

## Sustainable cities – and how cities can contribute to sustainable development

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## Introduction

Sustainable development is the combining of two goals – meeting the needs of the present without compromising the ability of future generations to meet their needs.<sup>1</sup> Within an increasingly urbanized world, this requires the attention of both urban and regional governments to both these goals

Many city governments have made very considerable progress in addressing sustainable development goals – and this paper includes short case studies of some of these cities. Most of these cities seek to address local needs (responding to democratic pressures) and reduce the generation of polluting wastes. Most now include some attention to climate change – either adaptation (to build resilience to the risks climate change brings or exacerbates) or mitigation (to reduce greenhouse gas emissions) or increasingly, both. There is also a growing recognition of key roles for regional governments in most nations (including metropolitan governments for large urban agglomerations). This is to help coordinate or integrate plans and actions within adjacent local jurisdictions and to support actions that usually need a regional focus - for instance watershed management, disaster risk reduction, solid and liquid waste management and rural-urban linkages.

Over the last two decades, much of the innovation worldwide in regard to sustainable development has been by city or municipal governments – and much of this has been supported by (and sometimes driven by) local civil society organizations. As the city case studies show, many city governments have recognized the multiple linkages between a good quality-of-life, better solid and liquid waste management (including waste reduction) and resilience to climate change (see the Boxes on Rosario, Manizales, Durban, Freiburg and Copenhagen). Some city governments have also recognized and acted on linkages between better health and reduced greenhouse gas emissions – for instance in reducing greenhouse gas emissions from transport and in energy supplies that also reduce air pollution. Some have also recognized the economic potential as moving to sustainable development increases demand for a range of goods and services and thus also increases in employment (see the Boxes on Copenhagen, Freiburg and Durban).

So we have a growing number of cities that are exemplars of how localities can meet sustainable development goals. There has actually been more innovation in this driven by city governments than in policies of national governments. We can point to a range of cities that have a very high quality of life yet with relatively low impacts on the local ecology and on global systems. They include some that have set ambitious targets for reducing greenhouse gas emissions – see the boxes on Freiburg and Copenhagen as examples (although many other cities could be added to this – including New York). This is particularly notable in that these are all cities with elected governments and reducing greenhouse gas emissions brings no immediate benefit to city dwellers (even as it is absolutely fundamental to preventing dangerous climate change in the future). Mayors and city governments that have the trust of the electorate to whom they are accountable on meeting local needs and priorities seem also to have the capacity to generate support for acting on global issues such as climate change mitigation too.

But it is also possible to point to thousands of cities and tens of thousands of smaller urban centres where little or no progress has been made in regard to sustainable development – including urban centres where much of the population has unmet needs (for housing, water, sanitation, drainage, health care, schools and much else besides) or where greenhouse gas emissions are very high and continue to rise. Since cities and other urban areas concentrate most of the world's economy, most new investments, most demand for electricity and carbon based fuels and most people with high-consumption lifestyles, how urban centres develop in the next few decades in relation to their global ecological footprint has enormous implications for whether dangerous climate change is avoided.

## From Habitat I to Habitat II and III?

At Habitat I, the first UN Conference on Human Settlements, in Vancouver in 1976, 132 governments formally endorsed 64 Recommendations for National Action (as well as the Vancouver Declaration). Most of these still have relevance. These include recommendations on universal provision for “safe water supply and hygienic waste disposal” and on service provision to spontaneous settlements. With the benefit of hindsight, it is possible to point to two limitations. The first is the assumption that most of the recommendations would be implemented by government and with national government as the main driver of this. Here, little attention was paid to local government and civil society (although mention is made of the importance of community initiatives in upgrading spontaneous settlements). The second is the lack of attention to the impacts on global systems of an urbanizing planet. But the commitment of governments to the recommendations they endorsed in 1976 got lost in the political realignments of the 1980s. For most international agencies, development priorities were also focusing on rural development; in 1976, only 27% of the urban population of what the UN terms less developed regions lived in urban centres and there were only five mega-cities that had exceeded 10 million inhabitants. Also, the scale and nature of urban poverty was greatly under-estimated at this time.

At Habitat II in Istanbul in 1996, governments made many commitments that are similar to those at Habitat I. But here there was more recognition of the role of local governments; “... the actors who will determine success or failure in improving the human settlements condition are mostly found at the community level in the public, private and non-profit sectors. It is they, local authorities and other interested parties, who are on the front line in achieving the goals of Habitat II.”<sup>2</sup> There was a strong commitment to sustainable development – although with a lack of clarity as to what was meant by the term and surprisingly, very little attention to climate change. But in 1996, among most governments and international agencies, the importance of an urban agenda for ‘meeting the needs of the present without compromising the ability of future generations to meet their needs’ was still not recognized. Perhaps the most important exception to this was Agenda 21 that was endorsed by governments at the UN Conference on Environment and Development (‘the Earth Summit’) in Rio de Janeiro in 1992. This recognized the key role of local governments in sustainable development and included a special section on the importance of ‘local agenda 21s’ and what these should include.

Now preparations for Habitat III are underway, the recognition of the importance of cities and other urban centres for sustainable development is more evident. More than half the world’s population lives in urban areas – and close to half the population of the ‘less developed regions’ are in urban areas. There are now 29 mega-cities with 10 million+ inhabitants including eight with 20 million+ inhabitants.<sup>3</sup> Almost all the world’s population growth in the next two to three decades is projected to be in urban areas in what are currently low- and middle-income nations.<sup>4</sup> How this new urban population is housed has very large implications for whether needs are met and whether dangerous climate change is avoided.

There are signs that the pivotal role that urban centres have in whether or not sustainable development is achieved is getting greater recognition. But this has yet to translate into an understanding of the critical role of city and municipal governments in this. The new interest in cities also tends to focus on their importance for economic development and not for other critical goals. In relation to climate change and resource shortages, cities are still seen by many as ‘the problem.’ For instance, it is still common to see the claim that cities contribute 80 percent of all greenhouse gas emissions, despite the evidence to the contrary.<sup>5</sup> Most bilateral aid agencies have no urban policies and no contact with city governments. Global discussions about urban development within the UN system have long been directed by national government representatives.

But this is beginning to change. The Report of the High Level Panel set up by the UN Secretary General to advise on the post-2015 development agenda states that “*The post-2015 agenda must be relevant for urban dwellers. Cities are where the battle for sustainable development will be won or lost.*”<sup>6</sup> The draft Sustainable Development Goals (SDGs) that are now to be reviewed by the UN General Assembly include an urban goal: “Make cities and human settlements inclusive, safe, resilient and sustainable.”<sup>7</sup> This combination of inclusive, safe, resilient and sustainable is a useful summary of what needs to be achieved, although some clarification is needed in relation to what needs to be ‘sustainable’. The draft SDGs also include targets to ensure access for all to adequate, safe and affordable housing and basic services by 2030 and upgrade slums. The draft SDGs also makes many commitments to universal provision for basic services that in urban areas will require more competent, accountable and better resourced local governments. The 2014 GOLD III Report made clear the very large backlog in infrastructure and services that will have to be addressed if these goals are to be met. It also highlighted how most city governments have very little investment capacity even as so many of the roles and responsibilities for meeting the SDGs will fall on them.<sup>8</sup>

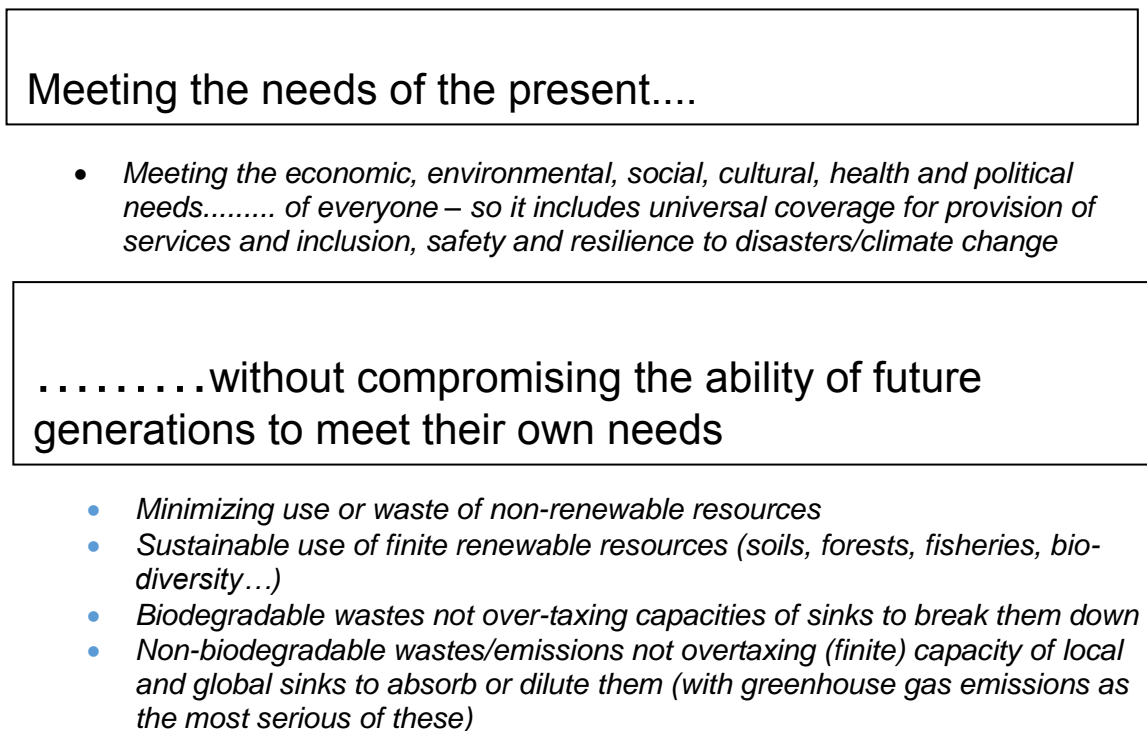
## Defining sustainable development

The core of sustainable development is the simultaneous achievement of two broad goals: meeting the needs of the present... without compromising the ability of future generations to meet their own needs.<sup>9</sup> Within the first of these fall all the measures to ensure that development reduces poverty and provides a high quality of life so it also includes all the draft SDG commitments to universal provision of services. It also obviously includes building resilience to disasters and climate change, as these are among the most pressing needs of the present. Most of the Millennium Development Goals (and many of the draft SDGs) are about meeting the needs of the present. Within the second of these broad goals are the measures needed to prevent resource depletion, environmental degradation and dangerous disruption to the planet’s climate (and many of the draft SDGs can be seen as sub-goals contributing to this). Figure 1 provides a summary of the two overarching goals of sustainable development and a range of sub-goals

These two goals that define sustainable development come from the 1987 Report *Our Common Future* by the World Commission on Environment and Development (also known as the Brundtland Commission). This in turn built on work undertaken during the 1970s on whether or how people’s needs could be met within local and global ecological limits.<sup>10</sup>

But the term sustainable development also came to be used by many different interest groups but with different meanings attached to it – and these meanings used to legitimate their operation or agenda.<sup>11</sup> Perhaps the most influential and pervasive of these was the appropriation of the term sustainable development by international agencies to mean measures to make their projects last – so the dam, bridge, and irrigation system or drainage network they had helped fund still operates a few years after its construction. These investments have no component that considers their impact on global ecology (or the needs of future generations) and usually has no component that considers local ecological disruption. Many are not directed at meeting needs. So they do not fulfil the goals of sustainable development. Then there are all the instances of businesses claiming to contribute to sustainable development, usually from some minor improvement in their resource use or waste generation. In addition, the terms sustainable development and sustainability are often used interchangeably. Terms such as sustainable cities or sustainable urbanization or urban sustainability are used but often with no clarity as to whether this is in the sense of ‘keeping going’ or in the sense of keeping intact the planetary resources and systems on which we all depend. An insightful OECD paper on ‘Building sustainable cities of all sizes’ did not specify what it means by sustainable cities – as if there was consensus as to what it meant.<sup>12</sup> Figure 1 contains the definition of sustainable development used in this paper.

Figure 1 : the two core goals of sustainable development and their components



## Every city and region needs to define its priorities, its starting point and its timetable

In most nations, much of what is needed to meet the twin goals of sustainable development in urban areas will fall to local and regional governments. So getting their commitment to these goals and supporting them in doing so is essential for their achievement. Whether knowingly or unknowingly, the commitments that national government representatives make or will make to the SDGs will depend heavily for their fulfilment on whether local governments commit to them and act on them. The examples of innovative cities mentioned in the introduction and elaborated in more detail below show how much competent and democratic city governments can contribute to sustainable development. It is also worth recalling the text from Agenda 21:

“Because so many of the problems and solutions being addressed by Agenda 21 have their roots in local activities, the participation and cooperation of local authorities will be a determining factor in fulfilling its objectives.... As the level of governance closest to the people, they play a vital role in educating, mobilizing and responding to the public to promote sustainable development.”<sup>13</sup> Local Agenda 21 also stated that each local authority should enter into a dialogue with its citizens, local organizations and private enterprises and adopt ‘a local Agenda 21. It is hoped that the SDGs will encourage and support local governments to also enter into such a dialogue and commit to their own local SDGs and to monitoring progress.

The draft SDGs contain good general goals – but developing targets and indicators will need to recognize the diversity of urban centres. This ranges from urban centres with a few thousand (or in some countries a few hundred) inhabitants to the 29 megacities mentioned earlier. It includes fast

growing cities and slow growing cities – and some cities with declining populations. It includes the world’s most successful locations for attracting new investments – and cities with declining economies. And of course, all cities and smaller urban centres are within particular political and geographic contexts. The risks facing any city or smaller urban centre from disasters or from the direct or indirect impacts of climate change are rooted in local contexts – the site, geography, climate, population, lay-out, economic base. The quality of local housing, infrastructure and services, the effective use of natural resources and alternative sources of energies, as well as land-use management and urban planning all influence an area’s resilience to these.

This means that government responses need to be as locally rooted as contexts and risks. As such, the quality of local government and its approach (local policies and initiatives), preparedness and accountability to its citizens and reaction to risk and those most at risk (including vulnerable groups) is vital. Successful climate change adaptation and disaster risk reduction (which include the ability for local government to change and adapt as risks and environmental challenges change) depend on local governments. For most urban centres and especially the larger cities, it also depends on their capacity to launch coordinated responses across many neighbouring jurisdictions. Metropolitan or regional governments also have importance for this – and for ensuring that rural issues and concerns get addressed in and around urban centres.

One way to bring out the differences in priorities is to consider the case of Dharavi, a large, dense informal settlement in Mumbai with around 400,000 inhabitants and an economy worth over \$400 million a year.<sup>14</sup> Box 1 lists a set of priorities that are important for ‘sustainable cities’. Dharavi performs very well in all these priorities: low greenhouse gas emissions (largely because consumption levels are so low but also because of high levels of waste recycling); prosperity and innovation (Dharavi businesses generate around US\$400 million a year), keeping resource use and waste to a minimum, very compact city (around 400,000 people living in 2 square kilometres), most trips by walking or bicycling and diets that are not energy/carbon intensive (including many vegetarians). The United Nations Population Division suggests that there will be more than 2 billion new urban dwellers by 2050. Where and how they live and what they consume will have very large implications for the achievement of sustainable development goals. But if this 2 billion new urban dwellers were housed in new Dharavis, it would be ecologically sustainable. In this Dharavi is a model eco-city. But judged by the first goal of sustainable development, meeting the needs of the present’ Dharavi does not perform well – for instance in the lack of provision for piped good quality water into people’s homes or provision for sanitation (estimates suggest 1,000 persons to each toilet) or provision for drainage (parts of Dharavi get flooded regularly) or provision for health care and schools – or in very high levels of overcrowding and many occupational health risks. Low consumption is also underpinned for many Dharavi residents by incomes too low to afford sufficient food. So one of the challenges is how to make cities and new city districts have the ecological performance of Dharavi but also with a high quality of life and adequate incomes for all.

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#### Box 1: Some criteria for judging a city’s sustainable development performance

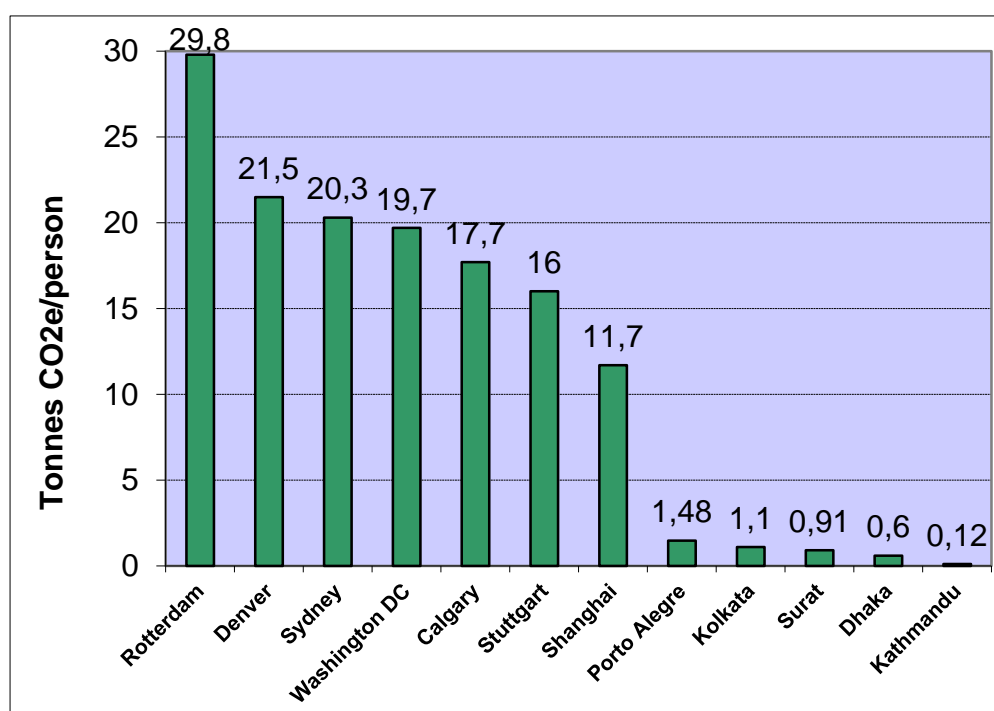
- Low and/or declining Greenhouse Gas Emissions
- Prosperity & innovation with low carbon footprints
- Keeping down resource use and waste
- Maximizing waste re-use & recycling
- Compact city so little loss of forest or agricultural land
- Most trips by walking or bicycling
- Diets that are not too energy-intensive (including many vegetarians....)
- Minimal transfer of environmental costs to surrounding region
- Encouragement of local production for local needs

## Different urban and regional agendas

Since sustainable development has two over-arching goals whose achievement depends on meeting a range of sub-goals, there are issues around how these can be combined. This in turn raises issues of how priorities are set in the allocation of funding and support. For some city, there are also contradictions to be resolved – for instance as the urgent need to increase land supplies for housing competes with land for watershed management and protecting biodiversity. Again the importance of local government has to be highlighted as local political processes seek the best fit for multiple goals.

Figure 2 shows the very large differences between cities in greenhouse gas emissions per person. In general, cities in high-income nations need to prioritize climate change mitigation but within programmes that also address local needs and respond to local demands while cities in low-income nations need to prioritize ‘meeting needs.’ The statistics in Figure 2 need to be viewed with some caution in that they come from a range of years and there is no agreed methodology for assessing a city’s greenhouse gas emissions. Assessments may focus on total emissions within a city’s boundaries or the emissions that arise from the consumption of that city’s population. The difference between these can be dramatic – for instance for London, the emissions per person are twice as high for the consumption-based estimate. Cities that have much of their economy based on exporting goods have much lower figures with consumption-based assessments, especially if the exports are energy intensive to make. And obviously, for fossil fuelled power stations that are outside cities but serve city markets, per capita figures for emissions for cities are influenced by whether if the electricity consumed in the city is allocated to the city. There is also the issue that within cities, there is great diversity in the emissions per person or per district. Ultimately, what drives anthropogenic climate change is not cities or nations but the high-consumption lifestyles among middle- and upper-income groups.

**Figure 2: The differences in per capita greenhouse gas emissions between cities**



SOURCE: Hoornweg, Daniel, Lorraine Sugar and Claudia Lorena Trejos Gomez (2011), "Cities and greenhouse gas emissions: moving forward", *Environment and Urbanization*, Vol. 23, No. 1, pages 207-227. This paper also emphasizes that the above figures are for different years and the need for caution in comparing them as they did not use the same methodologies for assessing emissions.

**Figure 3: The different urban agendas**

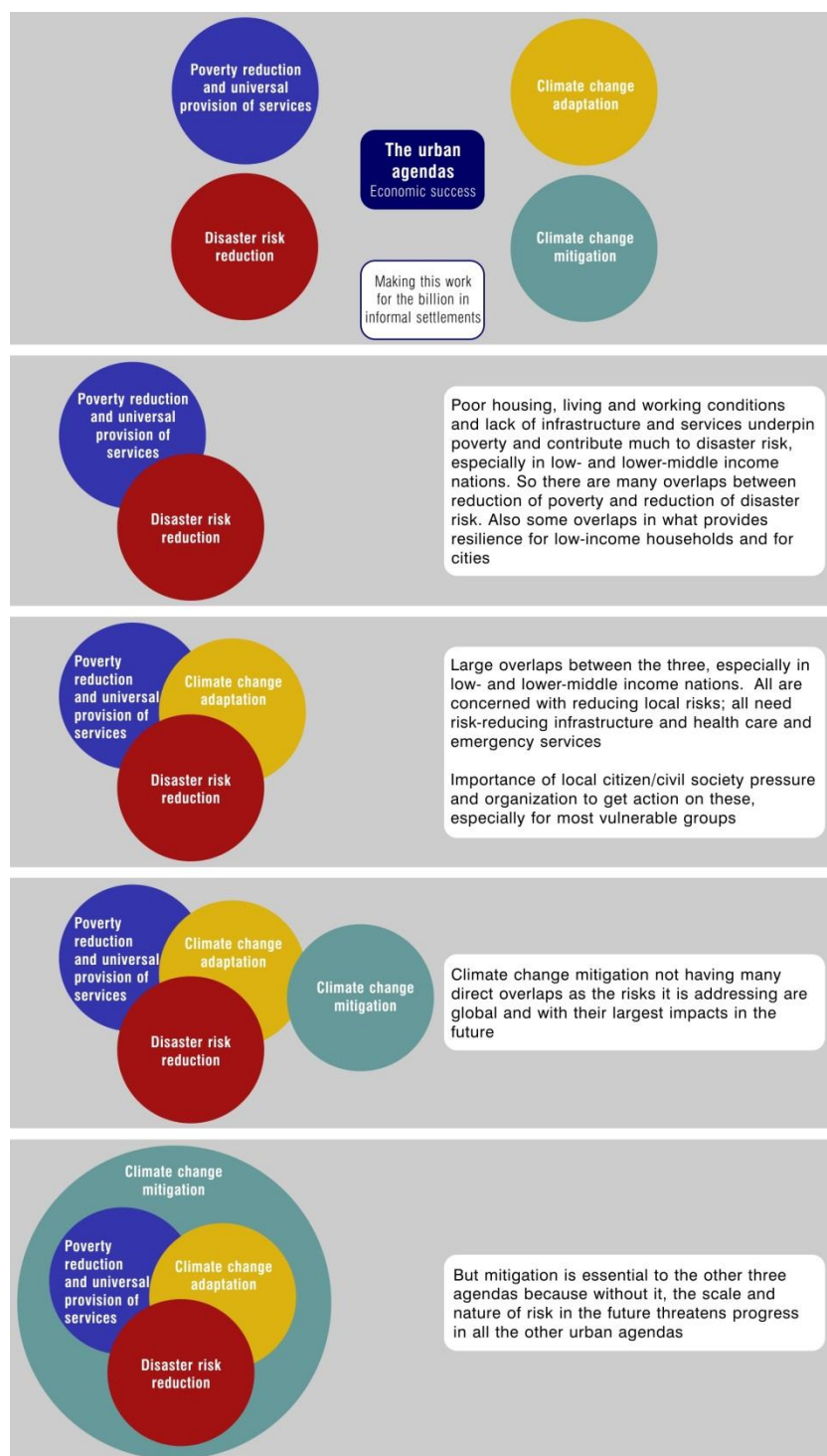


Figure 3 illustrates three key sub-goals in 'meeting the needs of the present' and the most important sub-goal in avoiding compromising the ability of future generations to meet their own needs. So it includes poverty reduction and universal provision of services (with its strong focus on



environmental health), disaster risk reduction (much of which is identifying and acting on risks from extreme weather) and climate change adaptation (which has to incorporate new risks or increased risk levels into disaster risk reduction and service provision). It also includes climate change mitigation (attention to where greenhouse gas emissions within the city and its surrounds can be kept down or reduced). Figure 3 also includes reminder of the importance of prosperity and of ensuring that the four agendas deliver for the billion or so urban dwellers living in informal settlements.

## Meeting the needs of the present – and poverty reduction and environmental health

Meeting the needs of the present in urban areas obviously includes addressing the needs and priorities of low-income groups, especially the billion or so that live in informal settlements. The GOLD III Report<sup>15</sup> documents in some detail the very large deficits in provision for basic services for most of sub-Saharan Africa and Asia and much of North Africa and the Middle East and Latin America. So meeting needs involves addressing the large deficits confronting many urban governments in basic infrastructure and services (lack of piped water, sewers, drains, all-weather roads, solid waste collection, and emergency services). Addressing this deficit also greatly increases a city's resilience to most disasters and to the many direct and indirect impacts of climate change. Box 2 and Box 3 give examples of two city governments that have sought to address unmet needs – although both have also taken measures to build resilience too. In the case of Surat, it is two disasters that spurred this.

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### Box 2: Surat, the plague and floods

Surat is one of India's most prosperous cities. It has a population of around 4.5 million and specialises in diamond cutting and polishing although it also has a large industrial base both of large and small scale industries. Two disasters – a plague epidemic in 1994 and a very serious flood in 2006 – helped reshape the city government's social and environmental policies.

In 1994, plague broke out, killing 52 people and causing 1.5 million to move out of the city from fear of contagion. This obviously brought great disruption to the city's economy too and a discouragement to new investment. The city also had a poor reputation for cleanliness; despite its wealth, the city authority had failed to provide basic sanitation, clean drinking water and solid waste collection for much of the population. In response to the plague, the city government considerably increased the priority given to the provision of cleaner water and the management of excreta and solid waste. In 1995, a new Commissioner took charge of the municipal government and he prioritized a much stronger commitment to environmental health and to increasing local government effectiveness. This included transforming the quality and coverage of solid waste collection and management and introducing charges for households and industries that were not putting their wastes in bins. The cleaning of streets also improved. The municipality's public health care system was strengthened and a disease surveillance system set up. The percent of the population served with water increased and detailed plans were developed to extend the drainage and sewerage network. By 2010, the piped water system reached 95% of the municipality's population and 86% were reached by sewers. Many 'slums' were upgraded with provision for water, sanitation and solid waste collection much improved. The municipal government's structure was also changed from a vertical hierarchy to a more decentralized structure within 38 election wards and their grouping into seven administrative zones. Surat came to be considered as one of the cleanest cities in India.

The city government also had to take action on flooding. Surat is located on the Tapi River that flows into the Arabian Sea 16 km from the city centre. Heavy precipitation in and around the city triggers floods but so too does heavy precipitation upstream and high tides. Since 1979, there have been five major floods – with the 2006 flood inundating three quarters of the city area. Official estimates

suggest that 150 people died (although unofficial estimates suggest more than 500). But the flood also brought huge disruption to the city economy. The 2006 flood and some earlier ones occurred because of emergency discharges of the Ukai dam 94 km upstream of the city centre.

Measures taken by the municipality to reduce flood risks include hardening power supplies, communications and other essential services. During the monsoon in particular, the municipality clears its drainage and sewer systems to increase the capacity to manage flood waters. Evacuation procedures have been enforced and some of the residents most at risk from flooding have been relocated. Water levels are also monitored from the reservoir behind the Ukai dam to give more time for flood warnings and the warning system has been improved, including warnings being sent via SMS to mobile phones.

SOURCES: Bhat, G.K. Anup Karanth, Lalit Dashora and Umamaheshwaran Rajasekar (2013), "Addressing flooding in the city of Surat beyond its boundaries", *Environment and Urbanization*, Vol, 25, No. 2, pages 429-441; Ghosh, Archana (1998), *Management of Urban Environment; A Study on Post-Plague Initiatives of Surat Municipal Corporation*, <http://www.globenet.org/preceup/pages/ang/chapitre/capitali/cas/indsurat.htm>, Institute of Social Sciences, Delhi.

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Box 3 provides an example of a city where an elected city government with strong support from the inhabitants addressed a whole range of environmental and social issues that included pollution control. This case is also notable for a city government seeking to act simultaneously on environmental, social and economic issues and for having a succession of Mayors from the same political party that gave continuity and coherence to public policies over many years. The city government increased the role of its Environment Department, in response to the fact that all sectors needed to take environmental issues seriously and address these in coordination with all the different government areas and sectors but this proved to be much harder in practice than initially expected. Comparable challenges have faced the environment department in the city of Durban. Here, as in most cities, the environment department is relatively weak in comparison to much larger sectors (including public works) and its effectiveness depends on getting buy-in from these.

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### **Box 3: The role of local government in addressing environmental issues; the case of Rosario**

Rosario is the third largest city in Argentina with a population of 1 million. It forms the core of Greater Rosario, with a population of around 1.5 million. From 1998 to 2011, under two mayors (both of whom served two terms), the city government developed a strong environmental policy that included improved public transport, urban agriculture and much increased recycling and expansion of public space. Measures to reduce flood risk have particular importance and floods have shaped the city's policy towards land use and protective infrastructure – and these policies now include addressing climate change. But what is perhaps more notable is that this has been combined with a strong social policy (including support for upgrading informal settlements and a much improved health care system) and with strategic urban planning that seeks to integrate environmental issues and support local economic development and measures to secure the city's economic success. The large expansion of public space involved the city government working with private landowners to restore the riverbank area and create many new parks and other public spaces. The social policies including the modernization and expansion of health care and the introduction of a community-oriented city police force. City government also supported participatory budgeting and decentralization, including the role of municipal district centres that concentrate many public services and support community programmes in each of the city's six districts. The city has an integrated mobility plan (Plan Integral de Movilidad Rosario) to promote the use of clean and renewable energy, discourage the use of private cars, encourage more trips by public transport and reduce pollution and GHG emissions. The city government has also supported workshops in each district to allow local institutions and representatives of different sectors to discuss priorities and contribute to the strategic plans for the city and the metropolitan area.

The challenges facing city government include its limited capacity to reduce unemployment (although the city government has done much to support local economic development) and the difficulties of

working with national and provincial governments and neighbouring municipalities controlled by different political parties. For climate change adaptation, challenges relate to the limited funding and lack of relevant data and the competition for attention and resources from other pressing interests.

SOURCES: Almansi, Florencia (2009), "Rosario's development; interview with Miguel Lifschitz, mayor of Rosario, Argentina", *Environment and Urbanization*, Vol. 21, No. 1, pages 19-35; Hardoy, Jorgelina and Regina Ruete (2013), "Incorporating climate change adaptation into planning for a liveable city in Rosario, Argentina", *Environment and Urbanization*, Vol. 25, No. 2, pages 339-360.

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## Disaster risk reduction and climate change adaptation

Since the early 1980s, with pioneering work in Latin America, many city governments have recognized that much of the damage and destruction caused by disasters was from a failure to anticipate them and invest in measure for disaster prevention.<sup>16</sup> Good quality housing and infrastructure are important components of this. There are also many overlaps between disaster risk reduction and climate change adaptation as many of the impacts of climate change are increased risks from storms, floods and heatwaves – although they have differences in risk assessment (disaster risk reduction draws on the historical record of past disasters and their impacts while climate change adaptation has to make allowance for new risks and increasing risk levels). Some of climate change's most serious risks are also not easily classified as disasters as they are long term changes in resource availability (for instance fresh water) or stresses on trees or crops while some of the most serious disasters are not climate-change linked (for instance earthquakes).

Many city governments have innovated on building resilience to disasters<sup>17</sup> and to climate change.<sup>18</sup> One example of this is the municipal development plan 2012 to 2016 for Manizales that integrates environmental policies, disaster risk reduction and climate change adaptation (see Box 4).

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### Box 4: Manizales and its environment and disaster risk reduction agenda

Manizales, a medium size city in Colombia (with around 400,000 inhabitants) has had a range of environmental policies. These began in 1990 with a city-wide environmental profile and assessment of disaster risks associated with urban development. A local environmental policy (BioManizales) was developed in 1993 and an action plan (Bioplan-Manizales) approved in 1995 with widespread consultation and these became integrated into the municipal development plan and the municipal budget. The Bioplan included measures to protect and revitalize the city's rich architectural heritage, improve public transport (partly funded by a tax on petrol), reduce the risk of landslides and relocate the population living on steep slopes that are at high risk of landslides. The relocation programme was linked to the development of eco-parks throughout the city, some on the land that had slopes that were too dangerous for permanent settlement and others with important ecological functions - for instance one integrated into the city's watershed and another focusing on conserving biodiversity. Some of the eco-parks are managed by community associations who also manage community plant nurseries and 15 neighbourhood parks. Community based environmental initiatives helped to generate jobs - for instance, managing eco parks, running tree nurseries and increasing recycling. Community or neighbourhood based environmental action plans have also been developed - for instance, one for Olivares commune (one of 11 communes in Manizales and also the one with the lowest average income) identified the main environmental problems and also the area's environmental resources on which their neighbourhood agenda could build.

The city developed an innovative indicators programme - the 'environmental traffic lights' through which progress in each of its 11 communes are tracked with regard to social conditions, community involvement, natural resource use, energy efficiency and waste management. Data on current conditions and trends in each commune are displayed in public places. They are called traffic lights because, for each indicator, public boards show whether things are improving (green), getting worse

(red) or are relatively stable (amber). The monitoring of progress is also helped by environmental observatories set up in different parts of the city.

Two challenges have been getting coordinated plans and actions across sectors and sustaining the policies through different mayors. On the first of these, support for the Bioplan from key municipal secretariats often waned. On the second of these, when new mayors were elected, some did not see these environmental policies and disaster risk reduction as a priority. Civil society pressure and the key role of the Instituto de Estudios Ambientales (IDEA) within the Manizales campus of the National University helped maintain policies even when mayors were not supportive. The current administration has reintroduced strong support for sustainable development. The municipal development plan 2012 to 2016 integrates environmental policies, disaster risk reduction and climate change adaptation. Environmental management has been strengthened through creating the Secretariat for the Environment and through a commitment to revalue Bio Manizales and to focus on sustainable development.

SOURCES: Vélasquez, Luz Stella (1999), "The local environmental action plan for Olivares bio-comuna in Manizales", *Environment and Urbanization*, Vol.11, No.2, pages 41-50; Velásquez, Luz Stella (2005), "The Bioplan: Decreasing poverty in Manizales, Colombia, through shared environmental management", in Steve Bass, Hannah Reid, David Satterthwaite and Paul Steele (editors), *Reducing Poverty and Sustaining the Environment*, Earthscan Publications, London, pages 44-72; and Hardoy, Jorgelina and Luz Stella Velásquez Barreto (2014), "Re-thinking 'Biomanzales' to address climate change adaptation in Manizales, Colombia", *Environment and Urbanization*, Vol, 26, No. 1, pages 53-68.

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The growing recognition internationally on the need for more attention to urban disaster and climate change issues and to governing urban growth (see for instance the latest draft goals for the post 2015 Sustainable Development Goals) has encouraged more attention to city planning and land-use management but has also raised fears that this might include a return to bulldozing informal settlements. In recent years, many disaster relief agencies have given more attention to urban areas while many cities have been encouraged to act on disaster risk reduction with the encouragement of UNISDR (and its make my city resilient campaign<sup>19</sup>) and the Hyogo framework.

The IPCC's Fifth Assessment includes a long and detailed chapter on urban adaptation.<sup>20</sup> This noted how urban adaptation is becoming an important part of policy and practice for some national governments and many city governments. It also noted the very large expansion in the literature on urban adaptation, although with most of this focusing on cities in high-income nations. In addition, national climate change policies as yet give little attention to urban adaptation. The national ministries or agencies responsible for climate change policies and practises rarely have much involvement in urban issues or contact with urban authorities.<sup>21</sup>

However, a large network of city governments have formally committed to the Durban Adaptation Charter (that now has over 1,000 signatures). The city of Durban hosted the 17<sup>th</sup> session of the UNFCCC Conference of Parties in 2011. As the host city, Durban worked with other members of a local government partnership (which included national level departments and organisations and international entities) to organize and host an adaptation-focused international local government convention during this. The main outcome of this was the Durban Adaptation Charter, signed by 107 mayors representing more than 950 local governments worldwide, with the majority of signatories being from the global South.<sup>22</sup>

## Climate change mitigation

Many city governments in high-income nations have made strong commitments to climate change mitigation. Two examples are highlighted here: Freiburg and Copenhagen. Both have set ambitious

targets for reducing greenhouse gas emissions, even as both these cities have growing populations. Both also have their climate change mitigation programmes within larger policies to improve health and enhance the quality of life.

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### Box 5: Freiburg

City leaders and politicians in Freiburg have set an ambitious goal of reducing carbon emissions by 40% by 2030. Most emissions reduction is coming from shifting to renewable energy sources, promotion of energy conservation and stricter energy efficient standards for buildings. Emissions are also kept down by an efficient public transport system and good provision for bicycling.

After the Second World War, city planners decided to rebuild the city centre following the old medieval pattern of streets and this lessened the need for automobile use. In the 1960s, the response to traffic congestion was not more road building but the expansion of public transport especially trams. This use of trams has continued - and they are fast as they mainly have their own tracks independent from car roads and get automatic priority at traffic lights.

An active environmental movement began in the 1970s to oppose the construction of a nuclear power plant nearby. The city government set up an environmental protection agency in 1980s. In 1996, the city council passed a climate protection resolution that called for 25% reduction by 2010 and it had managed 18% by 2009. Then the goal of a 40% reduction in carbon emissions was set

The means to achieve this is both through city planning, environmental protection and a transport policy that encourages, cycling and public transport. In 1969, the city developed its first integrated traffic management walking plan and cycle path network and this has been updated every ten years. In 1973 the city centre was converted to a pedestrian zone. Between 1982 and 1999, bicycling's proportion of all trips rose from 15 to 27%, pedestrians fell from 35 to 23%, motor vehicles from 38 to 32% and public transport from 11 to 18. There are over 400 km of cycle paths including bike-friendly streets, street-side bike paths, and separate bike-paths. About 9,000 bicycle parking spaces were provided including "bike and ride" lots at transit stations. In 2011 the city council set-up a by-law that requests that new buildings offer bike parking facilities. Freiburg has the lowest automobile density of any city in Germany with 423 cars per 1,000 people

A city-wide environmental card was introduced in 1984 that allows unlimited travel within the urban network (tram and bus). Any ticket for a concert, sports event, fair, or big conference also serves as a ticket for public transport.

The city supports high levels of recycling – for instance as each household or apartment building has separate bins for paper, food and garden wastes (the "bio-bin") and non-recyclables ("rest-waste"). They also have a "yellow sack" for packaging. Glass must be sorted by colour and deposited in one of 350 community bins. Hazardous wastes like batteries, paints, pesticides, etc. can be dropped off at temporary collection sites or at recycling yards. Freiburg reduced its annual waste disposal from 140,000 tons in 1988 to 50,000 tons in 2000. This is burned for energy at an incinerator 20 km from the city. As mentioned above, the contents of the bio-bins are fed to a biogas digester.

An important contributor to this was the integration of land use and transport planning to create a compact city. In Rieselfeld, a new urban district, the combination of high density low energy housing standards, a combined heat and power station, the use of photovoltaics and solar panels, energy conservation and improved public transit made possible a reduction in carbon emissions by more than 50 percent. There are around twelve thousand residents within the 70 hectare site.

The city has attracted many businesses that can be considered green and these employ close to 12,000 people. This includes more than 100 businesses working in solar power. Freiburg has also attracted research organizations. Overall the "environmental economy" employs nearly 10,000 people in 1,500 businesses, generating 500 million euros per year.

SOURCE: <http://www.ecotippingpoints.org/our-stories/indepth/germany-freiburg-sustainability-transportation-energy-green-economy.html> ; ICLEI (2011), Freiburg, Germany; successfully reducing automobile traffic, Priority for ecomobility in our cities. A series of local stories, ICLEI, 2 pages; Kunkel, Patrick (2011), Environmental Policy in Freiburg, with contributions from different city offices and departments, Stadt Freiburg im Brisgau.

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### Box 6: Copenhagen's plans and programmes for reducing carbon emissions

Copenhagen's City Council has a range of well-established measures to reduce greenhouse gas emissions through drawing on renewable energy sources and reducing energy use in commercial and residential buildings. Also in lowering carbon emissions from electricity and district heating systems and in transport (that includes increasing the proportion of trips done by walking or bicycling). In 2012, the city council set a goal to make the city the world's first carbon-neutral capital by 2025.

Copenhagen reduced carbon dioxide emissions by 21 percent from 2005 to 2011. The city currently emits about 2 million tons of carbon dioxide a year and is on target to reduce this to 1.16 million tons by 2025. The new plan sets a more ambitious target of 400,000 tons by 2025.

Nearly three-quarters of the emissions reductions identified in the 2025 plan will come from less carbon-intensive ways of producing heat and electricity, including drawing on biomass, wind, geothermal and solar. Wind turbines now supply 30 percent of Denmark's electricity, and under a national energy plan passed in 2012, this is set to rise to 50 percent by 2020. There are plans to add at least 100 wind turbines to the grid over the next dozen years, and wind electricity not used in the city will be exported to other parts of Denmark to offset Copenhagen's remaining several hundred thousand tons of transport emissions.

The two major combined heat and power stations that serve Copenhagen largely burn coal but with waste heat sent to the district heating system, they operate at around 90 percent efficiency, compared to around 40 percent for conventional coal-fired power plants. Hot water or steam to radiators is supplied through a network of pipes covering 98 percent of the city. The plants will replace coal-use with wood chips and straw certified as sustainable by the Danish Energy Association. A pilot project supplies geothermal heat directly into the district heating system. A clean-burning waste-to-energy plant is under construction that will provide electricity and heating to 150,000 households.

One of the most innovative infrastructure projects is the Adelgade cooling plant housed in what was previously a power plant. This draws seawater, cools it and delivers the chilled water through insulated pipes to buildings and businesses; the pipes are located below ground in the same tunnels used by the district heating network. The city estimates that district cooling reduces carbon emissions by nearly 70 percent and electricity consumption by 80 percent compared to conventional air-conditioning. Peak summer temperatures can reach 35°C and these are expected to increase by 2-3 degrees by 2050.

Commercial and residential buildings are to reduce electricity consumption by 20 percent and 10 percent respectively, and total heat consumption is to fall by 20 percent by 2025. New buildings must be constructed to Denmark's Low Energy Class ratings; the 2020 standard calls for near net-zero energy buildings. But more than 70 percent of Copenhagen's buildings were constructed before the introduction of Denmark's energy efficiency standards. Many city dwellers rent and neither tenants nor landlords have a strong financial interest to retrofit buildings to make them more energy efficient.

Better waste management aims to recycle 45% of household waste by 2018 and with various measures to cut waste including a new Sydhavn Recycling Centre.

In regard to transport, 36 percent of trips to work or school are made by bike (the goal for 2015 is to increase this to more than 50%). More than 20,000 cyclists enter the city centre at peak hours and there are 249 miles of cycle tracks. Among the improvements planned are more and broader bicycle lanes, improved design of safe intersections and behavioral campaigns.

The different components of the city's transport system are integrated through such measures as an on-line journey planner across different transport modes, easy transfer between transport modes, one ticket for metro, train and bus (that can be paid for by text messages) and bicycles allowed on the metro and trains

Another key component of becoming a net zero-carbon city is further reducing the use of cars. To reduce transportation's share of the total city emissions, (at present 22 percent), Copenhagen is expanding its cycling and public transit infrastructure to attract more users. The improvements include "green wave" traffic signals set to the speed of oncoming bikes, angled footrests that enable cyclists to rest without dismounting at intersections, and an additional 44 miles of cycle tracks separated from cars and pedestrians by curbs. Copenhagen is partnering with neighbouring cities to add wider, smoother, better-lit cycle tracks. In April 2012, the first so-called "bike superhighway," an 11-mile link connecting Albertslund with Copenhagen, opened. Two more are under construction and a total of 26 are planned. By 2025, the city wants 75 percent of trips to be made by foot, bike, or public transit. A new subway system due to open in 2018 will place 85 percent of the city's population within 650 yards of a Metro station.

The city is looking to convert its bus fleet to models powered by hybrid drives running on biogas. The city projects that 20-30 percent of all cars and small trucks, and 30-40 percent of all heavy vehicles, will run on electricity, hydrogen, biogas, or bioethanol by 2025. By 2015, 85 percent of the city's fleet of 1,000 small vehicles will run on electricity, hydrogen, or biofuels. 6%

The main reductions in CO<sub>2</sub> up to 2025 in the Climate Plan are energy production (74%), green mobility (11%) with 7% coming from new initiatives 6% from energy conservation and 2% from city administration initiatives

The physical growth of Copenhagen has long been oriented along five designated 'fingers' that follow train and major road routes with open space between them. To support what is often termed 'transit oriented development,' regulations allow for higher densities close to stations and ensure that large offices can only be located within 500 meters of a station.

Direct city investment in the 2025 Climate Plan is estimated to be \$472 million through 2025. Mayor Jensen has emphasized how the city could benefit from developing and testing new green solutions; 16% of Denmark's exports are from "clean-technology" companies. The climate plan also emphasizes liveability – and of course it also needs to retain citizen support.

SOURCES: Gerdes, Justin (2013), "Copenhagen's ambitious push to be carbon-neutral by 2025", *The Guardian*, Friday 12 April 2013 and City of Copenhagen, (2014), Copenhagen; Solutions for Sustainable Cities,, Third Edition, City Hall, Copenhagen, available at: <http://subsite.kk.dk/sitecore/content/Subsites/CityOfCopenhagen/SubsiteFrontpage/CityCouncil/~media/78DDF796E28E4AB8A76BCD0B3261F951.ashx>

## Green infrastructure and eco-system based adaptation

Many city governments in high-income nations have innovated on what is termed 'green infrastructure' and most of these investments contribute to a range of social/health, environmental, economic and ecological benefits. The term green infrastructure refers to interventions to preserve the functionality of existing green landscapes (including parks, forests, wetlands or green belts), and to transform the built environment through phytoremediation and water-management techniques and by introducing productive landscapes such as support for food production.<sup>23</sup>

The term green infrastructure covers at least four areas: open spaces (natural areas, woodland and parks, green streets and squares and other spaces in the public realm); water and waste water/drainage management systems that work with nature; transport routes that include waterways, cycle ways and pedestrian routes within cities; and smaller scale building modification including green roofs, walls and facades.<sup>24</sup>

The case for green infrastructure centres around: social benefits (including health, quality of life and lower temperatures during heat waves); environmental benefits that include more effective and lower-cost storm water management and support for biodiversity; and economic benefits that arise from energy and resource efficiency (including food production) and the potential boost to the local economy – see Box 7 for examples.

The economic case for green infrastructure has been demonstrated in many cities. For instance, the city of Berlin assessed the Biotope Area Factor of each area to help increase ecologically effective surface areas. The iTree system shows the monetary value of trees for energy savings, atmospheric CO<sub>2</sub> reduction, improved air quality, storm water runoff and amenity and aesthetic considerations. An evaluation of trees in New York's five boroughs using the iTree assessment determined that the 600,000 street trees provide an annual benefit of \$122 million, more than five times the cost of maintaining them.<sup>25</sup> As a critical part of Durban's climate change adaptation strategy, a large scale Community Reforestation Programme includes not only environmental and ecological benefits but also employment creation, improved food security and educational opportunities (see Box 8 for more details).

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### Box 7: Innovations in Green Infrastructure

**Parks:** Many cities have built new parks – including large and small ('pocket') parks. These are popular with citizens and can bring a range of health benefits (including those linked to more physical exercise and a higher quality of life), environmental benefits (cooler temperatures during heat waves, increased percolation of surface water into the ground), economic benefits (for instance their contribution to regeneration and attracting new services) and ecological (through support for biodiversity and carbon capture). Green works Philadelphia is adding 500 acres (202 hectares) of accessible green space as city government and neighbourhood residents transform empty or underused land into parks. The New York High Line linear park helped in the regeneration of many areas and with strong support for the engagement of communities along its course. In London, the construction of the Queen Elizabeth Olympic Park includes provision to support biodiversity and the London's government has committed to build 100 new small (pocket) parks. The Madrid Rio project created a linear green park along the Manzanares River (most of it on top of a large road tunnel) with provision for sport, leisure and cultural facilities. Post Office Park in Boston was created from the conversion of a 4.6 hectare car park into a park with parking underground with car park revenues funding the park maintenance

**Drainage and waste-water management:** Many new city developments are incorporating features that use natural systems – for instance to slow down, hold and buffer storm and rainwater, and allow it to infiltrate naturally back into water courses or ground water. This includes new water bodies, reed beds, and areas of ground percolation and green roofs and roof water storage to slow down run off. For instance, Chicago has a programme to build permeable pavements that allow storm water to filter through into the ground (and also high albedo pavement to reduce heat island effects). New York has a long-established programme to protect and enhance its water supply through watershed protection. This includes the city owning land outside the city and working with land owners and local communities to balance the protection of water quality with support for local economic development and better waste water treatment. This is complemented by a green infrastructure plan within the city that includes porous pavements and streets, green roofs and other measures to control storm water.

**Green infrastructure boosting the economy:** High quality public spaces can boost local economies as people meet and socialize there. In Brighton, a high quality public realm scheme on New Road has boosted the local economy (it is now among the most visited streets in the city) as well as increasing pedestrians and cycling and with decreases in motor vehicles. Many cities have buildings on whose roof food production has developed.



**Green infrastructure and sustainable transport:** A central part of green infrastructure is to encourage and support more pedestrians and cyclists and reduce private automobile use and motor vehicle traffic. Copenhagen has had a six fold increase in high quality public spaces since 1970 along with 65% rise in bicycle use and a significant drop in speed and quantity of motor vehicle traffic. Many cities now have cycle hire schemes that place cycles at different points around the city that can be hired for a small payment for use in short trips within the city; those of London and Paris are among the most well-known but the largest cycle hire schemes are in cities in China.

SOURCES: ARUP (2014), *Cities Alive; Rethinking Green Infrastructure*, ARUP, London, 160 pages (This book can be downloaded at no charge from [http://www.arup.com/Homepage\\_Cities\\_Alive.aspx](http://www.arup.com/Homepage_Cities_Alive.aspx)); Revi, Aromar, David Satterthwaite, Fernando Aragón-Durand, Jan Corfee-Morlot, Robert B R Kiunsi, Mark Pelling, Debra Roberts, William Solecki, Sumetee Pahwa Gajjar and Alice Sverdlík (2014), Chapter 8: Urban Areas on: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [ Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

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Most forms of green infrastructure contribute to climate change adaptation and mitigation – but to understand the full potential for this requires a system-wide approach. Ecosystem-based risk reduction and climate change adaptation and mitigation seek to move beyond a focus on street trees and parks to a more detailed understanding of the ecology of indigenous ecosystems, and how biodiversity and ecosystem services can reduce the vulnerability of ecosystems and people. Its importance for climate change adaptation has now been recognized<sup>26</sup> as have the co-benefits from its implementation. For instance, ecosystem restoration and conservation can contribute to food security, water purification, waste water treatment, climate change adaptation (including absorbing runoff for flood control and moderating high temperatures during heat waves) and mitigation.<sup>27</sup> As the IPCC’s Fifth Assessment noted. “These approaches are particularly important in low- and many middle-income countries where livelihoods for some urban residents and much of the peri-urban population depend on natural resources.” Box 8 describes how eco-system based climate change adaptation is being used in the city of Durban.

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#### Box 8: Eco-system based adaptation in Durban

Durban has adopted an ecosystem-based adaptation approach as part of its climate adaptation strategy. This required a series of steps:

- A better understanding of the impacts of climate change on local biodiversity and the management of Durban’s open space. The projected warmer and wetter conditions seem to favour invasive and woody plant species.
- Improved local research capacity that includes generating relevant local data.
- Reducing the vulnerability of indigenous ecosystems as a short term precautionary measure.
- Enhancing protected areas owned by local government and developing land-use management interventions and agreements to protect privately-owned land areas critical to biodiversity and ecosystem services. This can be supported by government incentives and regulation to stop development on environmentally sensitive properties, the removal of perverse incentives and support for affected landowners.
- The promotion of local initiatives that contribute jobs and promote skills and environmental education within ecosystem management and restoration programmes. Durban has initiated a large scale Community Reforestation Programme where community level ‘treepreneurs’ produce indigenous seedlings and help plant and manage the restored forest areas as part of a larger strategy to enhance biodiversity refuges and water quality, river flow regulation, flood

mitigation, sediment control and improved visual amenity. Advantages include employment creation, improved food security and educational opportunities.

Source: Roberts, Debra, Richard Boon, Nicci Diederichs, Errol Douwes, Natasha Govender, Alistair McInnes, Cameron McLean, Sean O'Donoghue and Meggan Spires (2012), "Exploring ecosystem-based adaptation in Durban, South Africa: "learning-by-doing" at the local government coal face" *Environment and Urbanization*, Vol. 24, No. 1, pages 167-195.

## From pollution control to zero waste

Many companies have made public commitments to improved environmental performance and signed up to codes of conduct and/or sought certification in ISO standards relating to environmental practice. More recently, there has been a growing interest in the green economy – and in its potential contribution to pollution reduction, employment and lower greenhouse gas emissions. Table 1 highlights the shift within industries from pollution control to eliminating pollution and waste in the production process, first through steps to improve efficiency, then by institutionalizing pollution control and other environmental issues into mainstream manufacturing and, finally, by restructuring production to make zero-emissions the norm (Robins and Kumar 1999). This fourth stage is where industrial production can be seen to contribute to both goals of sustainable development by reducing its greenhouse gas emissions.

**Table 1: Four steps to sustainable industrial production in cities**

	FIRM	CITY	NATION
Step 1: Control	End of pipe technology	Relocate dirty industries	End of pipe regulation
Step 2: Efficiency	Cleaner production	Collective environmental services	Environmental assessment
Step 3: Institutionalize	Lifecycle environmental management	Eco-industrial estates	Integrated pollution control
Step 4: Restructure	Zero emissions	Carrying capacity planning	Extended producer responsibility

Source: Robins, Nick and Rita Kumar (1999), "Producing, providing, trading: Manufacturing industry and sustainable cities", *Environment and Urbanization*, Vol.11, No.2, pages 75-93.

The earlier discussion of Dharavi provides an example of the scale and importance of what is often termed the waste economy, much of which occurs within the informal economy. Many large cities have a large informal waste economy generating employment for tens of thousands of people – that is important not only for its environmental and economic benefits but also for the jobs supported and for the city-wide contribution to waste management (and to local government costs – for instance as the volume and weight of wastes to be collected and disposed of is reduced significantly).<sup>28</sup> There are examples of city governments that have recognized this and sought to integrate the informal waste economy into city waste management. In Brazil, there is a national movement of waste pickers made up of more than 500 registered waste picker cooperatives and associations.<sup>29</sup> In Colombia, an organized movement of waste pickers in Bogota set up the

association of recyclers which have helped negotiate roles for their members in the city's waste management system.<sup>30</sup>

## City-wide planning and management

For any city, meeting the two overarching sustainable development goals and associated sub-goals depends on the management of urban expansion and of land-use changes. This has importance for meeting needs (especially in the supply of land and infrastructure for housing) and for disaster risk reduction/climate change adaptation (avoiding settlements expanding onto dangerous sites). It also has importance for watershed management (minimizing construction there to retain its role in provision of water and contribution to avoid floods). It has importance too for greenhouse gas emission reduction (as new settlements have buildings meeting high energy efficiency standards and lay-outs and connections to other parts of the city that minimize the need for private automobile use and encourage walking and bicycling). The cities of Rosario, Copenhagen and Freiburg all provide examples of city governments that recognize the importance of managing land-use and land-use changes for multiple goals. These are also cities that recognize the importance of strategic planning and how public provision for infrastructure can contribute to such goals, especially in steering urban expansion to places well served by public transport and avoiding urban sprawl.

Local agenda 21s had importance in many cities in encouraging city governments to develop plans that better addressed the goals and sub-goals of sustainable development.

More effective city-wide and city-region environmental planning and management also depends on the availability of relevant data - for instance on environmental quality and service provision. Many city governments have expanded their reporting on environmental issue – see for instance how the city of Manizales has been posting in public the performance in each city district of a range of environmental indicators within the environmental traffic lights (Box 4).

Inevitably, the maintenance and expansion of dedicated green areas within a city competes for land with other uses. Strategic urban planning can mediate between competing demands but as the case of Durban illustrates, designing and implementing an ecologically functional and well-managed, network of bio-infrastructure requires data collection, expertise and resources. But the outcomes should include more cost-effective and adaptable solutions and direct and immediate co-benefits for local communities.<sup>31</sup>

Strategic planning has proved to be an essential underpinning of urban expansion that remains compact and with protection of or enhancement of parks and forests as seen in the Boxes on Copenhagen, Freiburg and Manizales.

## The regional dimensions to sustainable development and cities

Many of the city initiatives described in this paper had regional dimensions that needed action in areas outside city boundaries. This includes New York's watershed management programme, the expansion of bike lanes in Copenhagen and Surat's need for cooperation with the authorities managing water releases from a dam far beyond its jurisdiction. They also include disaster risk reduction plans for Manizales. Provision for fresh water and flood control management have regional dimensions for most cities. Thus, regional governments often have key roles in encouraging and supporting region-wide initiatives that need coordinated action within different local government jurisdictions. The IPCC's Fifth Assessment also stressed the importance of coherent multi-level governance for climate change adaptation in which regional authorities often have key roles. These include avoiding the transfer of environmental burdens from cities to other jurisdictions – for instance through waste dumping or river pollution. They include support for

positive rural-urban linkages including enhancing food production around a city that can also mean less carbon intensive supply chains, as well as employment and livelihood benefits. In some nations, city governments are also in effect regional governments as their boundaries encompass large areas around and beyond the city's built up areas. Box 8 described the many aspects of Durban's ecosystem-based adaptation in peri-urban and rural areas and most of these are within municipal boundaries (as these encompass large rural areas).

## Conclusions

If we review the cities that have taken sustainable development seriously, the catalysts for their innovation come from different starting points but all depended on local government competence and capacity. The list of cities that have major achievements in meeting sustainable development goals are mostly cities in middle- and high-income nations where local governments have competence, capacity, accountability (as with elected mayors and city governments) and finance. The list of cities is impressive but it is still very short in relation to what is actually needed. The proportion of the world's urban population living in cities with effective sustainable development plans is very small. The draft SDGs have a strong focus on 'leaving no-one behind' in relation to poverty reduction and service provision – but the avoidance of dangerous climate change and other global limits also means leave no urban centre behind in addressing sustainable development goals. Key city networks including UCLG, ICLEI and C40 already have key roles in encouraging this – but the speed of change in this needs accelerating. What is currently achieved in regard to sustainable development by the most successful cities that are the outliers or exceptions needs to become the norm.

If we look at what provided the catalyst for sustainable development plans, for eThekweni (Durban), it was developing a local agenda 21, then external support for addressing climate change mitigation, then to an understanding within city government's Environment Department that climate change adaptation was urgently needed – but with a focus on meeting local needs and reducing local risks.<sup>32</sup> For Rosario, it was a strong development (meet the needs of the present) and flood risk reduction that also led to an appreciation of the need for climate change adaptation and more consideration of mitigation. For Manizales, it was an innovative environmental agenda that included rehousing those living on sites at high risk of landslides that then also took on climate change. For Freiburg and Copenhagen, it was a long-established local government commitment to environmental issues that then led to ambitious commitments to greenhouse gas emission reduction as the threats from climate change became more apparent.

The recognition that there are different goals within 'sustainable development' and with cities having different starting points is important. It makes no sense for a city with very low greenhouse gas emissions and with much of the population with unmet needs to prioritize mitigation – although the urgent need to reduce emissions globally means that some attention to mitigation is needed in all cities.

Any city government committed to sustainable development goals needs to prioritize economic success. This is where the potential contradictions between economic growth and sustainable development becomes evident. But meeting sustainable development goals will require a very large expansion in the production of goods and services for a low-carbon, resource efficient, waste reducing, quality-of-life enhancing future. Both Copenhagen and Freiburg have as a significant part of their economy a growing 'clean-tech' industrial economy. In the United States, a surge of 'green employment' to over 2.6 million jobs was reported by the Clean Jobs Index published by the Ecotech Institute (with a clean job "being part of a business that benefits the environment or conserves natural resources").<sup>33</sup> However, some care is needed in ensuring that the definition of 'green,'

‘clean’ or resource conserving enterprises does actually assess their performance (and also that they are not achieving this by displacing environmental burdens to other locations or the future). Many cities or new developments within cities promote themselves as ‘sustainable’ or as ‘eco-cities’ when they do not perform well in relation to many of the criteria needed for assessing sustainable development performance.

To make what is achieved by the innovating cities the norm needs major changes in most nations in the support for local and regional government. It is worth recalling how well this was recognized in Agenda 21, as well as acknowledging how the solutions have their roots in local activities and the participation and cooperation of local authorities - “As the level of governance closest to the people, they play a vital role in educating, mobilizing and responding to the public to promote sustainable development.”<sup>34</sup> As noted earlier, Local Agenda 21 also states that each local authority should enter into a dialogue with its citizens, local organizations and private enterprises. If urban governments have such importance for meeting the draft SDGs within their jurisdiction, should they also not be encouraged to define their own goals and targets and monitor their progress?

In most nations, there are a range of governance and institutional issues that need to be addressed if the two overarching goals of sustainable development are to be met. For instance, what are the main capacity limitations (in human resources, finances and responsibilities)? Are there jurisdictional limitations that prevent local governments from working efficiently on this field – especially in metropolitan areas made up of many local governments where there are political difficulties to developing the much needed regional responses – for instance for water supplies, solid and liquid waste disposal, flood management and open space (including green infrastructure). Are the potential synergies between rural and urban production and risk reduction supported and enhanced (and the transfer of pollution from cities to surrounding rural areas cut)?

Multi-level governance, where it works well, supports and enhances the roles of local governments in addressing sustainable development goals. This includes national (or in many nations state or provincial) governments providing the legal framework for (for instance) air quality, water use and pollution, land-use planning and revenue raising. It is often local government that has the responsibility for monitoring compliance. It includes the development of metropolitan or regional governments to take on a range of tasks to serve clusters of adjacent local governments. These tasks often include transport, fresh water and waste water management and thus of great relevance to sustainable development.

Multi-level governance also has particular importance for disaster risk reduction and climate change adaptation in urban areas. These usually need coordinated actions across several or many local jurisdictions that is often managed by regional governments. In some nations, national legislation has clarified and supported an expanded role for local and regional governments in these.<sup>35</sup> National governments may also encourage and support local government action through economic incentives or competitions - for instance as in China and Indonesia that have long-established national competitions for cities that assess city performance in a range of goals relevant to sustainable development.<sup>36</sup> But it needs more than this from national governments. They need to involve city governments in making commitments to global goals (including the SDGs). They need to see local and regional governments as key allies in this. They need to support all local governments to engage with their inhabitants (especially those who have many unmet needs) and their organizations in turning the commitments into locally realizable goals and targets – and monitoring their fulfilment. This is what the SDGs, Habitat III and the UN Conference of Parties must support.

- <sup>1</sup> World Commission on Environment and Development (1987), *Our Common Future*, Oxford University Press, 383 pages. This is also known as the Brundtland Commission.
- <sup>2</sup> Paragraph 56, the Habitat Agenda.
- <sup>3</sup> United Nations (2014), *World Urbanization Prospects: The 2014 Revision*, POP/DB/WUP/Rev.2014/1/F09, Population Division, Department of Economic and Social Affairs, New York.
- <sup>4</sup> United Nations 2014, op. cit.
- <sup>5</sup> Seto, K.C. and S. Dhakal with A Bigio et al (2014), *Chapter 12: Human Settlements, Infrastructure and Spatial Planning*, in 'Climate Change 2014: Mitigation of Climate Change', Working Group III contribution to the IPCC 5th Assessment Report, IPCC, Geneva.
- <sup>6</sup> High Level Panel of Eminent Persons on the Post-2015 Development Agenda (2013), *A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development*, The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda, United Nations, New York, page 17.
- <sup>7</sup> Open Working Group (2014), draft *Sustainable Development Goals*, United Nations
- <sup>8</sup> UCLG (United Cities and Local Governments) (2014), *Basic Services for All in an Urbanizing World*; the Third Global Report on Local Democracy and Decentralization, Routledge, London.
- <sup>9</sup> World Commission on Environment and Development 1987, op. cit.
- <sup>10</sup> See for instance Ward, Barbara and René Dubos (1972), *Only One Earth: The Care and Maintenance of a Small Planet*, Andre Deutsch, London, 304 pages and Meadows, Donella H., Dennis L. Meadows, Jorgen Randers and William W. Behrens III (1974), *The Limits to Growth*, Pan Books Ltd, London, 205 pages.
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