SUSTAINABLE CITIES

Assessing the Performance and Practice of Urban Environments

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INTRODUCTION

ASSESSING THE ASSESSMENTS

Pierre Laconte

The origins of this book lie in the realisation that rapid change in building and information technology has created unprecedented challenges for sustainable cities, which cannot be dealt with by using traditional planning methods. The issue was first raised at the 1976 UN Conference on Human Settlements (Habitat I), where Jaime Lerner, representing Brazil, first set out his innovative solutions for sustainable development, as adopted by the City of Curitiba of which he was the mayor. I represented Belgium and explained the ecological planning of the Louvain new university town where work began in 1969.[1] The functionalist city movement – dominant in the sixties – considered that cities were a juxtaposition of mono-functional parts, to be linked by motorised transport, rather than a complex integrated system mixing all urban functions. To counter this trend, the university planned for a living community, mixing all functions from the first phase of implementation (see Box I.1 at the end of this introduction). This approach was elaborated in a special issue of *The Annals* (American Academy of Political and Social Science).[2]

The Brundtland Report and the World Commission on Environment and Development (WCED),[3] made a breakthrough in the debate about sustainable environments by linking environment and development (including urban development) to form an integrated environmental management. The Intergovernmental Panel on Climate Change (IPCC), created in 1988, has linked scientists and politicians to develop strategies for a more sustainable world that mitigates and adapts to climate change.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs and it requires the reconciliation of the 'three pillars' of

sustainability: environmental, social and economic.[4] This book addresses most directly the first of these components and it focuses upon urban areas where the environmental challenge is most pronounced. As Kerry Mashford outlines in the first section of Chapter 1, the achievement of sustainable urban environments depends upon the sustainability of the individual elements of a city or town and on how these operate together to create effective and sustainable urban systems.

This three part book is about 'assessing the assessments' concerning the state of the urban environment. Part I explores primarily the built environment and at three levels of observation: the individual building, the neighbourhood, and the entire city or town, as expressed through systematic comparisons between those places. Part II is about the techniques that seek to assess urban development and systems as a whole – areas where the different approaches available can yield significantly different results. We end in Part III with a collection of case studies which explore best practice in the pursuit of various types of urban development.

Part I: Levels of Observation

The first level is that of the individual building. In terms of their overall 'green' rating, numerous sustainability assessment and certification schemes exist, although in some cases their quality has been disputed. The expanding business of environmental assessments and audits includes BREEAM (the Building Research Establishment Assessment Method) and LEED (Leadership in Energy and Environmental Design), which lead the commercially available standards for best practice in sustainable design. A large-scale example of BREEAM certification is reported by Chris Gossop in his assessment of London's King's Cross development (Chapter 12).

In Chapter 1 **Kerry Mashford** first addresses urban systems as a whole and then focuses on the energy performance of buildings across Europe and their energy use metering, monitoring and benchmarking. A critical issue she raises is that of 'the performance gap', whereby owners and occupants are increasingly aware that they may not be getting what they believed they had paid for in new-build performance. Indeed, it seems that we have been deluding ourselves for many years over the true energy performance of many of our buildings.[5] In terms of the basic fabric of structures, thanks to progress in building technology and European legislation we know how to construct low or zero energy buildings and the additional cost of these has come down greatly.[6] Energy producing buildings ('+ energy') may become the powerhouses of tomorrow. But to secure such gains our new buildings must be without the construction flaws that have too often affected actual

performance, and they must be properly managed so that in use they can achieve their true theoretical potential. And as design and construction techniques improve, resulting in buildings that are increasingly energy frugal, this needs to be matched by their occupiers in terms of an increased awareness of how to achieve that potential. Inevitably, the level of progress made will also depend on the prevailing cost of energy and how this is perceived.

Whatever the progress made in making new buildings energy frugal, the yearly addition of new buildings across much of Europe typically forms a small part of the total building stock (for housing in England, currently around 0.5 per cent of the total stock).[7] The vast majority of the 2050 building stock already exists and this older stock will be both difficult and costly to retrofit if it is to have a performance anywhere approaching that expected for new build. Heritage buildings are particularly difficult to deal with; associations such as Europa Nostra have repeatedly warned against the application of EU energy efficiency legislation, which risks taking heritage buildings out of the market, or disfiguring them.

The **second level** is that of the **urban neighbourhood**. **Elke Pahl-Weber** and **Sebastian Seelig** review Germany's current state of play in respect of this level of certification. They identify five approaches and initiatives that have taken place over the last 15 years or so, the most prominent of which is the certification seal of the German Sustainable Building Council (DGNB) as applied to neighbourhoods. So far, about 20 such areas have been certified in this way, involving a scale intermediate between that of the city block and the district. The authors indicate that the system is becoming increasingly prominent as a marketing tool for larger development projects; that is indeed one of the aims of the parallel US system LEED-ND (Neighborhood Development).[8] We cannot be sure to what extent, if at all, this process is actually driving environmental standards up.

Undoubtedly, there is a long way to go before we can be confident about the effective status of certification at this complex level. For one thing, the present scheme has been derived without any strong consensus between the various levels of governance and civil society over goals and common indicators. Secondly, there has been an absence of tools to assess the existing building stock; the LEED-ND, for example, focuses essentially on new neighbourhoods, including green buildings. Thirdly, there is surely a question about the overall scope of neighbourhood certification and what can be quantified. In particular, to what extent can/should it take into account the local traffic dimension (shopping, school runs, retail delivery) in terms of energy use by vehicles?

The **third level** of observation is **the city as a whole**. Numerous indices have been used to compare the sustainability of cities. **Birgit Georgi** compares several of them, according to their focus and intention, and their underlying selection of data and indicators, assessment criteria and methodology (expert panels, interviews and perceptions). Notwithstanding their differences and biases, they allow cities to learn from each other and encourage them to take action aimed at improving their performance.

A specific benchmarking experience worth mentioning is the EU Green Capital Award. Both Birgit Georgi and I were EU evaluators for the candidate cities of 2012 and 2013. Each evaluator was in charge of analysing one of the requested information areas. Frequent meetings among evaluators effectively ensured coherence and avoidance of overlap. Closed meetings between the group of evaluators and the representatives of the cities allowed questions to be raised about their data and its verification by outside sources. Only then was the addition of points made for each item, resulting in the final evaluator ranking. The final choice was made by a jury which had to follow the evaluators' results, with justifiable exceptions such as avoiding giving the award to two cities in a row from the same country. All parts of the exercise are available on the internet, including any objections. The thoroughness, neutrality and transparency displayed might qualify as an assessment best practice.

Among other comparative assessment exercises, using different methodologies, is the biennial Lee Kuan Yew World City Prize, reported by **Mark Dwyer** and **Calvin Chua**. Each nominee has to undergo a rigorous two-tier selection process, comprising of a multidisciplinary group of local and international thought leaders and leading practitioners in the field of urban development. The final stage was a visit to the shortlisted cities by the nominating committee. The recommendations by the nominating committee were ultimately validated by the Prize Council. I consider that the thoroughness and neutrality of this exercise could also qualify as an assessment best practice.[9]

Part II: Methodologies/Ways of Thinking

Peter Marcotullio and his co-authors examine selected methods of determining greenhouse gas emissions at the urban scale. They describe the various criteria considered when constructing an urban greenhouse gas protocol, including the definition of urban, the gases that are measured and their source, the scope of analysis and how the measurements are undertaken. They then present results for European medium and large sized cities derived from alternative methodologies to demonstrate the range of results, their own approach being a 'top-down' one. This is a particularly valuable comparative

exercise as the estimates for each city are made by the same team, according to the same methodology.

By contrast, as an evaluator for the Green Capital Award 2012 and 2013 I was confronted with 17 estimation methodologies, each candidate city using its own methodology. The results ranged from 3,000 to 10,000 metric tons (tonnes)/year per inhabitant. This discrepancy was in line with the findings of the GHG Study Report 2009 by Bader and Bleidschwitz, which compares the methodologies used by seven specialised institutions.[10] Areas of difference include the number of gases assessed (CO_2 alone or CO_2 equivalents for the six Greenhouse gases (GHGs) taken into account by the IPPC), the Global Warming Potential (GWP) values, the reporting standards and the scope of measurement (direct emissions alone or direct, indirect and life cycle emissions). Solutions to these many discrepancies include enabling communication between existing tools, developing international standards or reaching an international agreement on a single set of tools, in line with the seminal analysis of Peter Marcotullio and his co-authors.

As those authors recognise from their own studies, however, the differences in results also reflect the differences in the purposes for which the various types of studies are designed. They advise bringing together the findings from both top-down and bottom-up analyses to support local and regional actions, as well as the continued development of rigorous protocols for estimating urban GHG emissions worldwide, at regional and at local level. This is a key recommendation of the authors, and is still far from being on the political agenda.

William Rees suggests a framework to examine prospects for urban sustainability, particularly focusing on ecological footprint analysis (EFA) as an essential tool for assessing the sustainability of cities, the technique of which he is the leading developer. This tool includes the biophysical dimensions of urban futures, reminding us that cities are complex biophysical systems subject to natural laws. Because of higher incomes and purchasing power, urbanites make significantly greater demands on the ecosphere than do rural dwellers. City dwellers necessarily continue to satisfy their bio-metabolisms by consuming the products of natural and managed ecosystems and by disposing of their wastes back into surrounding ecosystems.

This is an inherently unsustainable process in that the 'human enterprise' cannot continue to function in its present state indefinitely. Guided by EFA, which affirms that we humans are integral components of the ecosystems that support us, we must begin to scale our material demands to the supply of productive biocapacity.

This line of thought has been seminal in the great expansion of studies about urban metabolism, among others by the European Environment Agency.[11] This

concept approaches the city as a living system like other ecosystems, with their interaction between human activities and nature. It does not stop at single city borders but considers the urbanisation processes across Europe.

The concept of the circular economy is part of the same strand of thinking. It involves the re-use, repair and refurbishment of existing materials and products, and what used to be regarded as 'waste' becomes a resource. All resources need to be managed more efficiently throughout their life cycle, an imperative that is becoming increasingly recognised by industry. Independently from their contribution to the present book, the concept was addressed by **Douglas Mulhall** and **Michael Braungart** (see hereafter) in a report to the Davos World Economic Forum entitled *Towards the Circular Economy.*[12] In July 2014 the European Commission adopted a Communication on the circular economy, the intention of which is to boost recycling, prevent the loss of valuable materials and create jobs and economic growth[13] and in two EU countries centres for the implementation of the circular economy have been established.[14]

These developments are all in line with Rees' pioneering views.

Ulrich Heink bravely tackles the evaluation of urban biodiversity. Biodiversity is a measure of the variety of organisms present in different ecosystems. This can refer to genetic variation, ecosystem variation or species variation (number of species) within a given observation area. As the scale of observation determines the observed phenomenon, urban biodiversity confronts us with the same definition issues as with GHG emissions. The smaller the observation area the more biodiversity interfaces with surrounding areas. As Ulrich Heink says: 'On the one hand the adverse effects of urbanisation have to be mitigated; on the other hand, concepts for a careful development of urban biodiversity on wasteland are needed.'

This chapter focuses therefore first on general biodiversity values, from which evaluation criteria can be derived. It turns next to the specific features of urban biodiversity and then explores in detail which biodiversity components and processes may be important for biodiversity conservation according to relevant evaluation criteria. It next discusses the use of these criteria as applied by an evaluation procedure at the overall urban level (the City Biodiversity Index) and in a case study – the former rail yard 'Schöneberger Südgelände' in Berlin. This area is a well-defined wasteland. Its former biodiversity has largely disappeared and has been replaced by new species, migrants from a wide hinterland.

The side interest of the chapter is its use for understanding the Natura 2000 network. Natura 2000 is an EU-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. Such areas are frequently located in cities, with important

implications for urban management. A case in point is the Antwerp port extension into a Natura 2000 boundary. At the request of nature protection associations the city had to create from scratch a new protection area.[15]

The contribution by **Douglas Mulhall** and **Michael Braungart** in Chapter 8 complements that by Peter Marcotullio and his fellow authors. While Marcotullio addresses the estimation of GHG emissions, Mulhall and Braungart explore ways of re-using emissions; in this they go beyond the emerging technologies aimed at capturing and storing CO_2 to consider the emerging technologies which seek to re-use such materials as a feedstock. In time this application of the circular economy could transform the economics of many processes while tackling the major GHGs at source.

Part III: Urban Sustainability – Best Practices

Our first case history by **Ian Douglas** discusses the role of canals and waterfront developments as catalysts for the sustainable post-industrial city. Former dock area redevelopments in Europe range from the re-use of old warehouses, as at Liverpool's Albert Dock and the dock area of Copenhagen, to the transformation of Bilbao's steel wasteland into a vibrant urban space, to the creation of major financial precincts such as at Canary Wharf in London.

In Greater Manchester, England, the change has been particularly dramatic, helped by aquatic scientists at the University of Manchester, with aeration of water in the former docks and the use of subterranean stormwater holding tanks to minimise the release of untreated sewage from combined sewers into rivers and canals. Waterfront living suddenly became pleasant at all times of the year and regenerated the whole city. The canalside and dockland new developments succeeded through a combination of government support, public and private sector partnerships, and municipal encouragement of developers to take up the waterfront regeneration challenge, through maximising the ecosystem service benefits of canals and other waterways and through being able to benefit from rising land values and property prices.

Waterfronts in Europe, as across the world, are now important elements in urban redevelopment and a highly effective re-use of brownfield land and redundant water space, fostering economic, social and environmental sustainability.

Sir Peter Hall's chapter on sustainable urban transport, with its comparison of France and the UK, is not only a major contribution to the present book but it is also – doubtless – his last publication, as sadly he died, at the age of 83, during the final editing of his text. Chris Gossop and I have both enjoyed his friendship over many years and admired his unrelenting energy and his utmost professionalism as an academic and a man eager to see his convictions become

reality. His contribution to my early symposium 'Changing cities: challenge to planning'[16] and the dialogue around it remain an unforgettable experience. My most recent opportunity to admire him was his guiding of a two-day tour of King's Cross, interviewing on the way all the major architects involved and the coordinating developer of this best practice (Chapter 12).

The main point made here by Peter Hall is that in each country transport project assessment has changed profoundly over half a century, but to varying degrees, and in different ways. The basic shift has been from a predict-and-provide approach to one based on limits set by public capacity to pay for investments, or social equity, or, increasingly in recent decades, environmental sustainability.

The UK's SACTRA Reports, published from 1994, provided a key opportunity to rethink trunk road assessments.[17] The first one, devoted to the COBA (cost benefit analysis) of road projects, showed that COBA ignored the traffic generated by new roads. It demonstrated that additional road capacity was attracting more additional cars than the additional road space could handle, and that we were not 'building our way out of congestion', but rather towards more congestion. The second report evaluated the role of road transport on regional development and demonstrated with examples that regional development was triggered by human capital and entrepreneurial initiatives, not by more roads. The third evaluated the 'degeneration of traffic' resulting from natural disasters and showed with numerous examples, such as the Kobe earthquake, that traffic adapted very quickly to a lower road supply through diversion or modal shift.

Peter Hall has paid particular attention to comparing the strong development of trams in France with their much weaker development in the UK. The French *versement transport* (employer contribution to public transport) allowed the municipalities to impose a yearly contribution on all employers of more than nine staff to finance improved public transport. This generated the resources to achieve more than 100 'tram cities'. However, low fares set by elected officials, and increasing costs, entail growing deficits. By comparison, the best tram city in the UK – Manchester – has succeeded in getting the best from the private consortia that won the tenders, minimising the cost borne by the tax payer.

My own contribution is about the assessment of heritage and the requirements to be met for UNESCO World Heritage listing. Taking the specific case of the Amsterdam Singel canal area, I was able to demonstrate as part of the UNESCO process that this canal ring layout (of residential canals and service streets), its land subdivision into small plots and its implementation framework and control have proven both their robustness

and their sustainability across several centuries. Moreover, the area's integrity and authenticity have been preserved and it has been possible to accommodate changes in functions as well as changes in building styles and building techniques. This adaptability, including adaptive re-use, makes the Singel canal area a prime example of a sustainable urban environment in Europe. It has been a collective masterpiece, not the result of an individual visionary initiative like St Petersburg or Barcelona's L'Eixample.

Chris Gossop's chapter on London's King's Cross area shows how the long-term vision of a fine urban quarter at the heart of an unparalleled network of transport communications is being implemented, focusing upon the railway termini of King's Cross and St Pancras International and six underground lines. He wonders if the new development matches the architectural quality of its Victorian predecessors and whether the new and refurbished buildings and extensive public realm will set new standards for urban areas everywhere. His overwhelming impression is that it succeeds on these counts. The chapter explores the environmental performance of this development and concludes with a summary analysis of the extent to which the development has met the aims set for it by the development plan and national planning guidance (for example on urban design) and complied with wider sustainability as well as 'liveability' considerations. Those considerations span the social and economic as well as environmental 'pillars' of sustainability and cultural factors (Table 12.1).

The final chapter by **Uli Hellweg** and **Kai Dietrich** focuses on Hamburg's island district of Wilhelmsburg, chosen as the location for Germany's eighth International Building Exhibition (IBA). The IBA has been developed over a period of more than a century: the general intention of this most original tool is to generate innovative ideas on the shaping of urban life by achieving a replicable model of quality planning. Each has had a special theme or themes and one of the those for IBA Hamburg is making Wilhelmsburg self-sufficient in energy terms. This makes it a pioneer in energy efficiency and in using renewables. Energy is at the forefront of a wider strategy to improve the liveability and sustainability of Wilhelmsburg, in accordance with the three Bruntland pillars of sustainability.

A comprehensive study has assessed the building stock and its suitability for upgrading in energy performance terms. The outcome has been the 'Energy Atlas', three very different local district heating networks and a number of highly innovative demonstration projects. The 'Top Climate Plan' campaign expressed the will to engage local communities and place them at the centre of all improvement plans. In 2013 an urban development company was set up to continue the work of IBA Hamburg in these important areas.

To sum up, these case histories illustrate different facets of urban sustainability and its assessment: water management and urban renewal projects (Manchester's canals), sustainable urban transportation (French and UK cities), the enhancement of urban identity and urban heritage through heritage conservation (Amsterdam ring of canals), links between urban heritage and large-scale new developments (London's King's Cross) and entirely new developments centred on energy saving (Hamburg's IBA project). Questions are raised on the evaluation criteria and practices.

Box I.1 Louvain new university town, Brussels.

During the 1960s, the University of Louvain was faced with having to leave its historic location. In 1969 the decision was taken to relocate on an agricultural site on the Brussels periphery and build at each phase of its growth a high density low rise mix of functions (education, culture, commerce and housing), along a pedestrian spine linking all phases. Figure I.1 shows the centre of the new university town's first phase (1972). The centre of that phase was the Science Library, together with its pedestrian plaza built above an automobile underpass and parking. It is surrounded by university buildings, apartments, shops and restaurants. The town is entirely pedestrian and its underground station (1976) is to become the head station of one of the lines of the Brussels high frequency S-Bahn, instead of a commuter line. Its shopping mall adjacent to the station attracts 8 million visitors a year. Rainwater is collected and fed into a reservoir treated as a publicly accessible lake.

Figure I.1 The Louvain new university town first phase central square, showing the Science Library (architect: A. Jacquemin; overall masterplan and architectural coordination: R. Lemaire, J-P Blondel and P. Laconte).
Source: the author.

Notes

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