Recent morphological trends in metropolitan South Africa

INTRODUCTION
The degree to which the centrifugal and centripetal effects of market forces on the prices and availability of land for urban development are limited or allowed to flourish in urban policy, remains an important factor in determining the evolvement of urban form. Based on the outcome of these forces on urban form, two opposing schools of thought have developed over time: those that believe market forces should be allowed to play an important role in determining the shape and tempo of urban development and those in favour of the densification of cities through strong intervention. Both these approaches hold different but equally important advantages. Proponents of market driven urban development generally find their inspiration in neoliberal thinking. They believe that:

- Urban deconcentration is a spontaneous economic and social outcome, a process in which freedom of choice as a human rights principle becomes a determining factor in locational choice.
- Despite economic integration and densification, compact cities do not necessarily lead to savings in travel time because people still cannot necessarily find employment close to home. Whether people travel by car or make use of public transport, even dense cities can be large, resulting in long commuting times.
- Compact cities with high levels of mixed land use do not make public transport necessarily more viable or cheaper. Public transportation services are only viable and sustainable when exceeding a minimum threshold of commuters between popular origins and destinations. The ideal outcome is a corridor-like concentration of businesses in urban economic space. Fundamentally, urban densification and residential-business integration (the spreading of businesses amongst residential areas) could potentially undermine the economic viability of public transportation provision.
- Using public transport to destinations other than those close to public transport service lines makes travel between home and work equally time-consuming. People using public transport therefore could become more exposed to adverse climatic conditions.
- The implementation of a compact city approach can lead to increased consumption of open spaces in cities, especially agricultural land. Protecting sensitive habitats and pristine agricultural land through designated conservation areas within the existing urban structure whilst relaxing / expanding the urban edges in areas of low agricultural value can be viewed as a more pragmatic urban development approach under certain circumstances.
- Compact cities can reduce living space in and around places of residence and employment and lead to negative psychologically impacts, especially children.
- The financial and environmental costs of upgrading and maintaining existing infrastructure in city centres and established neighbourhoods when cities are densified far outweigh the claimed advantages of compact cities (Ashworth, 2005; Barter, 2000; Bruegmann, 2005; Breheny, 1995, 1997; Garreau, 1991; Gordon and Richardson, 1997; Hall, 2001; Jenks, et al., 1996; Staley, 1999, and many others).

According to this school of thought compact cities could inhibit large scale commercial and industrial development because the land requirements of many businesses are not affordable at inner-city locations, or find locations that they are forced to consider, uneconomical. The large numbers of ap-
Applications for development outside cities with urban edges that are routinely turned down, confirm this.

‘Centrists’ present counter arguments. Usually having a new-Marxist leaning they believe urban growth trends of the past should be transformed into compact and socially and economically integrated post-modern urban environments. For them factors such as the carbon footprint of cities, influence by factors such as commuting times, the conservation of agricultural land and growing social and economic inequalities are key in explaining why cities should be integrated and densified. They believe that compact, integrated, multicultural communities where people of different backgrounds, social standing, and income live side-by-side – and close to their potential places of work – would create an improved urban environment. It is argued that this would lead to greater economic equality; less vehicle use; less time spent on the road; savings in energy; less carbon dioxide emissions; savings on infrastructure provision; integrated, interesting and more livable cities; and the preservation of agricultural land (Adams and Watkins, 2002; American Planning Association, 1998; Bontje, 2003; Headicar, 2003; Mieszkowski, 1993; Newman and Kenworthy, 1998; 2000; Smart Growth, 2008, and many others).

This paper seeks to evaluate recent morphological trends in South African cities against the background of these two schools of thinking. A broad overview of population growth and redistribution patterns in South Africa at a national level over the past decade is provided in the first section. This is followed by a discussion of the spatial planning context in South Africa in the post-1994 era, with a specific focus on three of the metropolitan areas in South Africa: Cape Town, Gauteng (including Johannesburg, Tshwane and Ekurhuleni) and eThekwini (Durban). The final section provides an overview of the structure and growth patterns of the main components of the urban fabric of these three areas.

NATIONAL MIGRATION TRENDS

Despite the impact of apartheid based policies such as influx control measures, urbanisation – as opposed to polarization reversal and counterurbanisation – has been the dominant migration trend in the country for many years. Looking at population redistribution trends since the end of apartheid – the time horizon of this study – it is clear that large numbers of people were still moving from rural to urban areas. Especially black people who were trapped in Bantustans and who became redundant in commercial farming areas, moved to cities. It may therefore seem as if urbanisation is still the main migration trend in the country but although this may have been true for the first few years after the end of apartheid, indications are that South Africa is currently approaching the polarization reversal stage of urban development. Studies of earlier migration trends showed that the country may already have approached, even entered, the polarization reversal phase by the mid-1980s (Geyer, 2003).

From 1996 to 2007, regional centres, intermediate sized cities and the metropolitan areas have shown the largest overall population gain (Figure 1). However, when comparing the redistribution patterns of the white (Figure 2) and black populations (Figure 3), interesting differences come to light. The white population increased most significantly in cities but their migration to metros and intermediate-sized cities was more selective than the black population. Cape Town, Johannesburg and Pretoria (Tshwane) gained population, whilst Durban (eThekwini) and Buffalo City (the former East
London) experienced a decrease in white population between 1996 and 2007. Whites have also been targeting destinations adjacent to the Gauteng and Cape Town metropolitan areas (although the black population also increased significantly in these areas). These trends may be an indication of local deconcentration but further investigations into this matter are needed to confirm this position\(^1\). The same trends were observed in the United States when the country’s urban system entered the counterurbanisation phase of development during the 1970s (Gordon, 1979). Although the United States had entered counterurbanisation and cities in the deep peripheral areas were gaining population whilst the growth rates of large metropolitan areas were tapering off or declining, centres closest to the major metropolitan areas (especially satellite cities) gained population faster than their counterparts in the periphery. Indications are that the same is happening in South Africa. In contrast to the deconcentration tendencies of the whites adjacent to the Cape Town and Gauteng metropolitan areas, the increase in the black population in areas around the metros may be more the result of step-wise migration from rural areas to the cities than deliberate deconcentration.

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\(^1\) Some of the growth of satellite cities during the study period may be due to people in the metros moving out, but it could also be caused by people moving from rural areas directly to satellite cities. Both streams represent the same trend.
Figure 3 Redistribution of the black population, 1996-2007

METROPOLITAN DEVELOPMENT TRENDS
Before the urban growth patterns in the three major metropolitan areas of South Africa are discussed, the spatial policies and planning instruments of the various spheres of government that were intended to guide urban structure will be outlined first.

The metropolitan policy and planning framework
During the apartheid era spatial planning at an urban scale was characterised by forced removals based on racial lines, and the development of large-scale new townships at peripheral locations (areas such as Khayelitsha in Cape Town and Orange Farm in Johannesburg). Strategic spatial planning in this era mainly took the form of ‘guide plans’ and ‘structure plans’ to manage the overall growth of urban areas.

The initial phase of the democratic era between 1994 and 1996 was dominated by the Reconstruction and Development Programme (RDP) that focused on investment in infrastructure and basic services to address inequalities resulting from the apartheid era and introduced spatial planning concepts such as the “densification and unification of the urban fabric” (Republic of South Africa, 1994:86). One of the first attempts to influence spatial planning after 1994 has been the introduction of the Development Facilitation Act (Republic of South Africa, 1995) which laid down a set of general principles governing land development throughout the Republic aimed at addressing some of the challenges of urban form of South African cities and towns. It introduced the concept of “land development objectives” to influence urban and rural growth and form in the areas of jurisdiction of municipalities. This was followed by the subsequent entrenchment of the Integrated Development Planning process (which includes the requirement for a spatial development framework) through the promulgation of the Local Government: Municipal Planning and Performance Management Regulations in 2001 (Republic of South Africa, 2001). The introduction of first the Growth, Employment and Redistribution (GEAR) programme between 1996 and 1998, and later the announcement of ASGISA in 2006 (Republic of South Africa, 2006) saw some change in focus at a national level aimed at creating macro economic stability in support of a competitive and fast growing economy. It also introduced
the concept of economic growth and competitiveness of cities. This interplay between the need and motivation for economic growth and competitiveness on the one hand and for socio-economic and spatial redress on the other has been one of the key tension points in spatial planning in South Africa over the last decade.

In the post 1994 context, government expressed clear objectives to address the inequalities and inefficiencies of the inherited space economy and to develop more productive and sustainable cities. This included a more compact, higher density urban form, mixed land uses and integrated transport and spatial planning decisions (Turok and Parnell, 2009). Concepts to spatially integrate settlements through compaction and densification was strongly influenced by Dewar & Uyttenboogaardt’s, *South African Cities: A Manifesto for Change* (1991) in which they argued that many of the problems with South African settlements can be addressed through the concepts of compaction and densification to achieve spatial integration.

The National Urban Development Framework (NUDF) also identified improved urban form and sustainability as one of its outcomes. This outcome is seen to be achieved by measures that will promote greater urban integration and densification, (particularly along the major transport corridors); greater access and mobility through improved public transportation and new mobility technologies, and greater resource efficiency and sustainability (Republic of South Africa, 2009:37). These concepts are further elaborated in the 2010 guidelines for the formulation of spatial development frameworks (Republic of South Africa, 2010) which include a set of good principles for spatial planning. These include, amongst others, socio-economic and functional integration, efficient urban structure, compaction and densification, and a framework for promoting sustainability. The principle of efficient urban structure is primarily seen to be achieved through appropriate densification (guided by density targets) and the limitation of the lateral growth of settlements through the use of an urban edge (Republic of South Africa, 2010:15). These concepts thus became entrenched in the South African spatial planning policy since the early 1990’s, and can be viewed as the overarching South African approach to urban spatial development.

The guidelines for the formulation of spatial development frameworks also introduced a hierarchical system of spatial planning which allows for the development of increasingly detailed, but aligned planning. It makes provision for metropolitan or district level SDF’s, sub-metropolitan plans or local municipal SDF’s, and sectoral or sub-area plans, depending on the nature and complexity of the municipality (Republic of South Africa, 2010:5). This resulted in a hierarchical system of planning allowing for increasingly detailed plans at lower levels of spatial aggregation now adopted by most of the metropolitan areas (eg. Johanneburg, Cape Town, Tshwane, Ekurhuleni and eThekwini). The municipal Spatial Development Frameworks (SDF) also plays a critical role in integrating and aligning different elements of national policies such as the National Spatial Development Perspective, as well as provincial policies such as the Provincial Growth and Development Strategies (PGDSs) and the Provincial Spatial Development Frameworks (PSDFs).

In the Cape Town metropolitan area, the process of preparing the SDF was initiated in 2005 when the city reviewed the successes and failures of the previous interim MSDF. The SDF process subsequently involved an extensive public engagement process from 2008 to 2010 and culminated in a final SDF approved during 2011. Based on the drivers of urban growth in Cape Town and their spatial implications, the SDF identified three key implementation strategies. These are planning for employment and improved access to economic opportunities, creating a balance between urban devel-
opment and environmental protection, and building an inclusive, integrated, vibrant city (City of Cape Town, 2010). One of the fundamental structuring elements to give effect to these strategies is areas of land use intensification. The spatial organisation of development in the areas of land use intensification is proposed to take on a variety of forms, including development corridors, strip development, urban nodes and civic precincts. One of the instruments to manage the spatial growth of the city is the use of development edges, and the identification of the future growth direction of the city. A combination of the various spatial structuring elements and development strategies provided the building blocks for the conceptual spatial framework which is a 50-year growth vision showing the envisaged long-term spatial structure for Cape Town.

Figure 4: Cape Town 50 year conceptual framework

Figure 5: Cape Town SDF (2011)

The province of Gauteng consists of the three metropolitan municipalities of Johannesburg, Tshwane (Pretoria) and Ekurhuleni (East Rand), as well as the two district municipalities of Sedibeng and the West Rand. All three the metropolitan municipalities adopted a hierarchical system of spatial plans. In Johannesburg this consists of the metropolitan level SDF and seven regional spatial development frameworks, in Tshwane the metropolitan level spatial development strategy supported by four regional SDF’s, and in Ekurhuleni the metropolitan SDF and three regional SDF’s. A composite assembly of the SDF’s of these three metropolitan municipalities and those of the two Districts however do not provide a compelling overall spatial development framework for Gauteng (see Figure 6).
The Department of Economic Development of Gauteng thus embarked on a project to develop a long-term development plan for Gauteng province during 2008. The purpose of this initiative was to compile an overarching provincial spatial development framework around which policy, infrastructural investment, economic and social programmes, urban management, public transport and various subsidies could be harmonized (Gauteng Department of Economic Development, 2010:11). The overall outcomes of the GSDF is, amongst others, focused on integration of the apartheid fragments; safe, affordable and sustainable public transport; proximity to, or easy and affordable access to quality open space and social and cultural facilities; shared, sustainable and inclusive economic growth; and protection and enhancement of the natural environment. Important concepts and policy positions in support of the implementation of the GSDF includes imposing an urban edge on the expansion of the Gauteng City Region, a densification policy for lower density residential townships and suburbs, harmonization of housing provision and subsidies within the wider urban system, an improved public transportation system, and implementation of the principles of sustainable development. The spatial manifestation of these concepts is illustrated in Figure 7.
The spatial planning system and products in the eThekwini metropolitan municipality includes an overall municipal level SDF supported by four regional SDF’s for each of the four functional planning regions. Key concepts embedded in the metropolitan SDF includes an Urban Development Line (UDL) to indicate the outer limit to which urban development will be restricted, areas for economic investment and regeneration, mixed use and infill development, and the introduction of a high priority public transport network supported by the densification along routes either within the urban core or distinct investment corridors.
**Metropolitan redistribution patterns**

The policy framework referred to above has to be interpreted within the framework of the overall urban structure and recent morphological trends of the three metropolitan areas. This section provides an overview of the structure and growth patterns of the main components of the urban fabric of the cities. The analysis is based on a spatial dataset produced by GeoTerraImage which describes the distribution of land-use patterns in the three cities for different periods: for Cape Town from 2002 to 2007; for larger Johannesburg and Pretoria (the central and northern parts of Gauteng) from 2004 to 2007, and for the larger Durban metropolitan area (eThekwini) from 1999 to 2007. The basic dataset consists of vector-based polygons with associated attribute information. The land use data was captured from the most up-to-date digital, ortho-corrected aerial photography and/or high resolution ortho-rectified satellite images that were available and accessible. Fieldwork teams were also used to visit and verify certain classes of information. The different land-use features were mapped using image interpretation and remote sensing techniques. The results portrayed in this section are based on this basic dataset and for representation purposes was aggregated into a more generalised set of thematic maps.

This analysis specifically focused on three categories of the residential component (formal housing on individual stands, cluster housing and informal housing) and commercial land uses. This classification is based on the visual and physical characteristics of the area and does not reflect the legal status of the various housing categories in terms of planning and other statutory processes. It can however be reasonably postulated that the formal and cluster housing categories will almost certainly consist of formally planned and proclaimed developments, mostly characterized by medium and higher income groups. Informal housing would normally refer to settlements that have not been subjected to a formal statutory process.

The spatial distribution of the various housing types for the different metropolitan areas over the past half-decade or so, reveals a number of very distinctive spatial characteristics.

**Cape Town**

Since 2002, most formal and cluster housing development in the Cape Town metropolitan areas occurred in the northern and north eastern suburbs, the southern suburbs, and the extreme south eastern parts of the metropolitan area (Somerset West-Strand area) (Figures 9A and C). Informal housing is mainly associated with the newer low income areas in the south eastern parts of the city (Figure 9E). However, more recently, informal housing showed considerable growth in other former higher income areas of the city (Figure 9F). These include informal settlements in the Table View area in the north, the north eastern suburbs, the southern suburbs, and even on the Atlantic seaboard.

The recent growth patterns for the various types of housing over the period 2002 to 2007 reveals clearly defined spatial patterns for the different categories (Figure 9B, D and F). It shows that, despite the focus and investments of the metropolitan government on the inner city areas the vast majority of formal housing development (on individual stands) took place at peripheral locations in close proximity to the defined urban edge. The notable exception to this trend is the large scale developments in the south eastern suburbs. The growth trends of cluster housing development is very similar to those of formal housing with an even more acute concentration in close proximity to the urban
edge, especially in the north eastern parts as well as along the west coast. From these development trends it can be inferred that formal and cluster housing development is likely to continue on the fringes of the metropolis. This will exert significant pressure on the land within the urban edge and ultimately outside the urban edge. The most extensive recent growth of informal housing took place in the north eastern and south eastern suburbs.

The spatial distribution of commercial activities was historically mainly structured in and around the central city area and along two main transport corridors (see Figure 9G). These include a corridor broadly structured around the N1 and Voortrekker Road connecting the Cape Town and Bellville CBDs, and a southern corridor along Main Road. Although the largest concentration of commercial activities are found in the CBD, the commercial development pattern over the period 2002-2007 shows clear signs of decentralisation giving rise to a polycentric city structure.

Prominent new commercial development nodes have emerged in recent years in the northern parts of the city as well as in south east in the Somerset West area. Although much smaller in extent, new nodes are also emerging in the lower income areas in the central-east and central-south. The location and extent of these new commercial development nodes appear to be strongly influenced by high levels of accessibility and visibility at major transport intersections, as well as the concentration and growth of disposable income, especially in the northern parts of the city.

Figure 9 Spatial development patterns in Cape Town, 2002-2007

Pretoria and the Greater Johannesburg area in Gauteng

Similar trends to those observed in the Cape Town area are also prevalent in Gauteng. In Pretoria (Tshwane) formal housing is concentrated in the northern, eastern and southern parts of the city while cluster housing is much more concentrated in the south east and southern parts. The largest concentrations on informal housing are found in the extreme northern parts of the metropolis. Signifi-
cant concentrations of informal housing also exist in the extreme eastern and western parts of the city.

In the greater Johannesburg metropolitan area (West Rand, Johannesburg and Ekurhuleni), the individual historical mining cities making up the larger metropolitan area traditionally developed around the Witwatersrand mining corridor. The corridor is clearly visible on the map showing the occurrence of formal housing in Figure 9A. Subsequently, formal housing spread out from Johannesburg to the north and the south. Large concentrations of cluster housing occur in the north east of the metropolis. Clusters of informal housing are mostly located in the extreme south-east, south-west north-east of the city.

According to the SDF of Gauteng for 2010, local authorities should focus on urban densification the inner city areas in the north (Pretoria) the centre (West Rand, Johannesburg and Ekurhuleni) and the south (the Vereeniging-Vanderbijlpark complex) as well as main transportation corridors linking those centres (Figure 7). However, despite these policy measures clear trends of urban de-concentration beyond the areas envisaged at this stage are visible on the maps showing the most recent residential developments in both metropolitan areas (Figure 10). In Tshwane (Pretoria) almost all recent formal, cluster and informal housing development occurred along the fringes of the city, close to the urban edge on the extreme northern, eastern, south eastern and western parts of the city. The same applies to the greater Johannesburg metropolitan area. Most formal housing development occurred along the northern and north-western fringe of the city, close to the urban edge, whilst lesser, yet still significant concentrations occurred in the eastern and south-western parts of the city.

As in the case of Cape Town, the areas of the most recent lower and higher density residential development correspond largely with concentrations of commercial development. This is a clear indication of path dependency – commercial development following residential development.
Greater Durban area (eThekwini)

Yet again, strong trends of deconcentration of residential and economic development are visible in eThekwini. Most of the historical formal and cluster housing development was originally focussed around the traditional Durban core area and gradually spread out and filled larger areas along the coast, south- and northward, as well as along the main routes leading inland. Most of the more recent developments occurred on the fringes of the city, especially the northern parts and the outer western region. These trends seem to be strongly influenced by the new emerging Umhlanga node in the northern parts of the city, and the location of the new international airport further north thereof.

Large concentrations of informal development existed along the fringe of the city by 1999. This was largely due to the location of historical apartheid based “self-governing homelands” and historical black townships developed at peripheral locations, as well as a lack of space to accommodate the large inflow of new migrants from rural areas to the metropolis after 1994. Technically, this development trend can therefore not be regarded as deconcentration since it could be assumed that most of these newcomers would have located inside the city if space were available.

Most of the historical commercial development was focussed around the traditional Durban core area and harbour and gradually spread along the main transport, with especially noteable concentrations at some of the important intersections of these routes. The more recent commercial developments since 1999 has predominantly been focussed in the new emerging nodes in the northern parts of the metropolitan area.
These development patterns clearly reveal a strong focus on decentralised nodes and along some major transport routes. A large proportion of new residential development took place in close proximity to the identified “Urban Development Line”. Only some of the nodes and corridors identified in the metropolitan spatial plans managed to attract a significant proportion of new development between 1999 and 2007.

Figure 11: Land use change in Durban


CONCLUSIONS
In this study population redistribution patterns in South Africa were studied at two levels: national and local. At the national level, population redistribution patterns can clearly be linked to the differential urbanisation model. The model suggests a long term inverted ‘U’ growth path of human settlement, starting with a dispersed rural population followed by a long period of urbanisation and increasing convergence and eventually ending again with impulses of divergence felt nation-wide when concentration forces start giving way to deconcentration forces at the end of the urbanisation phase (Geyer and Kontuly, 2008)\(^2\). In the process an urban system gradually evolved from an early development phase during which a large proportion of the population lived in rural areas served by rural settlements. Subsequently, cities that enjoy a broader range of locational advantages developed at a much faster rate. This brings about what is termed the urbanisation phase in differential urbanisation

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2 Trace elements of Kuznets’ (1955) and Williamson’s (1965) inverted ‘U’ economic models can be picked up in this evolving urban sequence.
(Geyer and Kontuly, 1993: Geyer, 1996). Through a process of decentralisation, the large metropolitan areas develop from monocentric into polycentric cities. Eventually the urban system reaches maturity when the growth rates of the largest polycentric metropolitan cities start tapering off and the urban agglomerations start losing migrants to satellite cities and the nearest intermediate-sized cities (onset of polarisation reversal). Intermediate sized cities now grow faster than the large metros and small towns. Eventually, polarisation reversal turns into full blast counterurbanisation when even smaller towns and cities in the deep periphery start to gain migrants from the larger urban centres.

Due to the inequalities created by apartheid, elements of all these phases of development are still visible in South Africa. Large numbers of people living in the former Bantustans still find themselves in early phases of development and remain trapped in those areas. Others are leaving and are migrating to the cities through step-wise migration. Larger towns, intermediate-sized cities and major metropolitan areas are targeted. Whites are more selective. They tend to concentrate in Gauteng and Cape Town, areas along the ‘garden route’ and isolated areas of development in the periphery. Although both population groups are growing strongly in some of the same locations, such as satellite cities near the large agglomerations of country, their movements seem to represent different phases of development – the one concentration, the other deconcentration.

Disaggregating residential and commercial development trends in the four main metropolitan areas of South Africa revealed some interesting trends. Despite clear signals sent by local governments of their desire to effect urban densification through their policy instruments, very little effective urban densification occurred in the targeted areas. People tend to vote with their feet. Literature has revealed many factors that could play a role in preferences of deconcentrated residential and business locations: Relatively high costs of urban densification through brownfield development due to clearing costs and delays and costs involved in upgrades of existing bulk services to accommodate higher density development; social and economic externalities linked to inner city locations; a clear desire of residential locations relatively close to (but not on) high order transportation routes which would facilitate changes in job locations without necessitating residential relocation; the desire of people to not only be close to nature but be able to see nature from home; commercial development close to residential development; and the footlooseness of industries in the post-industrial era. To what degree each of these factors play a role in the inner-city dynamics of the South African cities is a topic for another research project.

REFERENCES


