s needs depends on the use of resources, which are often non-renewable and generate waste. Both have a negative impact on the ability of the environment to
continue its functions. The biggest share of resources is needed for urban centers, which produce pollution and waste having effects not only on the cities themselves but also beyond their boundaries, for example, greenhouse gas emissions. Thus, to solve the conflict between protecting the environment (inside and outside of cities) and meeting the people’s economic needs, development has to become less consumptive and less waste creating while taking into account local, regional, national, and also global aspects. As McGranahan and Satterthwaite (2003) point out:

“The goal is not sustainable cities but cities that contribute to sustainable development within their boundaries, in the region around them, and globally.”

Thus, the governments of urban centers should be concerned about the impact of the city on the region and behave in a sustainable way even if the territories on which the city’s waste and pollution have an effect (for example, forests as sinks for carbon dioxide emissions by city traffic and heating) lie outside the city government’s jurisdiction (McGranahan and Satterthwaite 2003).

Perlman et al. (1998) reach a similar conclusion:

“There can be no sustainable city of the 21st Century without social justice and political participation, as well as economic vitality and ecological regeneration”.

During the preparatory meetings for the URBAN21 Conference (Berlin, July 2000), the following vision of sustainable urban development was developed:

“Improving the quality of life in a city, including ecological, cultural, political, institutional, social and economic components without leaving a burden on the future generations. A burden, which is the result of a reduced natural capital and an excessive local debt. Our aim is that the flow principle, that is based on an equilibrium of material and energy and also financial input/output, plays a crucial role in all future decisions upon the development of urban areas.”

In order to emphasize on the pertinence and the applicability of the concept of sustainable development in the African and Latin American context, some regional specific definitions of “sustainable city” must be mentioned. One comes from the Fundación Ambiente y Recursos Naturales (FARN) in Argentina:

“A sustainable city integrates environmental dimensions into the social and economic sectors in order to meet the needs of current generations
without compromising those of the future.” (FARN, quoted in The Regional Environmental Center 2004)

Also, the project “Sustainable Santiago”, for example, provides a definition, highlighting the need to put “environment” at the center:

“The project must guarantee that the municipal planning process includes effective methods oriented in the following themes that are a priority of sustainability:

– Environmental evaluation
– Improvement of air quality through urban design and management of transportation demands
– The reduction of industrial and municipal waste, as well as the conservation of water and energy.” (Proyecto Santiago Sustentable 1998)

5.3 The Need for Urban Sustainability

Regarding the challenges of global urbanization and the problems of large cities, the question that arises is not only how to achieve sustainable urban development, but how to avoid perpetuating negative and vicious cycles in it. It seems that we are far from what Agenda 21 addresses in its Chapter 7, where the concept of promoting sustainable human settlements was introduced for the first time:

“Urbanization, if properly managed, offers unique opportunities for the supply of sustainable environmental infrastructure through adequate pricing policies, educational programs and access mechanisms that are economically and environmentally sound.”

Will a city ever be able to develop in a truly sustainable manner? According to the UN (1999), Lagos, for example, will nearly double its population from 2000 to 2015 to reach 23 million. This will exponentially increase the city’s problems. Can the problems of Lagos be solved then? Of course, the earlier action is undertaken, the better the chances are of at least slowing down the increased quantity and complexity of urbanization problems. In other words, the smaller the city, the better the chances of curing its afflictions. So if the city decides to meet the challenges of urbanization, a lot of work has to be undertaken immediately: creating awareness among stakeholders, decision-makers and the public, defining locally specific objectives for sustainable urban development, elaborating measures in a participatory manner, budgeting financial resources for urban development (instead of for purchasing weapons, luxury merchandise from abroad, etc), and so on.
5.4 Meeting the Needs

One element, which remains to be discussed in the analysis of the concept of sustainability, is that of *necessity*. In all its aspects, development seeks to respond to individual and collective needs; needs which reflect different demands and will require different periods for resolution. In this area there are numerous debates, starting with the very definition of need. The stated needs must also be selected and prioritized, a process that implies focusing and excluding or postponing. A discussion about the order in which to focus and exclude must follow. The debate does not stop here, because the question of need is intimately tied to the issue of the direction of the change aimed at meeting these needs, that is, the direction of development.

According to Abers (1997 and 2001), Douglass and Friedmann (1997), Holston (1999), and Sandercock (2002), any project on urban sustainability must start by identifying the needs of the community. These needs must be incorporated into the design and implementation of sustainable policies.

Finally, before seeking optimum urban sustainability, in which the so-called four “E”s” (*economic development*, *environmental protection*, *equity*, and *education*; some put *empowerment* and others put *ethics* or *aesthetics* instead of *education*) converge in a harmonious and proportional way, it will be necessary to understand several conflicts. The distortions which appear in the concrete implementation of policies, in the distribution of power and competences, in the face of pressures from economic groups and other stakeholders and in insufficient participation and networking between those who make rules all affect strategies and plans to implement the concept of sustainability.

5.5 Specific Contexts for Sustainable Urban Development

When analyzing the challenges and opportunities for sustainable urban development in the case study cities, one might be interested to ask *how sustainable* the cities’ development is or could be. The “how” refers to measurable criteria. There are two ways to construct a framework in order to measure how well sustainability objectives have been achieved. First, one could use a general definition of sustainable urban development and describe the gap between the objectives and the actual development (distance-to-target analysis). Second, the same kind of analysis could be carried out on the basis of specific local definitions or visions of what sustainable urban development means in each case.

The 2000 Sustainable City Conference in Rio (quoted in ODPM 2004) stated:
“The concept of sustainability as applied to a city is the ability of the urban area and its region to continue to function at levels of quality of life desired by the community without restricting the options available to the present and future generations and causing adverse impacts inside and outside the urban boundary.”

Thus, there is an effort to integrate the diverse dimensions of social, economic and cultural development within the urban perimeter. However, the question centers on the manner in which equilibriums are generated between flows and stocks, in terms of the “urban metabolism” described by Acselrad in his matrix of discursive sustainability (Acselrad 1999). According to this author, these equilibriums are necessary in order for urban systems to attain the capacity to adapt to new requirements of development. Thus, the question arises as to the relevance of the “wise and scientific management of the territory” by public agents.

A closer reading of the above Sustainable City Conference definition reveals strong criticism of the tendency to comprehend the city as a closed system, unrelated to its regional, national and even global territories. The idea proposed instead is that cities are open systems, which require material and energy to keep their structures functioning. This perspective emphasizes the environmental dimension, in terms of ecological equilibriums or imbalances. However, there is no golden rule or single measure that can turn the development of cities in less developed regions into sustainable development. What measures have to be taken depend on the nature of the specific problems and the local and national context: culture, law, individual freedom, etc.

Working with a standard definition of sustainable urban development allows a comparison of the progress towards sustainability across several cities at a time. Some tools for comparison are the Human Development Index (HDI) and the City Development Index (CDI). The CDI proposes the use of benchmarks and ranks cities worldwide according to the criteria of Product (Income), Health, Education, Infrastructure, and Waste. However, this kind of benchmarking can be too general. On the other hand, if the possibility of comparison to other cities is limited, a more detailed and specific view makes it possible to distinguish different needs for sustainable development in each individual city.

For the example of Santiago de Chile, it is necessary to situate sustainable development within the framework of recent Chilean history. The Brundtland report appeared at the end of the period of Chile’s military dictatorship (1973 to 1989), a period of considerable autocracy in political decision-making and in the determination of development goals. Chile’s entrance in the process of globalization through a neo-liberal economic policy, the basic elements of which were to be maintained by the later democratic gov-
ernments, was precocious within the Latin American context. The main challenges for sustainable urban development in Santiago are as follows:

- Air pollution: the city holds the dubious distinction, along with Mexico City and São Paulo, of suffering from the worst air pollution levels in Latin America (cf. Zegras and Litman 1997).
- Territorial socioeconomic segregation: In the municipal region of Santiago there are 34 socially homogeneous communities, clearly defined along rich-poor lines. There is, for example, an inter-urban migration of higher income groups towards new real estate projects on the periphery. Due to its role in generating economic activities and taxes for the local governments, the real estate market appears to be the main stimulant of the processes of urban development in Greater Santiago, especially those that spur expansive suburban growth.

Due to the apartheid legacy in South Africa, the city of Johannesburg has its own share of major socioeconomic and cultural challenges. Urban development in Johannesburg is still characterized by the following problems:

- Strong ethnic segregation: Even though initial mixing has started (for example, by Africans moving to the inner city and the leafy, well maintained northern suburbs, with better access to the city’s amenities) most people have remained in highly segregated areas and townships. For instance, the densely populated and deteriorated areas of Soweto, Alexandra in the northeast and Orange Farm in the south still have close to 100% ethnic African populations.
- Unemployment (now estimated at close to 40%) and a poor skills base, especially in view of a tertiary economy.
- Backlog in housing and services such as water, energy, sanitation, and waste disposal.
- Informal settlements.

Gaborone, the capital of Botswana, for example, is one of the fastest growing cities in sub-Saharan Africa, if not the fastest (Mosha 1996). It is the nation’s focal center, where an overwhelming amount of both public and private investment is made. The main problems for urban development in Gaborone are as follows:

- Early master planning mistakes only take into account Gaborone’s administrative function with a maximum of 20,000 inhabitants by the end of the 20-year planning horizon in 1983.
- Thus, the master plan of 1963 was characterized by a comparatively low-density form of development based on the Garden City model with a generous provision for pedestrian walkways, open spaces, and closely tied neighborhood units. Housing development was polarized with high
and medium income on one side of the town and low income on the other; and the urban structure was such that it allowed little space for expansion outside of the original layout. In addition, the plan did not take into account any possible growth from migrating job seekers (Mosha 1996). In reality, the population in 1983 grew to threefold of the assumed figure. This underestimation of population growth brought with it a great deal of consequences, like shortages in serviced land for housing, as well as stress on the existing infrastructure and other facilities.

- The ongoing, uncontrolled, leapfrog expansion led to an overspill of Gaborone into the peri-urban settlements (Keiner and Salmerón 2003). Thus, the satellite settlements on tribal land around Gaborone have been growing at annual rates of 16% or more (Molebatsi 1996), becoming dormitory settlements.

In conclusion, the problems of the three case study cities differ, as do their size, culture, history, and geographical background. Each of these cities must find their own way toward sustainable urban development.

6. **THE SCOPE: RAPIDLY GROWING MEDIUM-SIZED CITIES WITH GOVERNANCE PROBLEMS**

In the past, research efforts and publications have placed significant focus on mega cities with 8 million inhabitants or more. Important is not only the size of a city, but also the speed of its change. In the future, more attention has to be focused on the problems of the fastest growing urban centers, almost all of which are located in the developing world. Hall and Pfeiffer (2000) use the term “cities of hyper growth” to describe cities in sub-Saharan Africa, India, the Islamic Middle East and poorer Latin America characterized by rapid population growth, an economy dependent on the informal sector, widespread poverty and sub-standard housing, basic environment and public health problems and governance problems. These problems of relatively small but rapidly growing cities are similar to those of mega cities, yet offer the opportunity for earlier intervention and correction.

Due to enormous growth rates, most of the sub-Saharan cities are on their way to becoming million-inhabitant or mega cities very soon. Due to the pace of their development, sustainable urban management is becoming more and more difficult, if not impossible. Not only mega cities have mega problems. As Hall and Pfeiffer (2000) suggest,

> “Some of the biggest problems occur in relatively small cities.”
What counts is not the size alone, but the management ability to cope with problems. This is also true for Latin American cities between 2 and 5 million inhabitants like Santiago de Chile, Belo Horizonte, Porto Alegre, Recife, and many others (Gilbert 1996).

The UN (1999) stipulates that in 2015, the largest proportion of urban dwellers in the developing world will still live in cities less than 500,000 inhabitants. Montgomery et al. (2003) point out that very often, small cities (even those with less than 100,000 inhabitants) lack an adequate supply of fresh water, electricity, waste disposal infrastructure and schools. Thus, medium-sized and rapidly growing cities merit more scientific attention. The capitals of African countries, especially small ones like Gaborone with less than 250,000 residents (Mosha 1996), tend to become the sole economic and political center of the country. If they are twice as large as the second largest city in the country, these dominant cities are called primary cities. Haub (2001) points out the importance of this kind of city:

“While many countries simply do not have populations large enough to generate one or more mega cities, the influence of a primary city, usually the capital, can have just as significant an impact on national development as the urban giants.”

The UN (1999) estimates that in 2015, there will be about 564 cities worldwide with more than one million inhabitants. In 1975, there were only 195 such cities. The sharpest increase in new million-inhabitant cities will occur in the less developed regions of the world. Therefore early action is needed for rapidly growing cities to avoid the typical environmental, economic, and social problems million and mega cities are faced with.

Urban development planning towards sustainability is of top priority for rapidly growing cities in the developing world, even if they are sub-million cities (Brockerhoff 2000). These cities must orient their planning and development management towards the predictable future (El-Shakhs 1997). With this type of planning, future problems can be reduced, the management of metropolitan areas can be improved, and opportunities for future development towards sustainability can be prepared.
7. THE CHALLENGE FOR URBAN MANAGEMENT IN MEETING THE OBJECTIVES OF SUSTAINABLE URBAN DEVELOPMENT

7.1 Steps Toward Urban Sustainability

The global phenomenon of rapid urbanization is the main challenge to planning today. The convergence of economic growth, population dynamics and urban expansion offers both great challenges and great potentials for achieving urban-metropolitan sustainability. What can be done to ensure that urban sustainability becomes real and not only a utopian vision? To answer the main question of how sustainable urbanization can be achieved, Perlman et al. (1998) proposed the Urban Sustainability Principles:

1. There can be no global ecological sustainability without urban ecological sustainability.
   – Concentrating the human population in cities is essential to preserve both agricultural and wilderness areas.
   – Circular rather than linear urban systems are necessary to recapture resources.

2. There can be no urban environmental solution without alleviating urban poverty.

3. There can be no lasting solution to poverty or environmental degradation without a strong civil society and grassroots innovations.
   – Small may be beautiful, but it is still small.
   – Micro solutions need to be scaled up for macro impact.

4. There can be no impact of scale without
   – sharing what works among local leaders, or
   – scaling up into public policy.

5. There can be no urban transformation without
   – changing the old incentive systems and rules of the game;
   – forming collaborative partnerships among mutually distrustful sectors;
   – linking the local to the global through a transnational independent network.

6. There can be no sustainable city of the 21st century without social justice and political participation, as well as economic vitality and ecological regeneration.

These principles are interesting but somewhat dogmatic and difficult to concretize. What are needed are practical solutions. Achieving sustainability will require reduced resource use, improved performance of urban systems
and processes, reduced waste and emissions and, ultimately, greater livability.

In order to give an overview of workable responses to urbanization problems, UN-HABITAT launched in 1997 the Best Practices and Local Leadership Program (BLP). Over 1600 proven solutions from more than 140 countries to the shared social, economic, and environmental problems of an urbanizing world are shown in an online database (UN-HABITAT 2002). Some of the best practices highlighted in the BLP database offer first steps towards achieving sustainability in Latin American and African cities. Achieving widespread implementation remains the greatest problem, because these “best practices” tend to take the form of specific principles for pushing forward sustainability within specific subsectors, such as housing, health care, and so forth. None of them actually represent “best practice” in a comprehensive sense. Others represent goals or objectives, but do not offer any suggestion of what sort of “practice” might actually help achieve these goals.

In the authors’ experience, examples for good and best practices from developing countries can serve as models to effectively address chronic social, economic and environmental problems:

1. General Urban Planning Practices
   - Renovation of public buildings, construction of points of identity (places, public buildings, parks, etc.)
   - Comprehensive renewal and improvement of slum areas
   - Definition of minimum quality standards for local road allowances, lot sizes and utility placement
   - Compaction of urban development to prevent sprawl, for example, by brownfield redevelopment, by allowing higher densities for construction, by using unbuilt sites in the city before developing greenfields
   - Enhancing energy-efficient settlement structures and housing
   - Mixing functions and low and upper-income housing to overcome socio-economic segregation
   - Controlling in-migration, not by limiting access to cities like in China or India, but by offering jobs in the countryside (for example, decentralization of labor intensive production sites in collaboration with national and regional planning authorities)

2. Urban Infrastructure and Services Practices
   - Maintenance, renewal, and restoration of infrastructures (e.g. water supply, sewage network, roads, public buildings and green areas) through community-based neighborhood rehabilitation programs
   - Managing demand for road space and providing quality public mass transport by the more efficient use of existing transport facilities, sup-
ported by measures like area licensing schemes, highly integrated land use and transportation planning

3. Environmental Management Practices
   - Implementing integrated solid waste management programs aimed at separating at source, composting, recycling, and constructing and operating sanitary landfill sites
   - Cleanup and garbage collection and separation projects (including income generating recycling for micro enterprises), for example, carried out by youth and volunteer groups
   - Closing of open dump sites, installation of sanitary landfills
   - Reducing air-polluting emissions by cars, industry and soft-coal burning households through the increased usage of unleaded gas, waste gas purification, energy saving and greenhouse gas-reducing cookers
   - Elaboration of a comprehensive, participatory environmental master plan
   - Protection of urban nature (biotopes, greenbelts, etc) and urban agriculture

4. Housing Practices
   - Development of alternative housing norms to reduce construction costs
   - Making housing affordable and accessible to disadvantaged groups and lower income families, for example, by providing decent self-help housing and infrastructure on suitable land to squatter cooperatives on a cost-recovery basis, using sustainable housing loan schemes and income generation activities
   - Popularization of new building technologies, allowing cheaper construction, energy saving strategies, healthier conditions, and increased safety

5. Urban Governance and Women Empowerment Practices
   - Establishing a broad-based steering committee for urban development comprising all groups of society
   - Promoting neighborhood-based development committees in the consultative process and in preparing development plans
   - Decentralization of administrative and financial powers, for example, by introducing participatory budgeting of municipal finances (e.g. Porto Alegre in Brazil)
   - Public-private partnerships, partnerships between administrators, residents and NGOs, as well as international agencies and foreign central governments and sister cities
   - Initiating and supporting poverty alleviation initiatives through small payback credits or loans for income generating activities (micro enterprises, arts and crafts, including traditional handicrafts, especially for the empowerment of women)
– Capacity building within the city administration, aimed at improving the performance of public services and implementing sustainable development; introducing a reward system for excellence in public services

6. Social Services Practices
– Crime prevention initiatives, based on social control in communities
– Reducing youth unemployment by promoting basic education, skills training and cultural activities
– Community-based preparatory and coaching centers and residential camps for children living in slums and squatter settlements to keep them in school
– Literacy training programs

Urban sustainability can only be reached if sustainable strategies are worked out and implemented by the cities and affected territories. Urban and rural sustainability strategies have to go hand in hand. Another attempt strongly backed by the international donor community, to improve living conditions in rural areas in order to reduce the movement of labor and brain drain to the cities, did not lead to the expected results. Through this experience, it was discovered that strengthening rural development may be a two-edged sword:
– Offering better education in rural settlements may lead to an education-driven migration to higher schools that are situated in cities. Once far from the farm, young people seldom return to the rural milieu.
– Mechanization in agriculture as well as political failures (like the expropriation of white farmers in Zimbabwe) result in rural unemployment, stimulating more rural-urban migration.
– Improving rural roads facilitates the access to urban areas.

For most of the big cities in the developing world, some of the best practices highlighted above offer first steps towards achieving sustainability. However, moving to widespread implementation remains the greatest challenge, because, these practices generally take the form of specific principles for pushing forward sustainability within each subsector. None of them actually represents “best practice” in a comprehensive sense. Others present goals or objectives, but do not offer any suggestion of new planning practices to help achieve them.

7.2 The Need for Good Governance

The main difficulty in achieving sustainable urban development is the lack of good governance (cf. Satterthwaite 1996, Gilbert 1998, Andam 2004). Thus, the following part is dedicated to showing the most obvious
examples of unsuccessful urban governance in the case study cities and to give workable recommendations for the planning practice.

A number of authors underline different approaches, including the value of local communities and the importance of public participation (Douglass and Friedmann 1997, Malbert 1998, Holston 1999), a grassroots approach (Douglass 1995, Abers 1997 and 2001) and the decentralization and democratization of planning decisions (Sandercock 2002). As enforcement is an important issue, evaluating the effectiveness of these policies in terms of achieving the stated goals is imperative. Once the objectives are clear and measures are defined, the planning process towards a more sustainable city must be steered. Most important is to control urban growth. For this, the use of sustainability indicators (Mitchell 2000, Keiner 2002), monitoring (El-Shakhs 1997) and controlling mechanisms (Keiner 2004) is indispensable. The use of Geographic Information Systems (GIS) by the planning authorities is also a must (Cavric and Mosha 2001). Moreover, increased cooperation between cities and researchers in the field and among cities in the southern hemisphere in general (Atkinson 2002), could contribute to mutual learning, synergistic effects and the exchange of expertise.

Besides urban governance, another major challenge for urban development is to eradicate or at least to alleviate poverty. Possible solutions to this problem have been worked out in the UK ESCOR program (1998–2000), among others, for Johannesburg (Beall et al. 2000) and Santiago (Rodriguez et al. 2000).

Other challenges of sustainable urban development include the control of socioeconomic segregation and the harmonization of visions, strategies, and planning instruments. Perhaps the greatest challenge is dealing with the overlapping of functions in governing structures and overcoming the high degree of centralization in local decisions. These points will be highlighted in the following sections.

### 7.3 Establishing Visions and Strategies for Sustainable Urban Development

In general terms, the notion of sustainable urban development appears to the majority as a “politically correct” concept with good intentions but lacking concrete repercussions in the arena of urban actions. It seems that sustainable urban development has neither been established as an important concept in the design and implementation of public policies, nor in the reading of urban growth trends. The future task and main challenge for the management and planning of hyper-growing cities will be to make the turn-around from a rapidly growing urban area with exponentially growing problems to a sustainable developing city. Taking this into account, a first ap-
proach places a greater emphasis on the clearer definition of what sustainable urban development is in the specific context of each city concerned.

One important prerequisite is to create a common understanding of what sustainable urban development entails. Global and urban sustainability is hindered by high levels of material and energy consumption and waste generation, selective pressures on endangered ecosystems and new hazards arising from technologies designed to meet the demands of the wealthy (IIED 2001). In more affluent cities and those experiencing rapid economic growth, it is important to address larger scale environmental burdens, preferably before they become embedded in the infrastructure of the city and lifestyle of the people living there. The World Summit of 1992 was held based on this premise and the recognition that humanity had reached a turning point.

This context also inspired the vision Joburg 2030 (City of Johannesburg 2002). The document first recognizes the unique status of the city as well as the key threats to that status. It then maps a developmental pathway highly focused on facilitating economic growth driven by private sector investment. The City Council plays a significant role in ensuring an adequate physical infrastructure as well as maintaining socioeconomic and cultural foundations such as controlling crime and enhancing the literacy and skills base. The focus of Joburg 2030 and the development challenges at the grassroots level will have to be addressed in a global context. The quest for development that ensures the non-depletion and non-degradation of resources and the environment has become a major factor to be addressed by all development agencies including local authorities.

For Johannesburg, sustainable urban development can be defined as

“Development which enhances the city’s global and regional attractiveness, ensures that the city meets its fair contribution to the global, regional and national commitments in sustainable development while at the same time ensuring a sensitive response to the specific needs and resource opportunities and constraints of its diverse regions and citizen groups.” (Irurah and Pile 2003)

In contrast, there does not exist a formal single vision of Santiago de Chile. Each ministry responsible for development issues in the capital creates its own vision. A similar phenomenon occurs within the real estate market and the 40 municipalities, which due to the absence of a metropolitan government, compete among themselves to attract public and private investment. However, with a view towards the celebration of the Bicentennial of the Republic of Chile (2000–2010), two planning efforts have been made: the elaboration of proposals for an Urban Reform project and the formulation of a Regional Development Strategy 2000–2006.
In Chile, more than 80 professionals and representatives of diverse institutions, private as well as public, including real estate agent associations founded the Work Group for Urban Reform (GTRU). From 2000–2001, this group formalized its proposals in a document entitled “Foundations for Reform of the City and Territory” (BRCT), which highlighted the reference framework for starting decisive action plans:

- Urban development as a key role in the democratic system of the country
- Flexible policies for dynamic and diverse cities in constant change
- Urban politics affecting people through significant economic and social effects
- The paradigmatic change of the integration of the city with its surrounding territories
- The central role of the State in the development of and quality of life in our cities
- The role of the market and private initiative in urban development
- The importance of an adequate government structure to manage the city

As a result of the Work Group, ten dimensions were defined which encompass the broad urban and territorial themes of Chile and which, in turn define the operative areas for action under Urban Reform:

- Management and integral planning of the national territory
- Integrated planning of transportation and land use
- The quality of life in cities
- Public space, participation and citizenship
- The market as an urban and territorial regulator
- Financing the management and development of cities
- Cities as centers for productive activity
- Instruments and mechanisms of urban and territorial regulation
- Incorporation of the environmental dimension in urban development
- Institutionalization and management of Urban Reform

However, concrete results from the Urban Reform were few. In part, these were proposals to modify the Law and General Ordinance of Urbanism and Construction in order to modernize instruments and incorporate mechanisms of urban management that facilitate dealings with the private sector.

One of the five key themes of Chile’s Regional Development Strategy is “Sustainable Territorial Environment: A Region with a Balanced Future.” With this theme, the Regional Development Strategy seeks to promote sustainable economic and environmental growth in a way that leads to an effective improvement in quality of life, preventing the exclusion and segregation of inhabitants and territorial and environmental deterioration. Although both approaches, the Regional Development Strategy and the Urban Reform pro-
ject, propose adequate schemes for managing the city in a more sustainable manner, they fall short by proposing structural changes without specifying the channels that will implement them. In practice, the intentions, which seek to integrate visions with a sluggish and unclear bureaucratic structure, remain only paperwork.

In the case of Gaborone, no proper vision for sustainable urban development exists (Keiner and Salmerón 2003). Although some “good governance” policies that create opportunities for sustainable development are already in use, they are not sufficient as a basis for sustainable urban development. Today, there is still a quest to define Gaborone’s sustainable identity as a whole and for the city’s constitutive parts. The concept of sustainable development was already introduced in Botswana in 1990 with the National Conservation Strategy (NCS). One basic objective of the NCS is to ensure that

“Future generations have access to capital stocks of natural resources, at least similar to those presently available” (Government of Botswana 1990),

a more or less condensed definition of sustainable development. Although the NCS is meant mainly for protected areas like national parks and game and forest reserves, its meaning could also be applied to urban development. One key sentence in the NCS that could be included in an improved urban development policy or strategy is,

“Achievement of sustainable development calls for comprehensive evaluation of environmental and economic implications before [sic] major new developments are undertaken.” (Government of Botswana 1990)

If this exigency had been taken into consideration in Gaborone’s development, then perhaps several of the unsustainable developments could have been avoided. However, in Botswana,

“Concerns with sustainable city development are not yet prominent in local planning concerns” (Molebatsi 1996).

In other words, a lot of work remains to be done. If further initiatives are not undertaken, difficult development problems like unordered and resource consuming settlement patterns will take hold and remain.

Fortunately, there is a strong basis to do this work: Vision 2016 (Presidential Task Group for a Long Term Vision for Botswana 1997). This vision is multidimensional, encompassing the economic as well as the social, environmental, political, cultural, and spiritual aspects of the lives of Botswana’s people. Vision 2016 outlines Botswana’s future aspirations and seeks to propel the country’s socioeconomic and political development into that of a competitive and prosperous nation. Thus, it delivers the elaborated frame-
work for a comprehensive and general strategy for sustainable urban development, which not just offers inspired definitions and principles, but also hints on how such an agenda could be translated into practice. Strong urban sustainability agendas place a similar emphasis on practical implementation steps.

7.4 Decentralization and Improved Multi-Level Cooperation

If sustainable development is to be achieved, appropriate measures have to be taken according to cities’ assessed needs. In one city, the health care may be quite good due to high government investment in hospitals enhancing social sustainability. However, high levels of air polluting emissions from industry may simultaneously diminish environmental sustainability. In another city, the situation may be just the opposite.

Thus, the questions to be posed are who can determine what each city needs in order to become sustainable, and what is a priority and what is not? This centers the discussion on the legitimacy of the decision-making process and its subjects. Strictly speaking, in a democratic society, the citizens and their representatives are the ones who should be able to determine their needs and the direction of development.

This assumption has various implications:

– The necessity to understand sustainable development as a collective construct between legitimate actors in the direction it takes and in the determination of the requirements to attain its objectives.
– The necessity to accept that sustainable development does not have an a priori definition but is rather the result of specific relationships in territories with their own particular characteristics.
– The necessity to recognize sustainable development as a dynamic concept due to the fact that it is the object of social relationships situated in time and space. Consequently, its priorities and directions are subject to ongoing evaluation and transformation.
– The necessity to consider the diversity of sustainable development, that is, its diverse manifestations, orientations, contents and emphases.

The question of who decides what is needed and what has to be done varies from city to city and country to country. One main prerequisite is the vertical distribution of power between the national government and smaller territorial units, including the cities.

As Hall and Pfeiffer (2000) state,

“Successful urban strategies will be possible only if national and local governments work in close cooperation, if central governments define
more clearly the most efficient distribution of functions between the different levels of government, and if political activities follow a common framework.”

In practice, many relevant decisions are made at the central government level in ministries that develop policies without a great deal of participation by local players.

For example, Gaborone’s City Council (GCC) receives its public finances to a large extent from the Ministry of Local Government and the Ministry of Finance and Development Planning. Therefore, the GCC is quite dependent on the central government to increase the revenues in order to compete with the rapid growth in expenditures. Since the GCC’s expenditures far exceed its revenues, the revenue support grant from the central government covers at present nearly 70% of recurring expenditure. Development expenditures are funded by a 100% grant from the central government. Gaborone’s City Council is also responsible for constructing and managing a large percentage of the city’s social infrastructure. Although the GCC has the power to make bylaws for the city area, prescribing what licenses and permits are required and what fees must be paid for acquiring them,

“No bylaw made by a council shall be of any force and effect unless it is approved by the Minister and published in the Gazette.” (Townships Act; Government of Botswana 1999)

Any changes proposed in these fees are subject to another bylaw, which similarly requires the Minister’s approval.

The city of Gaborone does not have the necessary power to decide how public finances should be spent on sustainability-oriented projects. The requirement of approval from superior authorities may cause delays in the implementation of the city’s measures and plans.

In conclusion, decentralization and the transfer of power and decision-making capability to the municipal level is a must for sustainable urban development. However, despite attempts to decentralize functions in many developing countries, the autonomy and power of regional and local governments continue to remain fairly modest.

7.5 Improved Horizontal Cooperation

Another point for consideration is the horizontal overlapping of functions and power of authorities:

“[…] Government structures need to work horizontally in order to implement the interdisciplinary nature of sustainable development. Governance is of core importance in implementing decisions towards sustain-
ability and in effectively managing public interests in a politically organized community.” (FARN, quoted in The Regional Environmental Center 2004)

One example for unsuccessful horizontal coordination can be seen in Santiago de Chile. In Santiago, public transport is provided through about 9,000 city buses running on 354 lines. The large number of buses overloads the main roads and results in long cross-city rides, which can take over an hour and a half in travel time (Malbrán 1998). There are also three metro lines covering a total of 40 kilometers, plus taxis. These means of transportation do not operate as an integrated network, causing insufficient quality of service and a reduction in public transport efficiency. An effort to revert this situation has been made by means of the Santiago Urban Transportation Plan, known as Transantiago. In addition, a number of public institutions are attempting to address issues related to urban development, but rarely in a coordinated fashion. There are at least four institutions responsible for infrastructure and transportation at the central level: the Ministry of Public Works (MOP), the Ministry of Housing and Urbanism (MINVU) operating through the Housing and Urbanism Service (SERVIU), the Metro, and the Ministry of Transportation and Telecommunications (MTT). The MOP is in charge of planning and building interurban roads (major highways) as well as public buildings like airports, prisons, hospitals, and schools. With Public Works Concessions, the MOP has been able to intervene more directly in the city, even though the planning and construction of roads on this scale is under the jurisdiction of MINVU. Since this organization’s limited resources are mostly allocated to public housing, many main highways are transferred by executive decree to the MOP, further complicating management. The MTT, on the other hand, is officially in charge of public transportation. The same minister of the MOP directs the MTT, however this does not guarantee coordination because the departments continue to duplicate functions in many cases. Thus, the implementation of Transantiago has been slower than expected, and many of the works scheduled for 2005, when the current political administration ends, will probably not be implemented.

No single institution has the formal task of analyzing urban expansion in Santiago and its effects on sustainability to cope with the problem of the city’s growth. As described above, this responsibility is distributed among different public agencies and some non-governmental organizations.

These examples show that urban policy and planning requires a clear distribution of functions and power. Obviously, the basic lessons from “New Public Management” have not yet been sufficiently applied.

A third aspect worth mentioning is the coordination between public institutions and the private sector. It must be recognized that the dynamics of development are constantly exposed to pressures from industry, the economy
and above all in the case of Santiago, from the real estate market. This fact is a problem related to the modification or adaptability of master plans according to market pressures. Since the definition of zoning regulations depends on subjective criteria, the planners are able to modify the regulations at will, arbitrarily generating a great deal of wealth for particular parcels on which potential investment is focused. On the other hand, a local zoning plan may define building conditions that are never implemented, because the market does not end up occupying those spaces, as happens in poor neighborhoods.

As one can see in this quick summary, Chile urgently needs to integrate responsibilities and powers to insure the proper coordination of planning measures in the capital city. A broad law is needed that coordinates the various different norms and unifies basic criteria on zoning and investments.

The last point to mention in this section refers to the will or ability to implement plans. Again, an example from Santiago will be stressed. The *Plan for the Prevention and Atmospheric Decontamination* (PPDA) of the Metropolitan Region of Santiago was formulated in 1997. Although the distribution of power is clear, as the *National Commission on the Environment* (CONAMA) has assumed the leadership in the design and execution of the PPDA, difficulties in reaching agreement have arisen, complicating the management of the plan. Along the same lines, another analysis views the various institutions as the biggest problem facing the implementation of the plan:

“In the application of the PPDA, it is evident that the institutions and a large part of society are not prepared to take on the plan and are not the least bit interested in making favorable interventions in the part of the system which corresponds to them.” (Rodrigo Jiliberto, quoted in de la Cuadra 2000)

This analysis coincides with the conclusions of the study by Nicod and Iizuka (2000) on citizens’ perception of environmental pollution.

### 7.6 Harmonizing Strategies, Planning Instruments, and Legal Regulations

Urban policies are applied through a set of planning instruments and bylaws that range from the regulation of land use to the definition of public and private transportation systems. Requirements for development to proceed as outlined in a city’s visions and strategies include the following:

- Plans must be oriented toward the objectives of the conceptual framework (i.e. focused on sustainable development)
- Plans and bylaws on urban development should not contradict other plans, strategies, and legal regulations
Plans should cover an appropriate spatial perimeter, i.e. take the urban-rural link into account.

Most of the assessed policies and strategies relating to urban development do not have a clear hierarchy of goals and objectives, and the link between goals and their measures is usually missing. In addition, measures sometimes get mixed with goals, which complicates the clarity of a plan or policy. To improve the performance of the different plans, a clear hierarchy of goals is necessary.

In Chile, despite efforts in formulating a nationally coherent urban policy, no such policy has been formally approved. This lack of national guidelines acts as a repercussive vacuum, where the nation’s regions and communities still lack a clear planning framework. Thus, planning in Santiago can be explained as the sum of uncoordinated legal regulations and sector plans, which often contradict each other. For example, although the Metropolitan Santiago Master Plan (PRMS) defines a boundary beyond which no kind of urban occupation should occur unless it is intended for agriculture, agribusiness activities, or the protection of the natural environment, a specific law, Law DL 3156 on Agricultural Land, permits the subdivision of any land into lots of up to 5,000 m² through approval by the Agricultural and Livestock Service (SAG) of the Ministry of Agriculture. Authorization by the Ministry of Housing and Urban Planning (MINVU) or the municipalities is not required when the land use change to non-residential uses is not in question. Used as a legal loophole, Law 3156 permitted the registration of more than 30,000 hectares for use as rural residential properties, before the urban extension boundary was approved. This situation was possible because of an overlapping of functions, giving the Agricultural and Livestock Service (SAG) jurisdiction on this matter, which clearly should be under the sole jurisdiction of metropolitan planning. Moreover, in 1997, the PRMS incorporated an additional 12,000 hectares north of Santiago. On the one hand, this extension drew strong criticism since it openly contradicted the policy of city densification by duplicating Santiago’s expansive growth pattern. However, in relation to this expansion, new laws were established to allow development to become subject to certain conditions, authorizing real estate development provided the developer not only assumes responsibility for all services but also pays for impacts on transportation and on the environment (a form of impact/pollution tax or levy). These conditions open up a new concept in the urban regulation of Santiago. For the first time, environmental and transportation impacts were estimated before subdivisions were approved, fixing mitigation requirements on a metropolitan scale. In addition, measures were taken to charge the developers significant amounts of money...
to finance related infrastructure projects, including treatment plants and new roads.

Another example is Decree 420 of 1979, which concerns the liberalization of urban land by creating an Urban Expansion Area. This decree also derogates the objectives of the PRMS, dedicated to the location of public housing and equipment, and it removes the restrictive conditions on growth and extension. Although MINVU reestablished some explicit regulations to prevent the unlimited expansion of the city in 1985, it is still possible to carry out unforeseen real estate development under certain conditions. Public agents, mainly SERVIU, which builds public housing, exercise pressure in this direction to allow private real estate promoters to obtain cheap, new urban land. This practice openly contradicts the policy of urban densification, encouraging Santiago’s expansive growth trend.

To cope with these problems, the project Ordenamiento Territorial Región Metropolitana Santiago de Chile (OTAS) seeks to implement a Regional Policy of Territorial Zoning to prepare the technical foundations to orient and define a policy of territorial zoning. This will lead to environmentally sustainable development in the metropolitan region by proposing instruments and designing formal procedures for institutional coordination and citizen participation at the regional level, which in turn can serve as a pilot program applicable to other regions or territorial levels. For this, the regional government of the metropolitan region has to be strengthened as manager of environmentally sustainable territorial zoning. There are many more examples that show Chile’s urgent need to integrate responsibilities and powers regarding the effective management of its territory.

In Johannesburg, in spite of the strong alignment between the municipal Integrated Development Plans (IDP) and Local Agenda 21 principles and processes, there has not been an official recognition of the opportunity to apply sustainable urban development as the overall framework for the IDP process and its outcomes. Consequently, urban sustainability strategies have not been explicitly applied in the conceptualization of the IDPs. Also, there is no systematic mechanism for linking the monitoring and reporting of outcomes (from the State of the Environment Report, City of Johannesburg 2003, for example) to the other sector plans to ensure action aimed at improving indicators in an integrated and synergetic approach. In other words, there has not been an explicit effort towards closing the loop of sustainable urban development (planning, implementation, monitoring, evaluation, and a return to the planning stage). Recasting Joburg 2030 and future cycles of IDPs (including related Spatial Development Frameworks and other sector plans) with the broader framework of urban sustainability would be a crucial step in the right direction. This could be followed by an expansion of the Key Performance Areas and IDP related indicators of the city’s performance.
scorecard to include operational areas and management as well as broader urban sustainability indicators. These indicators facilitate and support monitoring and evaluation for both categories of issues rather than the management indicators only. Johannesburg must refocus its attention on this need in order to sustain its global and regional competitiveness and also ensure that grassroots needs will be met in a sustainable manner over time.

In Botswana, due to the fact that modern physical planning in the country is still a relatively new topic, there are also inadequacies concerning the coordination of plans and policies and the organization of planning procedures. The present statutory framework regulating town and country planning in its present form is inadequate and out of line with current environmental policy as stated in the National Conservation Strategy of 1990. In general, environmental law in Botswana is fragmented in various different pieces of legislation administered through a number of different administrative bodies, resulting in incoherent decision-making. There are also some major problems concerning the coordination between plans and policies as well as the lack of their systematic monitoring and review. Approval of plans is slow. The Gaborone City Development Plan (GCDP), for example, refers to the time period from 1997 to 2021. It was approved in 2001 at the time when the first review should have already been made. Due to rapid growth and change of the built environment of Gaborone and the surrounding areas, some of the assumptions made in the plan no longer reflected reality at the time of approval. The Greater Gaborone Structure Plan (GGSP), which should officially determine general land uses has never been approved, the Gaborone Central Business District Master Plan of 1994 was delayed by politics until now and the Gaborone City Landscaping Master Plan of 1995 has no legal backing, but is merely advisory for planners and developers.

Given the many plans that are not in use or are already outdated when they are enacted, a major review of Botswana’s planning system is recommended. First, the envisaged and long debated National Physical Plan (NPP), which provides a spatial framework for the coordination and implementation of development programs and projects at the national, regional, and community level, should be completed and approved. In addition, the South East District Settlement Strategy (SEDSS) and the South East Region Master Plan (SERM), which are in preparation but not yet implemented, should be used to guide Gaborone’s physical development planning. In addition, the goals and objectives of the Vision 2016, adjusted to the needs of Gaborone, should be included in the SEDSS.

To adapt the planning system to the realities of spatial development, it must be adjusted to the right perimeter. Thus, the differentiation between “tribal land” and declared “planning areas” should be abolished. The entire urban area of Gaborone should be determined a “planning area” and the
Town and Country Planning Act’s declaration of the City Council as the planning authority in charge, put into practice. According to the Tribal Land Act, Land Boards are in charge of the land use zoning and planning of tribal land, i.e. the many villages surrounding Gaborone. Planning laws only apply to planning areas, thus, the development of tribal land, which lies de facto in the urban agglomeration of the capital, is not included. So, the new South East District Settlement Strategy should merge the tribal lands and planning areas of Gaborone by including the entire area of the City of Gaborone, even if it does not belong all to the South East District. In actuality, this district surrounds the administratively isolated capital. The Greater Gaborone Structure Plan (GGSP) should subsequently be fostered and amended to become a detailed “Coordination Plan.” Due to the findings of the South East District Settlement Strategy, detailed alternatives to development should be elaborated. Finally, the economy-focused Gaborone City Development Plan (GCDP) should be subordinated to the physical GGSP.

Sustainability-oriented planning in Gaborone could be enhanced with the creation of a Committee for Sustainable Urban Development (CSUD), which should function under the Physical Planning Unit of Gaborone’s City Council. Its task would be to provide the local and national authorities with a recurrent Report on Sustainable Urban Development (RSUD). This report should contain the results of indicator analysis and recommendations to political decision-makers and planning authorities for further development towards sustainability.

7.7 Public Participation

Public participation on a grassroots level is an indispensable part of sustainable urban development. Any measures aimed at achieving sustainable urban development in Africa and Latin America imply prerequisites on the national level, such as decentralization, democratization, “good governance,” encouragement of community participation and integration of women, family planning and health campaigns to cope with the problem of HIV/AIDS, an appropriate education system as well as the allocation of credit and capital for micro enterprises and self-help associations.

FARN (quoted in The Regional Environmental Center 2004) reinforces the importance of public participation:

“Public participation, different from the one existing in traditional representative democracies, must be present. Thus, a sustainable city requires institutions and systems that can facilitate public participation in decision-making regarding environmental use and management.”
In the current plans and policies of the case study cities, good as well as bad examples of public participation can be found.

In Santiago, little transparency in public decisions on urban regulation, which tend to favor private real estate investment, is apparent. During the development of the program *Sustainable Chile*, social leaders of the Metropolitan Region of Santiago and local community representatives asked for better public participation and criticized the existence of an uninformed citizenry and deteriorated social relationships, a lack of confidence in the government and individualism.

In Botswana, the government has recognized the importance of involving its people in the planning process. Planning participation and consultation structures in Botswana, some of which are officially defined, exist at various levels of society. Some consist of elected representatives while others are formed on an ad hoc or voluntary basis. Formal structures like Village Development Committees, Council Committees and the City Council itself, Land Boards, Tribal Administration, District Administration and Parliament are already taking part in the planning process. In the following paragraph, the model of *Kgotla* is highlighted.

The Kgotla is a traditional instrument for articulating public and individual interests in Botswana. Its functions are similar to those of a local parliament. The Kgotla is a meeting place in a ward. Wards are subsets of Council political areas, and there are 26 wards in Gaborone. The Kgotla is regarded as a legitimate institution for public decision-making. Once a decision has been made at the Kgotla, it is considered binding for the entire community. The Kgotla holds public meetings for development activities concerning the city, in addition to its customary court functions. Kgotla forms an important forum that brings urban development issues to the attention of the government. It is the starting point for bottom up development and forms a basis for involving the people in decision-making processes. The execution arm of the Kgotla is the *Ward Development Committee (WDC)*. It represents the lowest level in the hierarchy of planning bodies. Apart from ex-officio members (councilors, officers of the city council), the members of the WDC are elected by the Kgotla and are responsible for the following:

- Identifying the development needs of the community
- Coordinating development planning and projecting implementation within their area of jurisdiction
- Coordinating development activities of volunteer organizations
- Informing and assisting members of the public in the preparation of urban development plans, physical development plans and other policies and plans related to social issues
The importance of including the public cannot be stressed enough. Planning mistakes can be avoided and spatial conflicts can be minimized if the public is involved in all stages of plan preparation. Emphasis should be given to the consultation phase at the beginning of the planning process to further integrate the public. This early consultation also contributes to effective planning since plans do not always have to be adjusted radically in the proceeding planning period and a broad common sense for how development should proceed is established at an early stage.

In addition, the implementation of urban development plans and physical plans should ideally be initiated and backed by the authorities and taken up by community associations and NGOs. When public authorities are overextended, self-help communities, NGOs, and grassroots initiatives become more and more important. These organizations contribute to problem solving strategies on lower, basic levels, but lack access to political power and capital. Authorities should support such organizations instead of arguing that they should follow “official” policy.

Several possibilities to improve public participation exist. Basically, a distinction exists between active and reactive public participation. Active public participation begins at the first stages of the development of a physical plan, for example with the Ward Development Committees in Gaborone. The WDCs could also function as a source of information for the development of physical plans or policies. New interest groups or associations could also take part in round table discussions together with already existing NGOs. Performing workshops with experts on different subjects is another possibility for actively incorporating public needs into physical plans and policies. Nowadays, the opportunities the Internet offers should not be disregarded. Botswana’s youth are very familiar with the Internet. Using the Internet to gather the needs, ideas, visions, and opinions of the public to conceive the overall guidelines for spatial development is worth a try.

In collaboration with the Greater Johannesburg Metropolitan Council (GJMC), the International Council for Local Environmental Initiatives (ICLEI) backed the Land Development Objective (LDO) since 1993, which proposes a new urban management process that aligns stakeholder-defined priorities with local government planning, budgets and personnel. To accomplish integrated environmental management and development in Greater Johannesburg, the LDO was directly aligned to the Local Agenda 21 process. The LDO consists of seven sectors, one of which is environmental management. The Environmental Management LDO was formulated under the rubric of the Development Facilitation Act (DFA-1995), an act that focuses on achieving sustainable development from a financial and environmental perspective. The aim of the Environmental Management LDO is to achieve recognition for environmental management in local governments and to develop
institutional structures and obtain resources to make this management effective. A partnership group composed of members from the public and private sectors and interest groups coordinated the overall planning process. In 1996, an Environmental Management Development Forum was established to identify and set priorities for the metropolitan area. Membership was open to all. The creation of this stakeholder group and community consultations were simultaneous and complementary processes. This participatory approach, including workshops, succeeded in translating environmental issues into a strategic focus of the GJMC. As an outcome, environmental management has been integrated into the institutional framework, and priorities (inclusive budgetary allocations) for action plan development have been set (ICLEI 2004b).

7.8 Monitoring and Controlling Sustainable Urban Development

In Santiago, mechanisms and impact control systems have been developed which seek to measure the environmental externalities of real estate development until now, passing these costs on to mitigation works. The previously mentioned project Ordenamiento Territorial Región Metropolitana Santiago de Chile (OTAS) produces a GIS platform which provides diagnostic coverage and plans of urban and territorial impact that serve to support policy and to orient sector lines of ministries and municipalities. However, this project still lies within academic circles and has very little influence on the actions of the ministries.

In Johannesburg, the State of the Environment Report (City of Johannesburg 2003) actually sets a strong base for status quo and future monitoring of key sustainability indicators (environmental, socioeconomic, cultural, and institutional). The document applies the DPSIR model (driving force, pressure, state, impacts, and responses) of data capture and reporting. With regular capture and reporting of such data, one can better track sustainability trends in the city.

Although indicator sets are a known tool in Botswana (for example, UNCHS indicators for the comparison of Gaborone to Francistown), a comprehensive indicator set for sustainable urban development on the city level for Gaborone does not yet exist.

A significant amount of data exists for the case study cities today, which could be used in sustainability oriented monitoring and controlling. At the same time, there is a lack of specific data in the area of spatial observation, and the management of all the available data is more or less uncoordinated. The availability and quality of the data therefore do not provide a compre-
hensive monitoring of sustainable spatial development and must be improved.

Since spatial development is a dynamic system, development planning must be a continuous process as well. The goals, measures, and instruments should be adapted continuously to the changing framework. As spatial development is very complex, it is important to use tools and models that reduce this complexity. The urban developments of the case study cities reveal that the systematic spatial observation and the definition of development goals are necessary in order to achieve sustainable urban development. Thus, monitoring and controlling concepts can be tools to support the ongoing planning process and provide a comprehensive framework used for strategic and operational urban planning. This means collecting data and information in a systematic manner so that it can then be used for objective and well-founded decision-making.

Monitoring involves continuous spatial observation based on selected indicators, gathering information (for example, statistical or GIS analyses) covering a long time period and a wide thematic range. Monitoring is a systematic ongoing analysis of the environment and can reveal critical developments. Since monitoring always provides up-to-date information, development trends can be determined at an early stage. Indicators should cover a wide variety of topics and can also be used for controlling and evaluating urban development.

Controlling is a part of the monitoring process and compares the goals of the development plan with the current state of development (Keiner 2002). This comparison helps determine whether the goals and objectives have been or are being achieved and where measures must be taken in order to achieve them. Thus, basic information for the revision of strategies and plans can be provided. Whereas monitoring delivers extensive information about the current state of the environment, controlling only considers what is relevant with respect to the goals defined in the development plan and their associated processes. Monitoring and controlling can be combined to assess and evaluate spatial development and to gather information for further steps.

In general, one can conclude that the existence of a vision and an appropriate implementation structure still does not guarantee the successful integration of new initiatives. The involved parties must be committed to these goals and be able to work together to realize them.

8. CONCLUSIONS AND OUTLOOK

Main conclusions are:
– Sustainable urban development challenges vary among the cities studied.
Given current development patterns each of the cities studied is not on a sustainable pathway.
• Despite these patterns there are opportunities for the case study cities to enhance their ability to achieve sustainable development.
• Research in urban sustainable development through cooperative links between institutions in both developed and developing countries provided for a valuable and fruitful experience.

Working with city-specific definitions of sustainable urban development will allow the monitoring and controlling of the development over time. For each city in a developing country striving for sustainable development, bundles of harmonized and appropriate measures must be kept together to maintain their effectiveness. This is of the utmost importance, if we consider that sustainable urban development assumes a balance between the needs of the population and the presence of specific resources, including the location of health and education services, recreation areas, adequate public transport, and citizens’ security, among others.

Most developing regions are still going through urban transition and will retain a significant rural population for many decades. This means that sustainable development programs must reinforce urban-rural linkages. Sustainable development therefore calls for an ecosystem approach with the following elements:
• Inclusion of people and their activities in the ecosystem
• Awareness of ecosystem structure and function at multiple scales
• The use of ecological boundaries to define environmental planning, assessment and management of units
• Adaptive management strategies, based on feedback from new information to improve management and policies when they prove to be unstable
• Participatory management involving all stakeholder groups
• Integration of science and human values in the formulation of goals for protecting the ecosystem
• Recognition of the limits to action in ecosystems
• Geographically comprehensive systems with levels of analyses including interactions among physical, chemical, biological, and social components

National and local authorities should be aware of these requirements. For implementing policy reforms, governments need a strong and sustained political will. Also, they should be open to introducing innovative management systems and integrating environment and ecological issues into decision-making at all levels, giving them equal priority with economic and social concerns (Andam 2004). Thus, the development of human resources and institution building is indispensable.
An example for training support is the International Council for Local Environmental Initiatives (ICLEI). ICLEI is an international association of local governments implementing sustainable development. Its mission is to build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability with a special focus on environmental conditions through cumulative local actions. Through its campaigns, ICLEI helps local governments generate political awareness of key issues, build capacity through technical assistance and training and evaluate local and cumulative progress toward sustainable development. ICLEI serves as an information clearinghouse on sustainable development by providing policy guidance, training and technical assistance, and consultant services to increase the capacity of local governments to address global challenges (ICLEI 2004a).

Despite the recommendations given in this paper, what is the chance that sustainable development will really be effectively implemented? Sustainable Cities (1992) determined that most citizens of urban Africa, Asia, and Latin America would find it difficult to share the global environmental concerns of the North:

"Questions of survival 20 or more years into the future have little relevance to those concerned with survival today." (Sustainable Cities 1992)

Cities need to be sustainable at all levels. Their internal environments must be clean and of high quality for their residents. At the same time, cities must close the loop in terms of interactions with the hinterland. That is, they must decrease metro-wide pollution levels. Ultimately, urban activities must be looked at in terms of their impact on the global environment, including the consumption of resources and the production of gasses that quickly affect the global scale. That is the challenge of creating sustainable cities. Urban design issues cut across all of these levels. Sustainable Cities (1992) doubt that the environment-driven approach towards sustainability, as it appears in Europe and North America through Local Agenda 21 processes, would work for developing countries:

"It may be misleading to refer to many of the most pressing environmental problems in Third World cities as 'environmental' since they arise not from some particular shortage of an environmental resource but from economic or political factors which prevent poorer groups from obtaining them and from organizing to demand them." (Sustainable Cities 1992)

Moreover, Rydin et al. (2003) doubt that sustainable development would be the most easily enacted response despite the obvious challenges of urbanization, because there lacks a consensus as to the meaning of sustainable
development and quality of life, due to a real tension regarding future visions and what they entail. Also, Andam (2004) points out that there is a lack of vision and awareness in general, which has to do with illiteracy and language barriers in communication. For the example of Africa,

“Environment and development conventions are conducted in languages that most local people cannot fully understand.” (Andam 2004)

Therefore, it is indispensable that the concept of sustainability be translated into simple language and understandable implementations on the grassroots level and be based on a broad societal agreement that is fully assimilated into the culture of the organizations responsible for the implementation of sustainable urban development (Innes and Booher 2000).

Possible urban management policies are discussed in the literature, ranging from establishing innovation strategies and new technology (Brennan 1994, Sassen 1998), improving land tenure security (Gilbert 1994, de Soto 2000) and solutions for urban transportation (Rimmer 1998, Gakenheimer 1994), to measures to protect the climate (Liddle and Moavenzadeh 2002, Molina and Molina 2002). Von Weizsäcker et al. (1997), de Roo and Miller (2000), and Jenks and Burgess (2000) suggest that the structure of the built city should be as compact as possible for the efficient use of resources. This also would save financial resources that could be used to fight urban poverty and improve environmental conditions in the cities. The challenge is now to transform these scientific approaches into workable solutions in practice, solutions that vary from context to context, because there are no consumer-ready universally valid “recipes” for finding the path to sustainability.

In conclusion, solutions for sustainable urban development have to meet specific local needs and cannot be applied in a copy-paste manner. Thus, for every city striving for sustainable development, specialized analyses must be made and an appropriate bundle of necessary measures to be taken by national, regional and local governments gathered together.
Figure 1. Development of global urban population 1950 to 2030 (Source: UN 1999)

Figure 4. The original definition of “Sustainable Development” (autograph by Gro Harlem Brundtland)
Figure 2. Africa’s large cities (Data: UN 2001)

Figure 3. Latin America’s large cities (Data: UN 2001)
REFERENCES


Massachusetts Institute of Technology and Charles River Associates for the WBCSD Sustainable Mobility Working Group.