Chapter 8: Planning, Spatial Structure of Cities and Provision of Infrastructure

Alison Todes
School of Architecture and Planning
University of the Witwatersrand
Johannesburg
South Africa

Revised paper

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Acronyms

BOT Build Operate Transfer
BRT Bus Rapid Transit
GIS Geographic Information Systems
ICT Information and Communication Technologies
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>IDP</td>
<td>Integrated Development Plans</td>
</tr>
<tr>
<td>MSIP</td>
<td>Multi-Sectoral Investment Planning</td>
</tr>
<tr>
<td>PEDP</td>
<td>Physical and Environmental Development Plan</td>
</tr>
<tr>
<td>TOD</td>
<td>Transit Oriented Development</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
</tbody>
</table>
Chapter 8: Planning, Spatial Structure of Cities and Provision of Infrastructure

Summary
The provision of infrastructure such as transport networks, water, sewerage, electricity and telecommunications plays key roles in the development of efficient, healthy and sustainable cities. Other urban facilities and amenities such as schools, health services, social services, markets, places for gathering, worship and recreation are also important to the development of liveable cities. Infrastructure, facilities and amenities of this sort are necessary to meet people’s everyday needs.

These elements of infrastructure and facility provision are important in shaping the spatial structure of cities, at a city-wide and more local scale, and can result in certain sections of the population becoming spatially marginalized and excluded from access to urban opportunities. The spatial structure and degree of densification of the built environment also has a major impact on urban efficiency and sustainability. Thus the compact, mixed-use and public-transport based city is said to be more environmentally sustainable, efficient and equitable, but the trends in many parts of the world are towards declining densities and increasing outward expansion.

Cities grow through complex processes and the public sector is among a large number of actors shaping urban spatial organisation, which is always evolving. While planning potentially plays important roles in the way infrastructure and facilities are organised and in the spatial structuring of cities, its role has been relatively weak in many contexts. The recent ‘unbundling’ of urban development through forms of privatisation, developer driven growth, and mega-projects has in part underpinned this weaker role, and contemporary trends towards socio-spatial polarisation and growing urban sprawl. Yet there is a growing recognition of the problems associated with these patterns, and a search for new approaches to spatial planning that link more closely with infrastructure development and the development of mega-projects.

Planning has important roles to play in creating more inclusive cities and spaces. At a local scale, planning should recognise the diversity of needs in an area and create environments offering a range of services, facilities and amenities which meet these needs, and which support the livelihoods of the urban poor. The significance of pedestrian movement, particularly for lower income groups, also requires recognition. Understanding these needs requires analysis of diversity, including, inter alia, gender, disability, and age, and a strongly participatory approach.

Studies of international urban growth show the massive expansion in the spatial footprint of cities over the past decades, and suggest that these trends can be expected to continue. Several elements and principles of compact city thinking have value, but they way they are used and the form of spatial development promoted needs to be appropriate to the local context. This includes understanding underlying dynamics, and how these can be addressed. Yet most future development is likely to continue to involve further expansion on the periphery. If planning is to be effective, it must seek ways to direct, support and structure this growth, and to reinforce informal processes of upgrading and consolidation. Enabling the expansion of economic activity and of the livelihoods of the poor, and improving infrastructure, services and facilities on the periphery is also important.
Linking spatial planning to infrastructure development is critical in this context, and there are several international examples of initiatives to bring these together. In rapidly growing cities, there is a need for the public sector to provide the main routes and infrastructure trunk lines in advance of development, allowing the private sector, non-governmental organisations, other agencies and communities to connect to these main lines as they are able. Linking major infrastructure investment projects and mega-projects to strategic planning is also important.

Planning of this sort will require a good understanding of trends, development directions and market forces, but it will also need to be based on collaborative processes that draw together various public sector agencies and departments with a range of other stakeholders from civil society and business. Developing a common spatial vision of development is important to these processes, but it is unlikely that planning of this sort will be a single event. Rather, iterative processes building on agreements, past developments or bringing to bear new information and approaches are more likely.

In many cities, growth is occurring across municipal boundaries, and regional structures will often be required to manage growth, and to develop appropriate planning strategies. Spatial planning in these contexts should provide a framework for the co-ordination of urban policies and major projects, and a space for public discussion on these issues.
Chapter 8: Planning, Spatial Structure of Cities and Provision of Infrastructure

8.1. Introduction

The provision of infrastructure such as transport networks, water, sewerage, electricity and telecommunications plays key roles in the development of efficient, healthy and sustainable cities. Other urban facilities and amenities such as schools, health services, social services, markets, places for gathering, worship and recreation are also important to the development of liveable cities. Infrastructure, facilities and amenities of this sort are necessary to meet people’s everyday needs and are acknowledged as critical in the Istanbul Declaration and the Habitat Agenda\(^1\). Improvements in water and slum conditions are core commitments of the Millennium Development Goals.

These elements of infrastructure and facility provision are important in shaping the spatial structure of cities, at a city-wide and more local scale, and can result in certain sections of the population becoming spatially marginalized and excluded from access to urban opportunities. The spatial structure and degree of densification of the built environment also has a major impact on urban efficiency and sustainability. Thus the compact, mixed-use and public-transport based city is said to be more environmentally sustainable, efficient and equitable, but the trends in many parts of the world are towards declining densities and increasing outward expansion\(^2\), often across municipal boundaries, and the relevance of these ideas to the urban poor on the urban periphery is open to debate.

Chapter 7 has shown the complex dynamics through which urban growth occurs, and its variations across contexts. It has pointed to the important roles of entrepreneurs, individuals and consumers who make location decisions; providers of infrastructure and services; those who make undeveloped land available; and property developers. Informal land development processes are also critical in most developing countries. Municipal and government agencies are among a large number of actors shaping urban spatial organisation, which is always evolving. While planning potentially plays important roles in the way infrastructure and facilities are organised and in the spatial structuring of cities, its role has been relatively weak in many contexts. Informal urban development processes, the growing importance of urban mega-projects and privately driven development with little relationship to urban spatial planning, institutional divides, and the limitations of urban spatial planning discussed in previous chapters have all been contributors. Yet there is a need for a closer connection between spatial planning and both infrastructure provision and mega-projects as these have significant urban impacts.

This chapter explores these issues. The next section (8.2) provides an overview of contemporary urban spatial trends internationally, and their links to access to infrastructure and exclusion. Section 8.3 explores the way these trends are being shaped by the ‘unbundling’ of infrastructure development disjointed from spatial planning through forms of privatisation, developer driven growth, and urban mega-projects. Section 8.4 examines the links and interrelationships between forms of infrastructure provision, spatial organisation and access.

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1 UNCHS Habitat, 2001.
2 Angel et al, 2005.
The relationships between urban form, sustainability, efficiency and inclusiveness are considered through a focus on the compact city debate in Section 8.5, and a discussion of the relevance of compaction ideas across contexts. There is some debate over whether planning can influence the spatial organisation of cities, yet it does have important material effects. Linking spatial planning to major infrastructure development provides a potential avenue for shaping the future growth of cities, and section 8.6 explores various initiatives to align spatial planning and infrastructure development. The chapter concludes by drawing out key findings and policy implications.

8.2. Urban Spatial Trends, Infrastructure and Exclusion

Previous UN-Habitat reports\(^3\) provided extensive analysis of the changing spatial structure of cities and of levels of infrastructure and service provision in the world’s cities. This section provides an overview of these patterns. It provides a sketch of key infrastructural and service deficits, and examines how these are linked to urban spatial patterns and trends, and their relationship to exclusion.

**Table 1: Proportion of Urban Population Living in Slums 2005\(^4\)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing Countries</td>
<td>2,219,811</td>
<td>36.5</td>
</tr>
<tr>
<td>North Africa</td>
<td>82,809</td>
<td>14.5</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>264,355</td>
<td>62.2</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>434,432</td>
<td>27.0</td>
</tr>
<tr>
<td>East Asia</td>
<td>593,301</td>
<td>36.5</td>
</tr>
<tr>
<td>Southern Asia</td>
<td>468,668</td>
<td>42.9</td>
</tr>
<tr>
<td>South-Eastern Asia</td>
<td>243,724</td>
<td>27.5</td>
</tr>
<tr>
<td>West Asia</td>
<td>130,368</td>
<td>24.0</td>
</tr>
<tr>
<td>Oceania</td>
<td>2,153</td>
<td>24.1</td>
</tr>
</tbody>
</table>

Table 1 provides an overview of the extent of slums by region in 2005, while Table 2 shows access to improved water and sanitation in 2006. Tables 1 and 2 show that a third of the population in developing countries lived in slums\(^5\), and, while 94 percent of households had some access to improved drinking water\(^6\), only 70 per cent had such access in their homes, and 71 percent had access to improved sanitation\(^7\). In both cases, there are significant variations across contexts. Slum prevalence is highest in Sub-Saharan Africa (62 per cent), where basic services are lacking in many cities, and not only in informal settlements.

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\(^4\) Source: UN-Habitat, 2008

\(^5\) UN-Habitat, 2006. A slum is defined as ‘a settlement in an urban area in which more than half of the population live in inadequate housing and lack basic services’ (p19). Not all of the world’s poor live in slums, nor do slums only house the urban poor, but the figures provide a sense of physical dimension of poverty.

\(^6\) According to UN-Habitat, 2006, although levels of improved access to water are high, many people suffer from waterborne diseases, suggesting that the quality and quantity of water available to the poor is less than acceptable. Further the costs of water to the poor may be high per unit.

\(^7\) UN-Habitat, 2006. Defined as a private toilet or public toilet shared by a maximum of two households. Some facilities reported as ‘improved’ however are inadequate — overcrowded, unsafe, or poorly maintained.
Concentrations of slums are however much less and conditions are improving in Namibia and South Africa. In North Africa, outside of Egypt, only 15 per cent of households live in slums, and 10 percent or less do not have access to improved drinking water and sanitation. On average, the proportion of households living in slums ranges from 43 per cent in South East Asia to 24 per cent in West Asia, but there are significant variations between countries. Access to improved sanitation and water in the house mirror these patterns. Slum prevalence is high in Bangladesh and Nepal (69 and 68 per cent respectively), and in India (44 per cent). In Lebanon, Yemen and Iraq, slum conditions are particularly affected by the influx of refugees and displaced people. In Latin America and the Caribbean (LAC), the average slum prevalence is similar to West Asia at 27 per cent, but there is also considerable variation across countries. Water and sanitation are less of a concern in most LAC countries, but remain issues in Haiti, Nicaragua and Bolivia.

Table 2: Access to Water and Sanitation in Urban Areas 1990 and 2006

<table>
<thead>
<tr>
<th>Major Region</th>
<th>Improved Drinking Water Coverage</th>
<th>Household Connection to Improved Drinking Water Coverage</th>
<th>Improved Sanitation Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing regions</td>
<td>93</td>
<td>94</td>
<td>69</td>
</tr>
<tr>
<td>North Africa</td>
<td>95</td>
<td>96</td>
<td>83</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>82</td>
<td>81</td>
<td>46</td>
</tr>
<tr>
<td>Latin America and the Caribbean</td>
<td>94</td>
<td>97</td>
<td>84</td>
</tr>
<tr>
<td>East Asia</td>
<td>97</td>
<td>98</td>
<td>82</td>
</tr>
<tr>
<td>Southern Asia</td>
<td>91</td>
<td>95</td>
<td>55</td>
</tr>
<tr>
<td>South-Eastern Asia</td>
<td>92</td>
<td>92</td>
<td>41</td>
</tr>
<tr>
<td>West Asia</td>
<td>95</td>
<td>95</td>
<td>82</td>
</tr>
<tr>
<td>Oceania</td>
<td>92</td>
<td>91</td>
<td>-</td>
</tr>
</tbody>
</table>

While the trend is towards rising levels of services, infrastructural improvements are not necessarily keeping up with urbanization, and in some contexts, such as transitional countries, existing services are deteriorating in parts of cities. Informal waste management dominates in Latin American cities, and 80-90 per cent of new housing in the Pacific is

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8 UN Habitat, 2008.
9 Source: Statistical Annex, Table A.5
10 Hirt and Stanilav, 2008; Yuan, 2008.
11 Irazabel et al, 2008
informal and lacking services\textsuperscript{12}. In China, the high rate of urban growth in the absence of formal development means that even the middle classes rely on informal access to land\textsuperscript{13}.

Poor access to urban services is problematic from health and social perspectives, and particularly affects women and girls. It compounds gender inequalities and differences. For instance, long distances to walk for water affect the time taken for housework, as does poor quality of services. In some religious and cultural contexts, women and girls can only go out after dark to use collective sanitation facilities or to relieve themselves, affecting their health and safety\textsuperscript{14}. The HIV/AIDS epidemic in many parts of the world compounds the problems associated with poor water and sanitation, and exacerbates the work associated with caring for sufferers in advanced stages of illness. This work often falls on women\textsuperscript{15}.

The extent, nature and spatial distribution of slums, and of access to urban services are critical elements of the spatial structure of cities, and of the way spatial form links to exclusion. While the location of slums varies across contexts, Box 1 shows several typical patterns.

\textsuperscript{12} Yuan, 2008.
\textsuperscript{13} Ibid.
\textsuperscript{14} Moser and Peake, 1987. A report on water and sanitation facilities in 17 African cities notes as a problem the absence of sanitation facilities for girls and boys in schools in slums in several cities (UN-Habitat, undated a).
\textsuperscript{15} Todes et al, 2008
Box 1: Spatial Location of Slums in Cities

- **Inner-city slums**, usually rented accommodation in areas vacated by the better-off. Gentrification and commercialisation are displacing these populations in some cities, but these processes are less common in developing countries outside of rapidly growing Asian countries. While inner city slums may be crowded, and infrastructure and services may have deteriorated\(^{16}\), these areas offer good access to employment opportunities, reducing travel time and costs. Research on Brazil\(^{17}\) shows that low-income populations within the inner cities survived crises far better than those on the urban periphery. Inner city slums however accommodate a minority of the urban poor in developing countries.

- **Slum estates**, usually high rise public housing schemes in more peripheral locations. In several contexts infrastructure and services have declined\(^{18}\). Some schemes built to rehouse displacees from inner city slums were poorly located, with few amenities. Since costs to access work, markets and social networks were high, these have sometimes been abandoned by all but the most desperate.

- **Informal settlements and slums within the urban fabric**. These, often dense and poorly serviced settlements, which may draw from services provided to better off neighbouring communities, nevertheless provide good access to employment and markets.\(^{19}\)

- **Peripheral informal settlements and slums**, housing the majority of the urban poor in developing countries, develop in areas where it is easier and cheaper to acquire land. These settlements are likely to have better housing, but often have low levels of services, which can become problematic with densification. Access is also likely to be difficult since mass transit systems are often poorly developed, and areas accessible to the poor may not be located on main routes\(^{20}\). Hence considerable time (as much as 3-4 hours per day) and cost (up to 30 per cent of income) can be spent on accessing employment, markets, schools and other public services.\(^{21}\) These long distances are especially burdensome for women who travel to work and are also responsible for housework and childcare. Studies in Johannesburg show that living in peripheral informal settlements affects both domestic workers’ ability to access employment and the terms on which they do so\(^{22}\). In transitional countries\(^{23}\) the focus on improving mobility through cars has marginalised the poor on the periphery and those who do not have access to cars among the middle classes, such as women and the aged. Nevertheless, not all places which are apparently peripheral lack access to employment. In multi-nodal regions, some seemingly spatially marginal places turn out to be well-located on closer examination\(^{24}\), and local sources of employment (including informal work) may be greater than anticipated. In China, the growth of

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\(^{16}\) In several transitional countries, poor maintenance of infrastructure and services has led to decline of these areas (Hirt and Stanilov, 2008).

\(^{17}\) Eckstein, 1990.

\(^{18}\) UN-Habitat, 2003, p.83; see also Hirt and Stanilov (2008) on transitional countries.

\(^{19}\) UN-Habitat, 2003.

\(^{20}\) Eg. in transitional countries — see Hirt and Stanilov (2008); and in Latin America, see Irazabel et al (2008).

\(^{21}\) UN-Habitat, 2003. The Durban case study provides a South African example of these processes.

\(^{22}\) Benit and Morange, 2006.

\(^{23}\) Hirt and Stanilov, 2008.

\(^{24}\) For example in Diepkloof near to Midrand in Johannesburg: see Biermann, 2004
villages in peri-urban areas around cities is going along with significant economic activity there.\textsuperscript{25}

Other important spatial trends include the lateral spread of cities\textsuperscript{26} and the growth of socio-spatial segregation. The extent, nature and importance of these patterns however varies considerably.

Chapter 7 and Box 1 above have pointed to the growth of peri-urban areas around cities, particularly as urban growth outpaces infrastructure development. In East Asia and South East Asia, these patterns are occurring on a dramatic scale: in Jakarta and Bangkok, some 77 per cent and 53 per cent of urban growth by 2025 respectively is expected to be in peri-urban regions, while in China, some 40 per cent of urban growth by 2025 is expected to be in peri-urban areas as far as 150-300km from core cities. Similar patterns are also occurring in South Asia\textsuperscript{27}. In Asian cities, lateral spread is occurring along transport corridors, creating a form of ‘regional urbanisation’.\textsuperscript{28} Some cities, such as Bangkok, nevertheless remain relatively centralized in terms of employment and labour markets, particularly for the poor. While the lateral spread of cities is generally associated with declining densities\textsuperscript{29}, these patterns go along with a significant growth of high rise development in some countries, for example in China.\textsuperscript{30} Many Asian cities remain very dense, and in poorer cities, rising car usage in the absence of improved public transport is associated with high levels of congestion.\textsuperscript{31}

The growth of small and medium towns and development along transport routes within the commutable distance of metropolitan agglomerations, and the development of peri-urban areas is occurring in Latin American and Caribbean cities\textsuperscript{32}, and in the transitional countries\textsuperscript{33}. Peri-urban informal development is a key pattern in Sub-Saharan Africa, particularly on customary land.

The growth of city regions or ‘metropolitanization’ is occurring mainly through formal processes in developed countries, and is underpinned by the development of polycentric cities, the expansion of highway systems and increased reliance on cars. Patterns are most advanced in the US, where central business districts retained only 10-20 per cent of employment by the late 1990s, as economic activity moved to suburbs and major nodes outside the core city. The decentralization of employment within cities has not reduced levels of commuting, as jobs and housing are not generally co-located.\textsuperscript{35} In Europe, central cities have retained their importance to a greater extent, but trends towards sprawl are nevertheless evident. Initiatives to redevelop historic cores as upmarket service, finance and tourist nodes in developed – and some developing countries – have achieved varying success.\textsuperscript{36}

\textsuperscript{25} Yuan, 2008
\textsuperscript{26} Angel et al, 2005
\textsuperscript{27} Ansari, 2008
\textsuperscript{28} UN-Habitat, 2004, p.63.
\textsuperscript{29} Including, importantly, in Japan – see Kaido, 2005.
\textsuperscript{30} Yuen, 2008
\textsuperscript{31} UN-Habitat, 2001.
\textsuperscript{32} Itazabel, 2008
\textsuperscript{33} Hirt and Stanilov
\textsuperscript{34} UN-Habitat, 2001.
\textsuperscript{35} UN-Habitat, 2004; Bertaud, 2004.
\textsuperscript{36} Garau, 2008
Most recent studies of cities point to rising levels of class segregation, particularly with the growth of urban enclaves in the form of gated communities. Gated residential estates for middle and upper income groups are emerging in places where fear of crime is a major concern, such as in Latin America, and in South Africa, and in parts of the US. Nevertheless, this phenomenon is prevalent in most regions of the world, although it is less significant in Europe. In Asia and the Middle East, and to some extent in Latin America, major complexes including a range of services, facilities (including schools) and economic activities are also being developed. In many cases, developments are occurring in more accessible locations on the periphery, but in Asian contexts, several such enclaves are located in central areas, and are conceived as internally integrated, with significant office and/or industrial components. Some enclaves are located close to slums. In other cases, such as in South Africa, they have tended to avoid such areas.

In Asian and Middle Eastern contexts, and to a lesser extent in other parts of the world there has been a significant emphasis on infrastructural upgrading to respond to growth to produce ‘world class cities’: transport, ICTs, modern industrial parks, in association with suburban or high rise housing and shopping complexes, such as the Pudong development in Shanghai, and the Madinat al-Hareer development in Kuwait. The rapid growth of enclave development and rising levels of socio-spatial polarization reflect processes of globalisation, economic restructuring and growing income inequality, explored in previous UN-Habitat publications, but they are also the product of a neo-liberal era in which important elements of urban development have been privatised or driven by private developers in many countries. The following section explores these issues.

8.3. Spatial Planning, the Privatisation of Infrastructure Development and Mega-Projects

Traditional approaches to planning attempted to align land use planning with infrastructure provision through a comprehensive master planning approach, and through the public provision of infrastructure. There were however many deficiencies in these processes, and from the 1980s, new urban development and infrastructure provision became far less a matter of planning, and far more dominated by private sector interests. This section explores these issues and shows how this process of ‘unbundling’ has in part underpinned the spatial trends discussed in the previous section. The first two sub-sections trace the history of the links between spatial planning and infrastructure development, and the impact of unbundling, while the third section considers the contemporary focus on mega-projects.

8.3.1. Master Planning and Infrastructure

From the 1850s to the 1960s, the supply of infrastructure and services in cities shifted from fragmented and privately organised goods to centralised and standardised services provided by the public sector. These large scale systems underpinned much of the growth of cities after the second world war, and significantly shaped their spatial form.

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37 Irazabel, 2008; Yuan, 2008; Ansari, 2008;
38 Ansari, 2008; Shatkin, 2007.
41 Ibid.
One of the core functions of traditional master planning was to provide the basis for the integrated provision of transport, energy, water and communication with urban development. Master plans provided projections and guidance for the location, extent and intensity of particular land uses in the city. Planners thus targeted densities and land uses in particular areas. In theory, this kind of planning enabled authorities responsible for transport, water, sewerage, energy and other public facilities to develop infrastructure and services on a ‘predict and provide’ basis. Thus infrastructure provision was intended to follow spatial planning.

While this kind of planning might have been effective in some developed countries, there were problems in many others. Under communism in Eastern Europe, Central Asia and China, master plans were driven by economic targets developed at national level, without consideration of local needs. In most colonial contexts, planning and infrastructure provided by the public sector was only for an elite, and projections anticipated a small population which was soon outstripped by growth in the post-colonial period. For example, infrastructure developed in Lagos provided for only 10 per cent of the eventual population. Nor did patterns of development necessarily follow those anticipated, particularly with the rapid growth of high density informal settlements. Even in developed countries, shifting social and economic patterns such as declining household sizes, new patterns of economic activity and the like, meant that plans proved to be out of sync with actual needs for infrastructure and development. The accuracy of the ‘predict and provide’ approach was called into question.

In several countries, spatial planning occupied a marginal institutional position in relation to far more powerful departments responsible for various kinds of infrastructure planning and development. Departments working in silos developed their own plans, which did not necessarily link to one another or to the master plan. In these contexts, the provision of infrastructure such as major transport routes, bulk services and trunk mains for electricity, water and sewerage treatment, amongst others, has been far more powerful in shaping the spatial form of cities than planning.

**8.3.2. Private Sector Led Infrastructure Development**

From the late 1970s, the ‘unbundling’ of infrastructural development through forms of corporatisation or privatisation of urban infrastructure development and provision, and developer driven urban development, has tended to drive patterns of fragmentation and spatial inequality in many countries. In several post-colonial contexts, such as in Jakarta and Mumbai, these processes overlaid an already fragmented and unequal system of infrastructure and service provision. In many countries, a fiscal crisis of local government underpinned a shift towards the privatisation of service provision. These changes occurred in the context of the decline of the welfare state or the collapse of communism and a movement towards neoliberal economic and institutional policies, which have tended to promote the market and

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43 Harris, 1983.
44 Gandy, 2006.
45 In Durban and Cape Town, South Africa, for example, it led to a significant overestimation of expected population and need for infrastructure in the central areas (see Breetzke, 2008; Walker 2008)
46 Eg. see Sivaramakrishan and Green, 1986, on Asian countries.
47 Kooy and Bakker, 2008; Zerah, 2008.
market principles. Some large, influential international agencies, such as the World Bank and the Asian Development Bank\(^{48}\), have also promoted the idea of privatisation of infrastructure and services. Large multi-national firms have emerged in the field of infrastructure provision, with a focus on project by project investment\(^{49}\).

In both transitional and developing countries\(^{50}\), there seems to be a shift towards privatised provision of infrastructure in the context of local fiscal crises, which has underpinned new forms of sprawling and unequal development. In transitional countries by the 1990s, many governments had aging urban infrastructures, which were not refurbished as a consequence of the economic crisis and the withdrawal of state subsidies. Instead, new development occurred on a privatised or non-legal basis. Particularly in central and eastern Europe, there has been extensive privatisation and outsourcing of utilities\(^{51}\). Similarly in the Latin American and Caribbean countries, fiscal constraint has meant a reliance on privatised provision of services in many countries\(^{52}\). In the East Asian, South East Asian and Pacific countries, however, the bulk of infrastructure is still provided by the public sector, with only 20-25 per cent being developed by private finance institutions and through various arrangements with the private sector\(^{53}\). Privatised, or even individualised provision of infrastructure is also occurring in contexts where large scale systems of infrastructure provision are inoperable or only serve a small part of cities, such as in some African cities.

‘Unbundling’ has taken various forms and has occurred in both the provision of infrastructure and services, and in urban development projects. It includes leases and concessions; public-private partnerships of various kinds for instance in water and sanitation projects\(^{54}\), but also in major urban development projects; the role of the private sector in building, financing and managing infrastructure, for example the build-operate-transfer (BOT) projects for major transport works such as the Bus Rapid Transport (BRT) systems in Latin America\(^{55}\); private concessions to build and run toll roads, amongst others. Small local entrepreneurs and systems of community management are also being used in solid waste collection, water, housing and sanitation in countries such as Cambodia, Thailand and Philippines\(^{56}\), and in parts of Latin America\(^{57}\) and Africa, amongst others.

The private sector has tended to focus on more profitable aspects of infrastructure development: shopping centres, middle and upper class residential enclaves, mega-projects and the like. Nevertheless, privatised provision of services has also occurred through contractor models in poorer communities. These processes have been controversial: while they sometimes extend services to areas that would not otherwise have them, they also impose considerable costs on the poor, and limit the use of resources that are necessary for healthy cities\(^{58}\). The privatisation of public services has in some cases been resisted by

\(^{48}\) Yuan, 2008


\(^{50}\) Hirt and Stanilov, 2008; Irazabel et al, 2008

\(^{51}\) Hirt and Stanilov, 2008.

\(^{52}\) Irazabel et al, 2008.

\(^{53}\) Yuan, 2008, p.98.

\(^{54}\) Yuan, 2008

\(^{55}\) Irazabel et al, 2008

\(^{56}\) Yuan, 2008

\(^{57}\) Irazabel et al, 2008

\(^{58}\) Batley, 1996.
communities, for example in Latin America\textsuperscript{59}. In parts of South Africa there are ongoing protests around these issues\textsuperscript{60}.

In the context of increasing global competitiveness, local governments in many parts of the world are also being driven to become more entrepreneurial, focusing on enabling and attracting private sector development. This approach has sometimes led to a relatively laissez faire approach to development, where proposals by developers are accepted even when they are contrary to plans, such as in some Latin American countries\textsuperscript{61}. In Durban, a developer driven approach has resulted in urban sprawl contrary to the compaction principles of the spatial framework, as Box 10 shows.

\textbf{8.3.3. Mega-Projects}

The period since the 1980s has also seen a major growth of urban mega-projects linked to the new emphasis on urban competitiveness and urban entrepreneurialism. In many cases, particularly in Europe, mega-projects are linked to urban regeneration initiatives to reposition declining economies to capture new or growing economic niches. In several Middle Eastern and Asian contexts mega-projects are being developed de novo both as prestige projects but also to lay the basis for new forms of economic development. Box 2 shows various common forms of mega-projects.

\textsuperscript{59} Irazabel, 2008

\textsuperscript{60} McDonald and Pape, 2002.

\textsuperscript{61} Irazabel et al, 2008.
Box 2: Common Forms of Mega-Projects

- Developments linked to event tourism, such as conference centres, exhibition sites, sports stadia;
- Re-development of old industrial areas, ports towards a new service, leisure and tourist economy;
- Development of new areas linked to high-tech industries and economic activities, such as Malaysia’s super-corridor between the capital and the airport. These developments can include residential, commercial and industrial space and may be linked by premium transport infrastructure, both road and rail. In the Uttar Pradesh region in India, the provincial government has instituted a policy to enable ‘high tech cities’ as new enclaves within cities. These cities focus on ‘sunrise’ and high tech industries and associated infrastructure, and include a range of ancillary services such as conference centres, health and fitness centres. They are planned for lower density development and have far more liberal space standards for parking, roads, and retail than is generally the case.
- Major new satellite cities with international standard facilities, such as Muang Thong Thani planned for a population of a million, 40km from Bangkok. Significant new towns of this sort are also being planned and built in the Middle East. For instance, Saudi Arabia is planning to complete some five megacities by 2020.
- Major enclave developments taking the form of gated communities containing a variety of retail, schools, entertainment and other facilities for the wealthy, linked by privatised transport routes, for example in Latin America.
- Enterprise zones or special economic zones set up by national or local governments to attract new investment, sometimes linked to major airports and other developments. In transitional countries, these are occurring on municipal peripheries. In India, special economic zones are duty free enclaves where local laws and revenue regulations do not apply. They provide high quality space with good external connectivity for exports, and are oriented to manufacturing as well as services, but regulations allow for up to 50 per cent of the zone to be used for residential, retail and other commercial purposes. These zones are growing rapidly and it is expected that they will absorb a substantial proportion of the population over the next twenty years.

Projects of this sort have varying relationships to the public sector. While some are completely privately driven and provided, in other cases, they are initiated and funded by the public sector in the hope of attracting private development, and are driven by special

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63 Yuan, 2008.
64 Shatkin, 2007.
65 Ansari, 2008, Box 1.
66 Yuan, 2008
67 Nassar, 2008.
68 Ibid.
70 Hirt and Stanilov, 2008.
71 Ansari, 2008, Box 2.
agencies. Private-public partnerships, or arrangements in which the public sector provides bulk infrastructure and connections while the private sector undertakes development within these parameters are also common.

Although there are some examples where projects of this sort work with spatial planning processes and inclusive visions of urban redevelopment, such as the Plaine Saint Dennis Project in Paris, discussed in Box 11 below, in many cases, mega-projects are in contradiction to spatial plans, and enable unequal development out of sync with the needs and aspirations of ordinary residents. In Europe where such projects are generally state led and often funded by government, they are run by special agencies which compete with and supersede local and regional governments. Frequently, existing plans and associated regulatory processes are bypassed, and the usual participatory processes are replaced by stakeholder participation. Methods of assessing impacts are changed, and research indicates that there tends to be pervasive misinformation on costs, benefits and risks.

In Indonesia, megaprojects in greater Jabotek region (centred on Jakarta), have involved public development of large scale infrastructure, including a new airport, toll highways linking key axes of development, as well as major private housing, shopping malls, industrial areas, tall buildings and gated residential developments. While aspects of the development were consistent with the Jakarta master plan, which included an industrial corridor, various controls have been reduced, and development has occurred on land which was intended to be protected from urban development for environmental reasons. Development is taking place on prime agricultural land and green spaces in the region’s principal area of water supply and its main aquifer, undermining the region’s water supplies.

8.4. The Influence of Infrastructure on Urban Spatial Structure and Access

Previous sections of this chapter have provided an overview of key spatial trends and contemporary drivers of urban form. This section shifts the focus towards considering the way urban infrastructure, such as transport networks and systems, water, sewerage, electricity and telecommunications shape the spatial organization of cities, and how this in turn affects access and liveability from the perspective of different groups of people. The focus is particularly on transport networks and systems since these are generally acknowledged to be most powerful in shaping urban spatial structure, but other elements of infrastructure provision, and inclusive spatial and infrastructure planning at a local level are also considered.

8.4.1. Transport Systems and Networks

At the heart of the transport-land use relationship is the importance of accessibility for both the development of housing and for economic activity. In traditional urban economic models, the significance of access translates into higher land values around nodes and routes offering high access. Thus economic activities requiring high levels of accessibility cluster around rail

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72 Swyngedouw, 2002.
73 Ibid.
75 Goldblum and Wong, 2000.
76 Douglass, 2005.
stations and tram routes, along main roads or in nodes close to major intersections of highway systems. Firms that favour a particular transport mode will cluster near points of high access for that mode. Residential developments similarly seek accessibility, thus the development of new routes and transport systems provide important ways of structuring cities over the long term. The accessibility-value relationship however means that higher income groups are more able to pay for access and thus to locate close to good transport routes that suit the transport mode that they use, although they may also choose more distant locations and longer travel times.

Much has been made of the role of highways in facilitating the suburban form of development, and in encouraging urban sprawl. Detractors in the US, where much of the debate has occurred, point to the role of other factors, such as rising car ownership and incomes, cheap credit, mortgage loans, family formation, and taxation, a desire to escape congested inner cities, an attraction for suburban life, and the suburbanisation of employment. The growth of car oriented suburban development has also been dependent on an era of cheap oil, which may be drawing to a close. Clearly, the spatial form of cities is not a simple effect of transport routes, and will be the outcome of a range of social, political, institutional and regulatory conditions in various contexts. Nevertheless, studies suggest that highways play powerful roles as conduits for development in particular parts of cities.

Accommodating the motor car has been an important theme of ‘modern’ planning in many parts of the world. High levels of dependence on the motor car, and the low densities associated with car dominated cities however make access difficult for those without this form of transport — the elderly, disabled, youth, women in families with single cars, and low income workers in suburban office locations and homes, such as cleaners, domestic workers, and clerks. Further, the emphasis on planning for mobility in cities neglects the significance of pedestrian and non-motorised forms of transport in cities in developing countries. Little attention is paid to the needs of pedestrians, cyclists and other users of non-motorised transport for road space, crossings, and other amenities, resulting in high levels of accidents.

Several influential design approaches treated residential areas as introverted cells linked to highway systems, and focused on central facilities, with the expectation that pedestrian movement is internal to the cell. These forms of local design can result in very inconvenient conditions for those without cars who need to access facilities and employment outside the area, such as the aged, disabled and women. In low income areas, car ownership is low and planned central areas are likely to be poorly developed, requiring movement outside of the area, often on foot. For working women who have to travel to work as well, these types of design may compound the difficulties of negotiating everyday life.

The emphasis on accommodating the motor car in the design of local areas has also been criticised. Much greater attention is now being paid to ‘traffic calming’, i.e. slowing traffic through various devices, and the accommodation of pedestrians and cyclists in local planning. UN-Habitat’s Bicycle Transport Project in Kibera, Kenya for example combines the

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79 See Boarnet and Haughwout, 2000 for a summary.
80 Ibid.
82 Behrens, 2005; Rao and Sharma, 1990.
83 Such as the neighbourhood principle, Radburn, see Behrens, 2005; Behrens and Watson, 1996.
84 Eg. see Pellowthwyte 1986 on Mitchell’s Plain in Cape Town.
introduction of modified bicycle transport with improved road access for their use\textsuperscript{85}. Arguments for moving away from introverted neighbourhoods to areas with permeable boundaries, joined by centres and strips containing commercial activities and public facilities, linked to public transport, are also made by those advocating a greater focus on planning for accessibility rather than purely for mobility\textsuperscript{86}.

Amsterdam provides an example of where sustainable accessibility has been created through a combination of appropriate land use and transport policies, as indicated in Box 3.

\begin{boxed_text}
\textbf{Box 3: Sustainable Accessibility in Amsterdam}\textsuperscript{87}

In Amsterdam, a combination of evolving policies, shaped at times by contestation, has helped to create a city which is highly accessible to those without cars. Some 35 percent of commuting is by non-motorised transport – a world high – as a consequence of the importance of the bicycle. In the 1960s, a policy of ‘concentrated decentralization’ of population and employment in growth centres, which were well linked by both public transport and car, enabled the development of an accessible polycentric city. The compact city policy of the 1980s promoted transport modes other than the car, particularly walking and cycling, and encouraged concentrated mixed-use developments, providing services close to homes. The city centre has been preserved and is mainly accessible by public transport, while the edge of the city with its sub-centres offers good access to both the inner city and to places elsewhere. These policies have been reinforced by transport policies: rail, motorways, and good linkages between modes, particularly rail and bicycle. Policies did not always work as intended, for instance, people do not live and work locally as expected, and there are still problem areas, for instance, the city still lacks a comprehensive integrated urban-regional public transport system, but a form of sustainable accessibility has been created.

The structure of public transport systems can also shape the spatial organisation of cities in important ways, and as section 8.6 below indicates, has been a crucial element of attempts to restructure cities spatially for instance in Curitiba and Portland. Heavy rail systems in large dense cities (often taking the form of underground systems in central areas) are critical in supporting both good interconnections in central areas, as well as links between central and outlying areas. Commuter rail systems mainly link outer areas to the centre, while light rail and tram systems provide good connections within central areas, and between these and secondary nodes and suburban corridors\textsuperscript{88}. Rail and train stations provide potential points for the growth of nodes and more intensive development, but potentials are contingent on the way these services are used, as well as how stations are regulated and developed\textsuperscript{89}.

Buses are more adaptive, and require lower densities to operate, but are also slower and less efficient, and are likely to have less impact on spatial organisation. The use of dedicated busways however increases speed and capacity and thus usage\textsuperscript{90}, and does create more
\end{boxed_text}

\textsuperscript{85} Contracci, undated.
\textsuperscript{86} Behrens, 2005; Behrens and Watson, 1996; Curtis, 2005. There are obvious links here to new urbanism and neo-traditional design.
\textsuperscript{87} Sources: Bertolini (2007); Le Clercq and Bertolini (2003); Bertolini, Le Clercq and Kapoen (undated)

\textsuperscript{88} Cervero, 2004.
\textsuperscript{89} Ibid. For instance in the US, commuter rail is only used at peak hours and land around stations are used to accommodate parking.
\textsuperscript{90} Ibid.
structured routes around which more intense development can occur. In many developing countries, the provision of public transport is poor, and thus private forms of public transport such as minibus taxis, jeepneys, jitneys and the like have emerged. These forms of transport, termed ‘paratransit’ by some authors 91, can operate in highly congested conditions, but also emerge in sprawling low density cities. These systems are reactive to an existing spatial context, but in developing countries, important paratransit collection points can become significant places for informal trade, markets and the like, as a consequence of high passenger volumes.

8.4.2. Water, Sewerage, Electricity and Telecommunications

Major infrastructural systems for water, sewerage, electricity and telecommunications have also structured cities spatially in important ways, although their direct impact is less obvious than is the case for transport systems. All of these systems involve the establishment of major bulk elements which require large fixed investments and thus provide capacity for growth in particular areas, such as dams and water treatment works, reservoirs, pump stations, sewerage treatment facilities, power sub-stations, mobile phone masts and fibre-optic cables. Water and sewerage pipelines and electricity transmission lines distribute services to local areas and within them. Water and electricity can easily be led to different parts of the city and the bulk infrastructure required to open up new areas is not especially costly, but investment in these facilities enables new development there, and reduces its cost, until a particular threshold is reached. It thus influences the spatial direction of development. The impact of sewerage treatment plants is more significant since they are much more costly and serve much larger areas 92.

The availability of trunk lines for water, sewerage and transmission lines for electricity in particular areas reduces development costs and thus influences future patterns of growth. While bulk infrastructure does not usually feature high on planners’ agendas, it can be key in shaping patterns of spatial development. Section 8.6 shows how planning is attempting to link with infrastructure development in various contexts.

Stand-alone systems of water, sewerage and energy provision reduce dependence on these major systems and can have diverse spatial outcomes and affect access. Thus sewerage package plants, the bucket system, the use of septic tanks and French drains, and various forms of ventilated pit latrines do not depend on broader sewerage systems, but are generally more suitable for lower density development. Water kiosks and water tankers can be used outside of areas connected to water pipelines, but are usually much more costly per unit than water received through reticulated systems. The use of solar energy at a household level also offers alternatives to connection to electricity grids but installation charges are still high, and the alternative is more often the use of energy sources such as wood, coal, paraffin, and candles, which may be both costly per unit, and can generate greater pollution. Of course, proximity to networks for water, energy and sewerage does not mean that households can afford access to them.

91 Ibid.
92 For instance in Durban, a major strategic decision concerned whether a further sewerage treatment plant should be developed in the west, where large numbers of informal settlements and low-income housing developments had developed, or the north, where major economic projects and upmarket housing developments were being promoted by private developers and provincial authorities. The decision to provide bulk infrastructure in the north will shape the future spatial direction of growth.
Studies in the early 1990s predicted that information and communication technologies (ICTs) such as mobile phones, and the internet, would lead to the ‘death of distance’ and the declining importance of both cities and central places within them as people increasingly worked from home and communicated using ICTs. Although there has been a growth of working from home and the use of ICTs, both cities and central places within them remain important due to the significance of agglomeration economies, diverse labour markets, face to face contact, and interpersonal relationships. While some substitution of electronic communication for physical movement may occur, the two work in complementary ways and the overall expansion of both forms of communication makes it difficult to detect\textsuperscript{93}. Instead of the death of distance, new forms of ‘information districts’ and high tech centres are emerging within cities\textsuperscript{94}. Nevertheless, other shifts may occur over the long term, particularly with rising energy costs.

Physical infrastructure to support ICTs generally follows the lines of other forms of infrastructure, particularly roads, electricity transmission lines, sewerage and water pipelines\textsuperscript{95}. Combined with road infrastructure, ‘smart corridors’ have been important in structuring the development of new economic centres focused on high technology in some Asian cities, as section 8.2 showed. For the most part, infrastructure to support new technologies is provided by the private sector and follows customers, privileging both business and higher income consumers. Thus studies show that a digital divide tends to overlay patterns of wealth and poverty in cities\textsuperscript{96}. Unequal access however may be more a matter of affordability than physical access to infrastructure. ‘Smart city’ approaches, extending networks through municipal connections, and providing affordable internet access points in low-income areas, can help to some extent in addressing this form of exclusion\textsuperscript{97}.

### 8.4.3. Infrastructure and Inclusive Local Planning

The spatial form of cities, their liveability and inclusiveness, is also shaped by access to a broader range of infrastructural facilities and amenities, such as schools; clinics; crèches; community halls; libraries and learning facilities; safe spaces for recreation, ranging from playgrounds to gathering places for the elderly; spaces for religious and cultural practices; fresh food and other local markets and retail outlets; and appropriate spaces for economic activity.

Local planning needs to create places that meet the everyday requirements of diverse groups of people: men and women; old and young; the disabled; sexual minorities; different cultural groups, and so on. Understanding and responding to these diverse needs is an important part of planning. The tradition of gender analysis and gender mainstreaming within planning provides useful methodological tools and frameworks for assessing needs and potential responses\textsuperscript{98}, as does the more recent emphasis on planning for diversity\textsuperscript{99}. Box 4 contains the example of the safer city audits used in UN-Habitat’s Safer Cities Programme approaches.

\textsuperscript{93} Graham and Marvin, 1999.
\textsuperscript{94} Ibid, see also section 8.2.
\textsuperscript{95} Odendaal and Duminy, 2008; Rutherford , 2005.
\textsuperscript{96} Odendaal and Duminy, 2008; Graham, 2002; Baum et al, 2004.
\textsuperscript{97} See Odendaal and Duminy, 2008).
\textsuperscript{98} Eg. see Reeves, 2003; Moser, 1993
\textsuperscript{99} Eg. see OPDM, 2005.
Box 4: The Safer City Audit in Dar es Salaam

Manzese is a densely populated middle and low income area containing some informal settlements. It accounts for about a quarter of recorded crime within Dar es Salaam, and levels of violence against women were high. The safety audit was intended to help to find ways to enhance safety through planning and design and increase community awareness of the environment. The audit included a walk through the area with local women and officials and a discussion of findings and possible solutions. The following suggestions emerged, amongst others:

- Widening streets to ease vehicular circulation
- Refurbishing abandoned buildings that have become criminal hideouts
- Improving street lighting
- Using the spaces between houses for allotments, plays spaces and other community activities
- Improving drainage channels, sewer systems, pit latrines
- Addressing the lack of well designed secure public open space
- improving the accessibility and visibility of certain areas like narrow, blocked off and unlit streets

The Safer Cities project represents a form of local inclusive urban regeneration. This kind of planning for local infrastructure improvement is likely to be important in many parts of the world, and particularly in slums. There are also many examples of participatory approaches to slum upgrading, including improvements in social services and facilities.

UN-Habitat’s planning initiatives in post-conflict and post-disaster situations provide examples of inclusive local planning providing a range infrastructure and facilities according to diverse local needs. For instance, in post-tsunami reconstruction in Xaafun, Somalia, UN-Habitat designed housing to enable economic activities, developed a women’s centre close to the market, and created safe public spaces with playgrounds and water points.

The creation of appropriate spaces and infrastructure for economic activities is also critical as it influences viability and hence livelihoods. Informal trading activities are highly sensitive to pedestrian movement, and need to be accommodated in places of high access (such as major commuter stations, transport interchanges, main roads). Strategies to displace these activities to less intense spaces are rarely effective. The complex interests involved in planning for appropriate infrastructure for markets requires a participatory approach, as demonstrated in

Sources: Todes et al (2008); Mtani (2002)

Decorte, undated a.
UN-Habitat’s planning for the reconstruction of markets in post-conflict Galkaio, Somalia\textsuperscript{102} (Box 5), and in Durban’s Warwick Triangle (Box 6).

**Box 5: Planning for the Reconstruction of Markets in Galkaio, Somalia**

Somalia was a largely a nomadic society, but is urbanising rapidly. Urban areas are ruled by unregulated black market principles, with ongoing conflicts over the control of urban land and infrastructure. Uncontrolled land grabbing and the lack of urban management make the introduction of urban infrastructure and services a difficult task.

The Galkaio municipality wanted to build new central market structures to relocate vendors clogging narrow streets. A design exercise was undertaken to see how a more integrated restructuring of the whole centre could contribute to a better functioning business centre, and city as a whole. Suggestions were made to reorganise public transport, and the chaotic loading and unloading of goods. The exercise demonstrated how the street front could be used for commercial developments, while linking the new market area with the remaining shopping streets and cross-subsidising part of the public infrastructure. The design also offered solutions for resettling some of the urban poor squatting in the area. Design here was mainly used to investigate opportunities and to highlight crucial interventions needed to make the new market structures work.

**Box 6: Planning with the Informal Economy in Warwick Junction, Durban, South Africa\textsuperscript{103}**

Warwick Junction is a major public transport interchange in Durban’s inner city, accommodating 460 000 commuters and 5000 traders on a daily basis. In 1997, the Warwick Junction Project was launched to regenerate the area, which at the time was under-serviced and neglected. It was intended to focus on cleanliness, safety, trading conditions and public transport. The project included both capital works and the establishment of teams working closely with various groupings in the area. Some 60 per cent of traders are women, and the Self-Employed Women’s Union has a particularly strong presence in the area. It encouraged the project to address child care facilities for traders’ children, and overnight accommodation for women sleeping in vulnerable conditions on the street. Other projects included spatial redesign to improve safety for commuters and traders; crime prevention; improving cleanliness; redeveloping unhygienic and unsafe toilets; and a series of sector specific projects, including the establishment of a Herb Traders Markets, and the introduction of appropriate infrastructure for bovine head cookers.

Thus infrastructure plays an important role in shaping the spatial development of cities. Spatial planning needs to work much more closely with the planning of infrastructure at both a city wide and more local level if it is to have an impact on the way cities develop, and their sustainability, efficiency and inclusiveness.

\textsuperscript{102} Decorte, undated b.

\textsuperscript{103} Sources: Skinner and Dobson (2007); Skinner (2008)
8.5. The Compact City Debate and Its Implications for Sustainability, Efficiency and Inclusiveness

While previous sections have shown that the predominant spatial trend in most cities is towards sprawl, many analysts argue for promoting more compact cities. These arguments have been adopted as policy in various contexts. The 1992 Rio Summit on Environment and Development accepted arguments that low density cities promote excessive use of energy and the 1990 European Green Paper promotes the idea of compact cities. Some countries such as South Africa, and cities such as Curitiba and those linked to the US’ smart growth movement, have adopted these ideas as policy, although implementation may fall short of intentions. This section explores the compact city debate in various contexts, and considers the implications of this debate for planning and managing urban change. Box 7 provides a discussion of the meaning of compact urban development.

Box 7: Defining Compact Urban Development

Compact urban development usually refers to medium to high built densities, enabling efficient public transport and the use of non-motorised transport, as well as sufficient thresholds to allow good access to economic activities, services and facilities. Most versions of compact cities envisage vibrant mixed use places, providing opportunities for small and informal business. Continuous urban development (except for planned open space) and clear divisions between urban and rural, sometimes achieved through urban containment policies, are common elements. While some compaction advocates have focused on infill and intensification around central city areas, others see a range of possibilities, including, inter alia, densification around transport routes and nodes across the city, and decentralized, interlinked compact settlements. The development of new areas or the redevelopment of existing suburbs using ‘new urbanist’ approaches are also common themes. These approaches include many elements of compaction, and the use of layouts and street patterns that enable public transport and pedestrian movement, emphasize public space, and focus facilities (such as health, libraries, retail and government services) around key public transport facilities and intersections to maximize convenience.

8.5.1. The Compact City Debate

Arguments in favour of compact cities centre on claims that they are more efficient, inclusive and sustainable. The costs of providing infrastructure are lower, there is better access to services and facilities since thresholds are higher, the livelihoods of the urban poor are

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104 Eg. see texts by Jenks et al (1996), Jenks and Burgess (2000), and Williams et al (2000) which bring together much of the literature assessing the compact city idea.
106 Jenks, 2000; Breheny, 1996.
107 Modernist designs based on the neighbourhood principle by contrast developed local areas on a cellular basis, reducing thresholds, and forcing public transport to move around the edges of the development, thus limiting convenience, safety and access for users. See Behrens and Watson, 1996; Curtis, 2005.
promoted and social segregation is reduced\textsuperscript{108}. The time and cost spent travelling is also lower. Compact cities are less reliant on cars and minimize distances travelled and hence fuel use, and have less impact on farmlands and environmental resources\textsuperscript{109}. As a consequence they are theoretically more resilient in the context of climate change, and have fewer harmful impacts. Critics however question several of these claimed benefits, and argue that compaction is contrary to market forces towards sprawl, the decentralization of work, and residents’ desires, and hence is not politically feasible — or even desirable. Higher density they argue is associated with congestion and pollution, higher crime rates, and puts greater pressure on natural resources\textsuperscript{110}. Containment policies push up land costs and also encourage development beyond restricted zones\textsuperscript{111}.

Much of the debate has focused on cities in developed countries, where high car ownership rates in an era of low fuel costs have propelled low density sprawl. Although research showing that higher density cities use less fuel\textsuperscript{112} has had its detractors\textsuperscript{113}, the relationships established are remarkably robust\textsuperscript{114}, and there seems to be a clear association between higher densities and public transport, and between low density and reliance on cars\textsuperscript{115}. Nevertheless, higher densities only provide the conditions for public transport, they do not guarantee it. Nor do they prevent rising car ownership and use, even where public transport systems are relatively good, as for example in Japan\textsuperscript{116}. Some research for instance finds that higher densities are associated with less usage of the motor car for some trips, but not for all\textsuperscript{117}, and that households in places designed along new urbanist lines may nevertheless drive elsewhere to work, shop and use facilities\textsuperscript{118}. The complexity of these relationships (and of urban forms) means that many attempts to prove the benefits of compaction statistically are weaker and more equivocal than expected. Nevertheless, if oil prices continue to rise over the long term, as they did so dramatically in 2007/8, these relationships may change. One of the greatest critics of compaction in the late 1990s, for instance spoke of the irrelevance of compaction ideas given the energy glut at the time, and the availability of surplus farmland\textsuperscript{119}. These conditions have changed significantly since then.

Cities built on low density lines may however find adaptation or change towards greater compaction difficult to achieve. Cities are ‘path dependent’ in that their spatial structures are largely set in place and change slowly\textsuperscript{120}. Research indicates that it is difficult to provide efficient public transport in cities with lower densities than 30 people per hectare\textsuperscript{121}, but the actual threshold varies by transport type\textsuperscript{122} as well as in terms of contextual factors such as

\textsuperscript{108} Feminists have also been critical of cities built around land-use separations since they isolate women at home, and make it difficult for working women to negotiate various spatial demands. See eg. MacKenzie and Rose, 1983.


\textsuperscript{111} Gordon and Richardson, 1997.

\textsuperscript{112} Newman and Kenworthy, 2000.

\textsuperscript{113} Eg. Simmonds and Coombe, 2000; Mindali et al, 2004; Gordon and Richardson, 1997.

\textsuperscript{114} Eg. see Breheny, 1995 — generally a critic of compaction arguments — confirms it.

\textsuperscript{115} Bertaud, 2004.

\textsuperscript{116} Tanigochi and Ikeda, 2005.

\textsuperscript{117} Simmonds and Coombe, 2000.

\textsuperscript{118} Handy, 2005.

\textsuperscript{119} Gordon and Richardson, 1997.

\textsuperscript{120} Bertaud, 2004.

\textsuperscript{121} Ibid.

\textsuperscript{122} See Bertaud, 2004, Table 1. Drawing from the US Institute for Transport Engineers, he cites the following minimum residential densities for different forms of transport:
spatial organization, topography and the like. Table 3 shows the effect of densities on access to public transport in the case of sprawling Atlanta and denser Barcelona.

### Table 3: Density and Public Transport Access: Comparing Atlanta and Barcelona

<table>
<thead>
<tr>
<th></th>
<th>Atlanta</th>
<th>Barcelona</th>
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<tbody>
<tr>
<td>Area (km²)</td>
<td>137</td>
<td>37</td>
</tr>
<tr>
<td>Population (millions, 1990)</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Density (people per hectare)</td>
<td>6</td>
<td>171</td>
</tr>
<tr>
<td>Population close to metro</td>
<td>4 per cent within 800 metres</td>
<td>60 per cent within 600 metres</td>
</tr>
<tr>
<td>Trips undertaken by public transport</td>
<td>4.5 per cent</td>
<td>30 per cent</td>
</tr>
</tbody>
</table>

Movements towards smart growth and transit oriented development, discussed in section 8.6, are seen as ways of shifting cities in these directions, but critics argue that without very significant redevelopment, changes are likely to be marginal. Major changes require well coordinated and consistent policy and implementation over a long period of time on infrastructure development, taxation and land use regulation, and there are few cases where this has been possible — Curitiba being a notable exception. The regeneration of Plaine Sainte Dennis on the periphery of Paris, however provides an example of development along lines favoured by compact city advocates, as discussion in Box 11 shows.

#### 8.5.2. The Relevance of Compaction Ideas to Developing Countries

Pre-existing conditions for compaction vary between contexts. On the whole, densities are much higher in developing than developed countries, but there are also variations within these categories, with the highest densities in Asian cities, somewhat lower densities in Latin American, African and European cities, and lowest in North American and Australian cities. Critics question whether the concept has relevance in the cities of developing countries, which already contain many elements of urban compaction: mixed use largely as a consequence of the lack of regulation, very high densities (at least at the centre), and a reliance on public transport, largely as a consequence of low incomes. Densification processes are often occurring in informal settlements through processes of autonomous consolidation, so the role of public policy or planning in this context is questioned.

Yet the benefits of urban densification at least for the urban poor in the centre are apparent: while housing costs are high, and they have less space, they have greater livelihood opportunities (particularly in the informal sector) and access to employment. Transport costs are low and they are able to rely to a greater extent on non-motorized transport. In many

- 1 bus/hour (30p/ha);
- 1 bus/30 mins (44p/ha);
- Light rail and feeder traffic (53p/ha).

123 Source: Bertaud, 2004
124 Ibid.
126 Richardson et al, 2000. See Table 2, p.28 for details of densities across cities.
127 Richardson et al, 2000.
respects dense areas in cities of developing countries, including informal settlements, are living versions of compact city ideas — and they arguably have greater relevance in this context. Planning and public policy might most appropriately work with these processes of change to consolidate the position of the poor in inner cities, and to support existing processes of informal upgrading, and improvement of infrastructure and services. Avoiding displacement or forced relocation of slums, as has often occurred through modernist planning in the past, is also important. In Mumbai, for example, floor space bonuses were rewarded to developers who made provision for low income housing in commercial developments. In Brazil, participatory informal settlement upgrading including the provision of a range of social services and facilities has helped to improve living conditions in Rio de Janeiro’s *favelas*.

Nevertheless, dense inner city areas in developing countries are often very congested and polluted. Some cities combine high densities with poor public transport and a reliance on paratransit, increasing levels of congestion. Rising levels of car ownership as incomes increase are placing considerable pressure on these cities. Wealthy dense Asian cities, such as Singapore, Hong Kong and Tokyo, however have been able to constrain the use of motor cars, provide good public transport and manage environmental conditions, but they are also places with considerable capacity and few alternatives to accepting compact development.

Do compaction ideas have value for development on the periphery of cities in developing countries, or for managing urban growth? The urban periphery has in some cases provided space for households willing to trade lower housing costs and more space for longer travel distances to economic activities. Where there are local economic opportunities or few commuters in a household, peripheral location is likely to be attractive. The opportunity to rent housing or to combine incomes from rural and urban economic activities are some of the livelihood opportunities for households located on the periphery in the South African context, suggesting that the needs and livelihood strategies of poor households are diverse. The increasingly polycentric form of cities has meant that accessibility is more complex than simply distance to urban centres. But in other contexts, as previous sections showed, distance from work and transport costs are major concerns. Improving infrastructure, services, and facilities in sprawling developments on the periphery, and promoting employment and economic development there is critical.

It is clear that satellite city policies have had little value in either developed or developing countries: there is no necessary match between those employed and those living in these areas. Cities are major labour markets and people move in multiple ways across the city. In several instances, satellites have not proved particularly attractive to economic activities, resulting in large concentrations of poorly located housing, and long commuting distances. The notion of concentrating and intensifying development along major transport routes, and

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130 Richardson et al, 2000.
133 Privately provided collective transport such as minibus taxis. Barter, 2000.
135 Todes, 2003; Schoonraad, 2000; Cross et al, 1996.
136 See Biermann et al, 2004 on Diepsloot in Johannesburg, which is relatively close to emerging new nodes in the city.
138 Eg. see the case of Atlantis, in Cape Town. Also see Brown and Lloyd-Jones, 2002; Lloyd Jones, 2000.
of promoting nodal development of economic activities and public services\textsuperscript{139} in peripheral areas has greater merit, but obviously potentials and possibilities are contextually defined. While it is unlikely that the public sector is in a position to provide urban services to all in most developing countries, planning can seek to shape the infrastructural framework of major roads, rail lines, and bulk services, as the following section argues.

### 8.5.3. Cost Efficiency and Compaction

The cost efficiency of providing infrastructure and services to higher density developments, and to existing areas — and thus of ‘compact’ rather than ‘sprawling’ development — is perhaps the least contested of the compact city claims. However research shows that relationships are far more complex\textsuperscript{140}. The study which originally made these claims\textsuperscript{141} based its arguments on conceptual models rather than on actual development. In reality, however, unit costs vary considerably between types of infrastructure, topography and geotechnical conditions, and on the basis of available capacity and service thresholds\textsuperscript{142}. Hence there is no necessary relationship between compaction, cost and efficiency: rather conditions are highly contextual.

### 8.5.4. Conclusion

Several elements and principles of compact city thinking therefore have value, but the way they are used and the form of spatial development promoted needs to be highly specific and sensitive to local contexts, conditions and processes. Addressing spatial development patterns will need to go beyond mapping of desired ends or spatial forms to examining the underlying dynamics and considering how these can be approached. These include a broad range of government policies, which may have a more powerful influence on spatial form than planning, as well as taxes, regulatory instruments, and infrastructural development. Whether there is the commitment and capacity to carrying through coordinated approaches however is open to question\textsuperscript{143}. Addressing the spatial form of cities might also be seen as another fruitless planners’ pursuit of abstract spatial ideas\textsuperscript{144}. Yet the spatial organization of cities does have material effects as the discussion above has shown, and planners can work with informal processes and with major infrastructural developments to shape change in more positive ways.

### 8.6. Contemporary Approaches to Linking Spatial Planning to Urban Infrastructure

Previous sections of this chapter have shown that urban infrastructure developments have shaped the spatial form of cities, but in ways that intersect with social, economic, political and institutional dynamics. While the detailed and static land use planning associated with traditional master planning has generally been discredited, and there are questions as to the relevance, feasibility and possible influence of large scale city-wide spatial planning, strategic spatial planning that is able to give direction to major infrastructure development is an important part of the new approach to planning. Conversely, it is also important to link and

\textsuperscript{139} Jenks, 2000.
\textsuperscript{140} Biermann, 2000.
\textsuperscript{141} RERC, 1974.
\textsuperscript{142} See also Breetzke, 2008 on Durban.
\textsuperscript{143} Bertaud, 2004; Burgess, 2000; Williams, 2007.
\textsuperscript{144} Neuman, 2005.
tie the development of mega-projects to strategic spatial plans for cities. This section explores various contemporary initiatives to link spatial planning to urban infrastructure development, and to use major elements of urban infrastructure, such as transport routes and systems, to influence spatial form.

8.6.1. Smart Growth and Transit Oriented Development

As discussed in the previous section, the ‘smart growth’ movement has gained support in the North American context, and has promoted the creation of more compact and integrated urban development. Smart growth supports the intensification of urban development and attempts to limit growth beyond the urban edge. It encourages increases in density; mixed use and cluster developments; a variety of housing types beyond detached units; protection of open space, agricultural lands and ecologically sensitive areas; the reduction in use of private and motorised forms of transport; the promotion of public transport systems; and the design and redesign of areas to support such use. Mechanisms to promote such growth include both regulations and tax incentives, but also rely on urban plans linking land use, transport and other aspects of infrastructure development. In Maryland, where smart growth legislation was adopted in 1997, subsidies for new roads, sewers, schools and other elements of infrastructure are limited outside of areas designated for growth, and funding is instead channelled to priority growth areas and in ways that do not encourage sprawl. Several states which have adopted smart growth ideas require consistency between local plans and the planning and programming of capital facilities.

Transit-oriented development (TOD) occupies an important place within the smart growth movement. TOD posits the restructuring of regions towards greater use of public transport by improving or creating light rail or rapid bus transport systems, and generating dense mixed use nodes around transit stations. Retail, public facilities, office and other work spaces, are created around these stations, along with relatively high density residential development, within a radius of 400-800 metres. The intention is to create human scaled, walkable spaces, encouraging the use of public transport. In Portland (US), where the TOD idea has been adopted, light rail is combined with a feeder system of bus networks and three types of centres of different sizes and intensities. Proponents argue that smart growth and the TOD system is enabling Portland to become more compact, is encouraging greater use of public transport, and is reducing traffic congestion.

There are considerable debates over the impact of these ideas, and their requirements for success. Research shows that smart growth has slowed urban sprawl and declining densities in Maryland, although overall, the dominant trend is still towards sprawl and car usage. While proponents claim that Portland’s urban growth boundaries have contained growth, others argue that growth has spilled over into adjacent areas. Successful implementation requires consistent policies between plans at various levels, and the coordination of various methods and agencies. Critics argue that while many cities have

146 Ibid.
148 Ibid.
153 Belzer and Autler, 2002.
adopted forms of TOD, it is often implemented in narrow and partial ways. In Vancouver, metropolitan planning was based on compaction ideas, but they were not shared by suburban communities and municipalities, whose ideas of liveability were very different, thus development did not follow the plan\textsuperscript{154}. Whether these concepts have purchase in developing country contexts is open to debate: both smart growth and TOD depend on high levels of coordination and integration, as well as consistent programmes and policies. These conditions may be difficult to achieve in contexts where administrative capacity and finances are scarce, and there is a dominance of political decision-making. Concepts of smart growth and TOD also need to be carefully adapted to local contexts, and to be based on an understanding of conditions there\textsuperscript{155}.

### 8.6.2. Integrating Land Use and Transportation

Core to the TOD idea is the integration of transportation and land use, but there are several ways in which this has occurred internationally. The case of Curitiba, Brazil\textsuperscript{156}, represents a well known example where ideas of this sort have had a real impact, and is discussed in Box 8.

\textsuperscript{154} Owens, 2008.
\textsuperscript{155} Wilkinson, 2006.
\textsuperscript{156} See Irazabel et al (2008) for further detail.
Box 8: Curitiba’s Integrated Land Use and Transport System

Curitiba’s 1965 master plan structured its development around a set of transport axes with dedicated bus lanes, carrying express high capacity articulated buses, flanked by high density residential development, as well as offices, commerce and services, in areas adjacent to the route. Large bus terminals at the ends of these express bus routes permit transport between routes, as do medium sized terminals along the routes. Passengers may transfer to interdistrict and local buses using a single ticket\(^\text{157}\). Proponents claim that residents spend a comparatively low 10 per cent of their income on transport, and that fuel consumption is 25 per cent lower than in comparable Brazilian cities. And while there is a high rate of car ownership, more than 1.3 million passengers a day take the bus, with 85 per cent of residents using it\(^\text{158}\). The success of this model has been attributed to a planning process that strongly integrated land use and transport planning, and to persistent long-term implementation of the plan. While a master plan was used, its focus was on a strategic vision and principles to guide development, and on the use of appropriate systems and incentives\(^\text{159}\).

Despite the many benefits of the Curitiba planning and development approach, it has not escaped the realities of urban spatial inequalities. Curitiba sits within a broader metropolitan context in which the poor live on the periphery with limited services, amenities, and an absence of public transport\(^\text{160}\). In addition, although the transport axes within Curitiba were meant to house middle and low income people, the supply of good infrastructure has pushed up property prices to the extent that this is no longer possible, and the poor are forced to live on the periphery.

Curitiba’s model of ‘Bus Rapid Transport’ (BRT) has been emulated and elements have been adopted (and adapted) by other Brazilian and Latin American cities (most famously Bogota’s Transmilenio system), as well as by cities elsewhere in the world\(^\text{161}\). Santiago’s Transantiago system however provides an example of ‘failed implementation’\(^\text{162}\) of the BRT approach as a consequence inter alia, of the lack of integrated transport planning, poor links to urban planning, and the failure to understand the complex ways in which people use space and transport in the city\(^\text{163}\).

There are many other examples of linking transport and spatial planning in urban development. The redevelopment of rail stations in Naples involved integrated consideration of timetables, service lines, stations, modal interchange facilities, urban renewal around rail stations, and the design of stations. These improved the quality and acceptability of services

159 Rabinovitch and Leitman, 2004.
161 These systems generally involve public-private partnerships, with the public sector developing infrastructure and regulating system, while the private sector runs the vehicles.
162 Jiron, 2008.
163 A system of trunks and feeders with poor cross routes replaced the previous more chaotic bus system, but in the process made it difficult to move across the city outside of these parameters. Nor did planners understand the way various modes of transport were used by people and how patterns of movement were socially constructed. In addition, the number of buses and hence frequency was cut, reducing convenience. See Jiron, 2008.
to the extent that usage increased by some 43 per cent over the 2001-2004 period\textsuperscript{164}. The Dutch system of analysing economic activities in terms of the kind of transport they are likely to generate and locating these variously to rail or road interchanges\textsuperscript{165} provides another example. The strong links between transport and land use planning in Amsterdam were shown in Box 3 above.

While transport is generally acknowledged to be the key element of infrastructure shaping urban form, and the importance of linking land use and transportation planning is widely accepted\textsuperscript{166}, the links between the two are often poor. In part, there are varying discourses and logics of these forms of planning\textsuperscript{167}, institutional divides, and the traditional modelling approaches often used by transport planners were subject to many of the criticisms of large urban models: overly comprehensive and data hungry, too aggregated to be useful and too distant from actual behaviour\textsuperscript{168}. More recent models, using more sophisticated technology, GIS systems, and new theoretical approaches enable a better understanding of transport land use relationships, but remain very data intensive, and are still moving towards usefulness in policy terms\textsuperscript{169}.

\section*{8.6.2. Strategic Spatial Planning and Infrastructure Planning}

In response to the problems associated with master planning, there has been experimentation with new forms of strategic spatial planning. In Europe and North America strategic planning based on developing a consensus on the main directions for development has been important\textsuperscript{170}, and may include infrastructure development. The rising importance of strategic planning is linked to a reaction against the dominance of the market and its effects in terms of fragmenting development, and in producing unsustainable and inequitable development patterns.

Several Australian cities are including an infrastructure plan as a core element of strategic spatial planning\textsuperscript{171} since the previous focus on flexible, market driven approaches made it difficult to manage important outcomes and resulted in a lack of coordination. Integrated approaches linking land use and infrastructure planning, funding and delivery are relatively recent, but early findings\textsuperscript{172} from these initiatives suggest the importance of a well supported long-term strategic plan leading the process. The involvement of a wide range of stakeholders is key to the development of a shared and consistent approach, but the plan itself also needs to be based on credible analysis and understanding of trends and forces. The strategic plan identifies the expected economic base, drivers for change and major factors affecting the spatial distribution of population, employment and services. It considers the influence of technology and social change on patterns of development, and on the demand for services and infrastructure. Plans however cannot be old fashioned master plans. They require regular review, consideration of sequencing, reinforcing funding and pricing, and institutional

\begin{itemize}
  \item \textsuperscript{164} Cascetta and Pagliara, 2008.
  \item \textsuperscript{165} Vanderschuren and Maarseveen, 2001.
  \item \textsuperscript{166} Eg. see Auckland Regional Council, 2006.
  \item \textsuperscript{167} Wilkinson, 2002. The links between other forms of infrastructure planning and spatial planning are also not automatically made as a consequence of differences in methodology, scale and time, although there are potentials to link them. See Ramnath, 2007.
  \item \textsuperscript{168} Lee, 1973; Kane and Behrens, 2002.
  \item \textsuperscript{169} Iacono et al, 2007.
  \item \textsuperscript{170} Healey, 2006.
  \item \textsuperscript{171} Auckland Regional Council, 2006.
  \item \textsuperscript{172} Ibid.
\end{itemize}
elements. The importance of internal champions and special agencies for coordination are stressed. Although several plans attempt to coordinate across a range of sectors, it is argued that transport-land use links are key, and that other forms of infrastructure can follow 173.

8.6.3. Integrated Urban Management and Development Plans

While the approach adopted in Australian cities may, like master plans, require far more data and analysis than is generally available in many developing countries, there have similarly been initiatives to undertake planning linking strategic plans with infrastructure planning. A movement towards integrated urban management and development plans was based on the argument that “unless an integrated and holistic approach to urban development and infrastructure development planning is applied, the current sectoral and segmented planning and urban management practices will continue to result in haphazard and unplanned development” 174. Proponents argue that while the logical route is for government to plan for future development, acquire land and provide bulk/mainline infrastructure, which then provides the framework for the private sector to subdivide and connect to services, this frequently does not occur in Asian countries 175. Instead, fragmented private development occurs on fringe land in the absence of distributor/collector roads and utility lines, with government (sometimes) later ‘catching up’ and providing these services.

One influential approach arose from action planning and proposed the development of strategic structure plans focused on guiding urban infrastructure development in combination with multi-sectoral investment planning (MSIP). This approach departs from master planning both in the methodology used for spatial planning, and in the strong link to planning for infrastructure investment. In contrast to master planning which did not focus on financial and institutional aspects, and did not have an emphasis on implementation, the intention here is to move towards integrated investment packages for infrastructure linked to broader planning processes. Considerable attention is also paid to institutional and capacity issues, and community consultation is included in the process. MSIP is preceded by a Physical and Environmental Development Plan (PEDP) which includes a rapid analysis of key spatial and environmental profiles, problems and trends, and then develops scenarios and strategy, and a broad spatial framework for urban development. A long-term view is developed, coupled with a shorter five year action plan, which links to the MSIP. The PEDP provides a phased programme for expansion of the city. This approach excludes detailed land use and zoning, and operates at a broad level associated with structure planning, but with a focus on infrastructure development. 176 Planning for infrastructure needs is linked to the spatial plan, so that the multi-sectoral plan includes the location, timing and type of infrastructure development. The intention of spatial planning in this context is to help to manage urban growth, in particular through improving the co-ordination of the supply of infrastructure and facilities in time and space.

The approach was supported by several international agencies, including the UN-Habitat and the German aid agency, GTZ, and was applied in Indonesia (Integrated Urban Infrastructure Development Planning), Nepal and India in the 1990s. In Indonesia and Nepal, where evaluations were conducted in the late 1990s 177, the impact of spatial planning was far less than anticipated. While spatial plans produced were for the most part consistent with

172 Ibid.
174 Singh and Steinberg, 1996, p.17.
175 Archer, 1996
176 Singh and Steinberg, 1996.
177 Mattingly and Winarso, 2000; Mattingly, 2001. See also Box 7 in Ansari, 2008.
intentions (or overlaid other plans), there were limits to the way these were used and how they intersected with infrastructure planning. In Nepal, investment plans tended to be seen in a static way, rather than requiring annual revision as intended. In Indonesia, plans were seen as the responsibility of central government and were not integrated into municipal planning. At the same time, central government agencies did not properly participate in planning, nor follow its recommendations. Projects were often assessed on the basis of financial issues, and locational questions and broader impacts were ignored. Difficulties with land acquisition impeded planned projects. Despite the participatory process, priorities did not necessarily follow the plan; projects favoured by the elite were supported, whether or not they were part of the plan, and decisions on priorities were made on a political basis. As a consequence of extensive service backlogs, there was a tendency to focus spending in addressing backlogs, rather than anticipating future development\textsuperscript{178}, negating the significance of the plan. Similar problems occurred in Nepal\textsuperscript{179}.

Despite these difficulties, the approach is still seen as valuable by its proponents. The methodology for developing a spatial plan has proved to be robust, and is now the basis for more widespread training on developing alternatives to master planning\textsuperscript{180}. The spatial plan itself and its value is also seen in a different way. Recognising that it is unrealistic to expect spatial plans to replace political decision-making, or to expect a simple movement from plan to implementation, it is argued that the plan nevertheless can be brought into decision-making at various stages. It is not therefore conceived as a single driver or a static plan, but rather provides information and approaches which can be used throughout the development process\textsuperscript{181}. Similar conclusions arise from initiatives to link spatial planning to infrastructure planning in Durban, as Box 10 shows.

\textbf{8.6.4. Strategic Structure Planning}

The idea of strategic structure planning has been used in several projects undertaken by the UN-Habitat in post-disaster, post-conflict and other areas\textsuperscript{182}. These plans provide an integrative framework and a long-term vision of development, based on analysis and engagement with stakeholders and communities, but also a focus on key strategic projects to address immediate problems. Enabling conditions to facilitate long-term success are addressed. This kind of planning does not only focus on infrastructure: rather it deals with problems in a multi-faceted way, but will generally also include infrastructure development and service delivery within localised projects. Planning in post-conflict Somalia is outlined in Box 9.

\textsuperscript{178} Mattingly and Winarso, 2000.
\textsuperscript{179} Ansari, 2008
\textsuperscript{180} Mattingly, 2001.
\textsuperscript{181} Ibid.
\textsuperscript{182} UN Habitat, undated b.
Box 9. Strategic Structure Planning in Somalia

In Somalia, planning was used to locate and develop settlements for displaced people around four towns. Instead of the common approach of locating settlements at some distance from towns, UN-Habitat’s planning followed urban compaction ideas and acquired well located land close to town, accessible to economic opportunities. Planning clarified the growth potential of the towns, and looked at how land for vulnerable groups could be set aside. In Bossaso, some five parcels of land to house 50 families each were acquired close to town. Basic services and security of tenure, enabling housing upgrading, were provided. Processes such as the redevelopment of a central markets area to improve conditions for informal traders have also been undertaken. These approaches combine detailed stakeholder negotiation with spatial planning and design.

Similarly the Dar es Salaam Strategic Urban Development Planning Framework combined stakeholder participation with spatial analysis, issue assessment and developed a framework for urban expansion, an identification of prioritised areas for redevelopment, densification and investment, as well as a set of environmental concerns to be addressed. Action plans focused on immediate strategic issues to be addressed.

8.6.5. Linking Spatial Planning to Infrastructure Planning

The idea of integrated urban infrastructure development was influential in the formulation of South Africa’s Integrated Development Plans (IDPs), strategic municipal plans intended to provide a five year development plan and programme of action for both the municipality and other agencies operating in the area. Spatial development frameworks, which provide the spatial component of IDPs, are also cast as broad ranging strategic spatial visions. In reaction to critiques of master planning and blueprint planning, they have tended to focus on indicating the main areas for growth and development, the major ‘corridors and nodes’ which are intended to structure the city, major areas for intervention, and spaces for conservation. Compact city ideas have been influential, with the intention to concentrate development around nodes and corridors, and to contain growth, often through the use of an urban edge.

While the expectation was that these spatial frameworks should give direction to infrastructure planning and to low cost housing development sponsored by government (with the intention of integrating it into the city), spatial frameworks have not been effective in doing so. In part, housing policy has tended to encourage detached units in peripheral locations, in contradiction to plans, and transport policy has not been able to give effect to public transport systems supporting corridors. Although spatial frameworks avoided the detailed land use zoning associated with master planning, this nevertheless exists — in many cases untransformed since the apartheid era. Decisions on site level developments — often dominated by the demands of the market, and in many cases in contradiction to spatial plans — exerts a powerful influence on spatial form. Housing and private developments have tended to lead, while infrastructure development and spatial planning have followed. Spatial planning has also been too broad and conceptual to give direction to infrastructure planning.

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183 Decorte, undated c.
184 Decorte, undated b.
185 UN-Habitat, undated c.
which has taken its cues elsewhere. Box 10 presents the example of Durban, which demonstrates these points, but also points to new initiatives to link spatial planning and infrastructure.\footnote{Other South African cities have also begun to bring together spatial planning and planning for infrastructure development. As was the case in Durban, the initial post-apartheid spatial framework for the city did not engage with infrastructural development, even to the extent that the capacity to support various recommendations in the plan (such as densification) was not tested. As in Durban, piecemeal private sector development has tended to drive infrastructure and spatial development. Recently however, the City of Cape Town has begun to explore various future spatial growth options, centred on where and how infrastructure can and should be provided, and its timing (Walker, 2008). The intention is that decisions arising from the spatial plan and from the infrastructural decisions linked to it, then drive development. It is recognised that this requires extensive engagement and the forging of a common vision with various stakeholders, including other spheres of government and the private sector (Walker, 2008). In Johannesburg, an energy crisis and infrastructural deficits are resulting in a shift away from a fairly laissez faire developer driven approach to a growth management strategy which links development intensities in various areas to infrastructural capacity and the way particular areas are seen within the spatial framework. ABRT forms a central element of this plan.}
Under apartheid, the Greater Durban Metropolitan area was run by fragmented and racially based local government. The city was divided on racial lines, and low income African people were forced to commute long distances from peripheral locations to more centrally located areas of employment. In the post-apartheid period after 1994, the region was consolidated under a single municipality, eThekwini, through two phases of local government reorganisation, and a spatial framework intended to achieve ‘compact’ ‘integrated’ development was put in place.

However development trends did not follow the spatial framework and patterns of relatively low density urban sprawl and the peripheral location of the urban poor continued. Significant growth has occurred in the northern area of the city, driven in part by large landowners in the area and by the provincial government which is developing a new airport there. This growth is largely taking the form of upmarket development of gated communities, shopping and office development, with little provision for the urban poor. Some of this development is the consequence of earlier divided local government, but it also the result of a concern to support economic growth. In addition, the housing subsidy system has made it difficult to support the development of low cost housing in areas where land costs are high. The spatial framework was largely ignored in decision-making on land development applications, and was too broad to provide a basis for infrastructure planning. Instead, a developer led approach predominated.

In recent years however the limits of earlier spatial planning have been recognised, and there are initiatives to link infrastructure planning and spatial planning more closely. GIS and urban modelling has been used to highlight key interrelationships between forms of urban development and infrastructure costs, and to feed into decision-making. A set of scenarios were developed to model the impacts of various spatial development patterns on the requirements for infrastructure and its cost, as well as to identify key patterns. This assisted in choices over long-term development directions. A cost surface model was developed to predict the cost of providing bulk services to new housing developments, highlighting the costs of peripheral location, and enabling arguments for greater expenditure on development in better located areas. An accessibility model was used to assess the need for facilities in new housing developments. These models have not determined development directions. Rather they are an input into development decision-making, and by presenting information and choices in a clear way, they allow more informed discussion between various groups of officials, and between councillors and communities. These approaches have suggested the value of the use of harder data and GIS based models, but they also point to the need for a clear long-term spatial development vision, based on engagement and agreement between various stakeholders, councillors and officials, and amongst municipal departments.

188 Source: Breetzke, 2008
8.6.6. Linking Mega-Projects and Major Infrastructural Developments to Spatial Planning

Finally, it is critical to link mega-projects and major infrastructural developments to spatial planning. Previous sections have showed how these are often contrary to spatial plans and are frequently contributing to fragmented and sprawling developments. Plaine Saint Denis in Paris, discussed in Box 11, provides a positive example where a major regeneration initiative worked with spatial planning and was consistent with its ideas.
Box 11. Linking Mega-Project Development to Spatial Planning: Plaine Saint Dennis, Paris

Plaine Saint Dennis is an area north of Paris, located on the axis linking the metropolitan centre to the Roissy-Charles de Gaulle International Airport. Between 1840 and 1960 it had been one of Europe’s largest industrial zones, and provided some 50,000 jobs in 1940. However industrial restructuring in the 1970s affected the area badly, and by 1990, the number of jobs had fallen to 27,000.

Urban regeneration began as a partnership between the three local authorities in the area, which set up an urban project to regenerate the area. The project envisaged the development of a multi-functional, and diverse area, housing a range of groups of people, consistent with broader ideas about sustainable development in Paris. Some 23,000 jobs and 10,000 dwelling units were to be established. This vision of a ‘city for all’ — an intense mixed use, pedestrian oriented city — focused on maintaining industrial activities and low income households in the heart of the Paris region, while creating new development around a network of transport and social infrastructure in the broader region.

The project developed slowly at first, but picked up momentum with several rounds of development. In the early 1990s, the Regional Structure Plan designated the area as an ‘urban redevelopment centre’, giving it priority for investment in infrastructure. The location of the 1998 Soccer World Cup gave the area a further boost, and drew private developers into the area. In contrast to many other examples of urban redevelopment associated with event tourism, the developments associated with the World Cup were consistent with the planning and vision for the area. Private sector development has accelerated in what was once a depressed area, but has not displaced business and local residents. The area has become an important location for a range of new economic activities, and is seen as a strategic area for development within the region. Nevertheless, there are some mismatches between local skills and jobs, and old and new residents. Housing renovation and environmental improvement in some area is still wanting.

On the whole, however, Plaine Saint Dennis represents a successful regeneration initiative. Links here have not been simple. Rather than a single large flagship project, the development of the area evolved over time, using various instruments, and linked to both broader strategic planning processes and to opportunities created by event led development, but always with the idea of supporting the planning intentions for the area. These intersections allowed the area to become a priority for infrastructural investment. Importantly, the success of the development is linked to the building of cooperation between levels of government, different parts of the public sector, various private sector interests and local communities.

8.6.7. Conclusion

Thus there are several initiatives to link spatial planning and infrastructure planning and development — both at a larger scale and at the level of specific projects. Infrastructure

Source: Lecroart, 2008
development is potentially a strong lever for shaping the spatial growth of cities, but unfortunately, linkages are often weak, even around transport and land use planning, which as has been shown, has strong interactions. Some initiatives to link spatial planning and infrastructure planning have confronted similar problems to master planning — lack of implementation due to the politics of prioritisation, and an overly comprehensive agenda. The importance of a strongly participatory approach and buy-in by stakeholders, including various infrastructural departments within the public sector is underlined by these experiences.

8.7. Concluding Remarks and Lessons for Policy

This chapter has shown the role of infrastructure and the way it intersects with a range of social, political and economic dynamics to shape the spatial structure of cities, and their impact on access and inclusion. The unbundling of urban development, and a weakened role for the public sector and for planning, has in part underpinned strong trends towards socio-spatial polarisation and growing urban sprawl. Yet there is a growing recognition of the problems associated with these patterns, and a search for new approaches to spatial planning that link more closely with infrastructure development in this context.

Planning has important roles to play in managing urban growth and in creating more inclusive cities and spaces. At a local scale, planning should recognise the diversity of needs in an area and create environments offering a range of services, facilities and amenities which meet these needs, and which support the livelihoods of the urban poor. The significance of pedestrian movement, particularly for lower income groups, also requires recognition. Understanding these needs requires analysis of diversity, including, inter alia, gender, disability, and age, and a strongly participatory approach. The chapter has highlighted some examples of this kind of planning.

Studies of international urban growth show the massive expansion in the spatial footprint of cities over the past decades, and suggest that these trends can be expected to continue. Attempts to develop more compact urban forms have some contribution to managing this growth: the importance of inner city development; the usefulness of some smart growth principles; the role of TOD and related systems, have been noted. Planning should seek to promote compaction in ways that are appropriate to the local context. Yet most future development is likely to continue to involve further expansion on the periphery. If planning is to be effective, it must seek ways to direct, support and structure this growth, and to reinforce informal processes of upgrading and consolidation. Enabling the expansion of economic activity and of the livelihoods of the poor, and improving infrastructure, services and facilities on the periphery is also important.

Linking spatial planning to infrastructure development is critical in this context. Analysts point to the need for the public sector to provide the main routes and infrastructure trunk lines in advance of development, allowing the private sector, non-governmental organisations, other agencies and communities to connect to these main lines as they are able. One study suggests that if the public sector cannot afford to pay for infrastructure, they should

190 Angel et al, 2005.
191 Ibid., Archer, 1996.
192 Where project finance is available for communities to undertake development projects, support around project preparation (such as feasibility studies, basic planning, land availability, business plan) can help to bridge the gap between planning and implementation. The Project Preparation Trust, a South African non-governmental organisation, has developed successful methodologies for a range of development projects.
193 Angel et al, 2005.
purchase rights of way to enable later infrastructure improvements. Clearly, what is possible varies across contexts: in many countries, much more ambitious planning is feasible, and strategic spatial plans linking to infrastructure development might, for example, promote more compact forms of urban expansion focused around public transport, and attempt to improve urban services, environmental conditions, economic opportunities and livelihoods on the existing urban periphery as well as in relation to new development. Linking major infrastructure investment projects and mega-projects to strategic planning is also critical, but the real prospects for doing so are likely to vary considerably.

Planning of this sort will require a good understanding of trends, development directions and market forces, but it will also need to be based on collaborative processes that draw together various public sector agencies and departments with a range of other stakeholders from civil society and business. Developing a common spatial vision of development, and a common discourse or storyline, is important to these processes, but it is unlikely that planning of this sort will be a single event. Rather, the examples of Durban (Box10) and Plaine Saint Dennis (Box11) point to iterative processes building on agreements, past developments or bringing to bear new information and approaches. Harder analytical, modelling and GIS based approaches may be useful in this context, as a feed into discussion and decision-making, but are unlikely on their own to determine outcomes.

In many cities, growth is occurring across municipal boundaries, and regional structures will often be required to manage growth, and to develop appropriate planning strategies. Spatial planning in these contexts should provide a framework for the co-ordination of urban policies and major projects, and a space for public discourse on these issues. Planning of this sort is likely to be challenging since institutions which may have conflicting interests and agendas have to be brought together. The prospects for developing this sort of co-ordinated approach is likely to be highly contextual, and will depend as much on planners’ strategic and negotiating abilities as their technical skills.

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