

# THE ROLE OF TARGETS AND STANDARDS IN DELIVERING URBAN GREENSPACE FOR PEOPLE AND WILDLIFE

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## Introduction

Greenspace and blue spaces, parks and natural areas (wildspaces) are the places where those who live and work in urban areas have the contact with nature that is important for their mental and physical health and well-being and their quality of life (Faculty of Public Health 2010; Lee and Maheswaran 2011; Tzoulas and Greening 2011; van den Berg et al. 2015; Parliamentary Office of Science and Technology 2016; World Health Organization (WHO) 2016). People experience biodiversity where they live and work. Opportunities for people to come into contact with nature in their everyday lives should be a fundamental part of urban planning and design.

Urban greenspace provision is usually seen in terms of availability standards (a unit area of greenspace for each resident or household) and/or accessibility standards (defined areas of greenspace within set distances from every resident). Simple quantitative greenspace availability standards can mask the accessibility of greenspaces to all urban residents especially at a local scale. The quality of the resource is important in terms of the benefits derived by the public (van den Berg et al. 2015; World Health Organization 2016; Zhang et al. 2017) and urban greenspace standards should incorporate a qualitative standard (Ironsides Farrar Ltd 2005).

Aspirational greenspace policies and goals are commonplace in strategies, masterplans, and frameworks for guiding the spatial planning of towns and cities. Standards, targets, and guidelines need to be included together with timeframes to provide the quantitative basis for such policies and goals. Nilon et al. (2017) reviewed 135 city or metropolitan plans for conserving biodiversity and providing ecosystem services from 40 cities globally and found that few plans contained quantitative targets. Implementation is the key to real success in the provision of urban greenspace and legislation and regulation or financial incentives are the most effective drivers (for example, Chapters 70 and 76; Box 2011). The implementation of greenspace policies may be strategically planned or may be opportunistic, for example as part of a community benefits package negotiated as part of an urban development – or indeed some combination of the two. Studies that investigate how standards and targets for urban greenspace have been incorporated into spatial plans or strategies are rarely undertaken and this lack of data weakens the knowledge-base for the implementation of effective policies.

These issues are addressed by the superb series of six case studies in this chapter from metropolitan areas, cities, and urban areas from five continents that illustrate the complexities of providing greenspace in places where there can be conflicting potential land uses and where the economic value of land is high. The case studies, written by experts in the individual countries concerned, range from urban local authorities in England (United Kingdom), Durban and the eThekweni Municipality (South Africa), Surabaya (Indonesia), Belgrade (Serbia), Portland (United States of America) and across the whole of Chile. Delivering urban greenspace for people and wildlife as set out in these case studies covers a wide range from natural greenspace to urban parks. This is a reflection of the state of the art in developing standards in different countries. The overall goal is to ensure that people have access to greenspace because of the demonstrable benefits but local needs and priorities must be fully taken into account.

### **Case study 1: Accessible natural greenspace standards in England (United Kingdom)**

*John Box*

Access by the public to sites of value for nature conservation has become increasingly important since the pioneering efforts in the early 1980s by local authorities in the West Midlands and Greater London and other major urban areas in England to seek to ensure that all residents have reasonable access to wildlife habitats (Goode 1989). Standards that link people and natural greenspaces have been promoted by the statutory nature conservation agency in England since the mid-1990s (English Nature 1996; Natural England 2010a):

- an accessible natural greenspace of at least 2 ha in size, no more than 300 m (5 minutes' walk) from home;
- at least one accessible 20 ha site within 2 km of home;
- one accessible 100 ha site within 5 km of home;
- one accessible 500 ha site within 10 km of home;
- statutory Local Nature Reserves at a minimum level of 1 ha for every thousand population

This set of standards comprises quantitative accessibility standards that link people and natural greenspaces at different sizes and geographical scales. The standards include a qualitative standard in relation to the provision of Local Nature Reserves (LNR) which is a statutory designation made by local authorities in the United Kingdom (UK) for high quality sites. The primary land use of a LNR must be nature conservation and LNRs are managed for their natural features, habitats, and species and for enjoyment by the public and local residents (Natural England 2010b) (Figure 72.1).

Guidance and targets in relation to people and wildlife and access to nature in urban areas were first published in 1993 (Box and Harrison 1993). Subsequent research refined the minimum of 2 ha of accessible natural greenspace from 500 m to 300 m from every home in urban areas but left the other targets unchanged (Harrison et al. 1995). These targets were adopted in 1996 by the then statutory nature conservation agency for England (English Nature 1996) and are in current use (Natural England 2010a).

Technical and institutional barriers for their implementation were identified (Handley et al. 2003) and a toolkit was produced for local authorities who are the key agencies for applying accessible natural greenspace standards at a local level through planning policies and development frameworks (Barker 1997; Town and Country Planning Association and The Wildlife Trusts 2012).



Figure 72.1 Annual community day at Lodge Field Local Nature Reserve, a high quality urban greenspace

LNRs in England are best seen as nodes in multi-functional green networks, placing them in a landscape context, valuing them as part of the environmental resources of the county or district, and drawing attention to their excellence as sites of nature conservation value (Barker 1997). The demonstration of a positive land use for LNRs has important practical benefits by clearly indicating that there is no potential for other land uses, such as built development, on these sites. Such a positive land-use allocation helps to move away from the idea, particularly in urban areas, that nature conservation only occurs on land which has no other beneficial use.

The standard for LNRs at a minimum level of 1 hectare for every thousand population is a simple and appealing measure that allows local authorities to establish a nature reserve on a statutory basis on land that they own, lease, or over which they have a long-term management agreement. LNRs are designated by local authorities and can be chosen to reflect local priorities primarily in respect of nature conservation but also for recreation through providing opportunities for the enjoyment of nature or for open-air recreation (for example, Natural England (2010b: 7). The position a decade ago in respect of LNRs across the UK was set out by Box et al. (2007).

The implementation of standards for accessible natural greenspace by local authorities may be visible at a local level, but implementation is hard to monitor at a regional or national level in the UK because of the lack of appropriate mechanisms. However, one of the targets – the provision of statutory LNRs by local authorities in England – can be measured over time because the data is collected both locally by local authorities and nationally by Natural England.

The original set of targets and guidelines for accessible natural greenspace (Box and Harrison 1993) included data on the provision of LNRs from a sample of 25 urban local authorities in England. This ranged from an average of 1 ha of LNR for 889 residents (Canterbury, a small

city with rural countryside in the local authority area), against a target of a minimum of 1 ha for every thousand population, to an average of 1 ha for 170,500 residents (Camden, in inner London). Only two local authorities in the sample met the minimum standard for LNRs (Canterbury and Wakefield). This 1993 baseline dataset was updated a decade later in 2006 using the same urban local authorities (Box 2007). There were significant improvements with one urban local authority (Coventry) achieving an order of magnitude increase in the number of LNRs since 1993 and a number achieving an order of magnitude or greater increases in LNR area.

The results of a review of the provision of LNRs by these same urban local authorities in 2018, which is 25 years since the original targets were published, is set out in Table 72.1 (in the appendix to this chapter) together with the results of the 1993 baseline assessment and the 2006 assessment. Data for Salford City Council and Telford and Wrekin Council in 1993 and in 2006 have been included in the appendix although this data was not included by Box and Harrison (1993) and Box (2007). The assessment of the provision of LNRs has become more accurate and more sophisticated since 1993 with online data sources and geographic information systems. There are apparent inconsistencies in Table 72.1 between the data and the comments due to recent updates and revisions to the LNR data. A few LNRs extend outside the boundary of the urban local authority and the decision rules that were applied in these situations are set out at the foot of Table 72.1. The Local Nature Reserves in each of the urban local authorities in the sample were checked for the 2018 assessment.

There were 62 LNRs in total in 1993 in the 27 urban local authorities (2.3 LNRs on average for each local authority), 160 LNRs in 2006 (5.9 LNRs on average) and 207 LNRs in 2018 (7.7 LNRs on average). A few of the urban local authorities in the sample have not really engaged with the concept of LNRs; others have made steady progress with designations. Two of the urban local authorities had achieved the target of 1 ha of LNR for every thousand population in the 1993 assessment and this had increased to six local authorities in the 2006 assessment (Canterbury, Gloucester, Norwich, Stoke-on-Trent, Telford, and Wrekin, Wakefield) but this had not changed by the 2018 assessment. Those local authorities in highly urbanized areas have to struggle to find suitable sites given the high land values and pressures for built development and their LNRs tend to be small. Any comparison between different urban local authorities in the provision of LNRs should take into account that the local authorities in the sample range from highly urban (e.g. Birmingham, Camden, Haringey, Islington, Sandwell, Southwark) to some that have substantial rural areas within the local authority area (e.g. Canterbury, Leeds, Peterborough, Salford, Telford, and Wrekin, Wakefield).

The total number of LNRs in the sample increased by 98 over the 13 years between 1993 and 2006 but by only 47 over the next 12 years to 2018; put another way, the average number of LNRs in each of the sample of urban local authorities had more than doubled from 2.3 in 1993 to 5.9 by 2006 but only tripled to 7.7 by 2018. This is evidence that the rate of designating LNRs has halved since 2006 compared to a similar period before 2006. In fact, 12 of the 27 urban local authorities have not declared any LNRs since the 2006 assessment. Nevertheless, some of the local authorities have substantially increased their numbers of LNRs over the same time period. The reasons for such major differences between different urban local authorities and between two time periods are not obvious, although the presence or absence of LNR champions may well be a factor (Nilon et al. 2017: 340).

There is no agency in England charged with responsibility for LNRs. Natural England has promoted LNRs since the early 1990s and was responsible for the national standard for accessible natural greenspace (English Nature 1996; Natural England 2010a). Funding to assist more and better LNRs was made available by English Nature (now Natural England) through the

*Wildspace!* grants program in 2001 and this lasted until 2006 with a total of £7 million spent. My conclusion is that it is once again time for a targeted grant scheme that is combined with a promotional program about the importance of LNRs to the health and well-being of everyone and which is focused on the contribution of LNRs to the current national standard for accessible natural greenspace (Natural England 2010a, 2010b).

## **Case study 2: Local government efforts to secure biodiversity values for citizens in eThekweni Municipality, South Africa**

*Richard Boon*

eThekweni Municipality is the local government administration responsible for the eThekweni Municipal Area (EMA) in the province of KwaZulu-Natal on the eastern seaboard of South Africa. The EMA is 2556 km<sup>2</sup> and includes the city of Durban, although the whole EMA is sometimes referred to as Durban. The population of the EMA is approximately 3.8 million with nearly 25 percent of people living in informal settlements (eThekweni Municipality 2017a). There are high levels of inequality and South Africa is the fourth most unequal society in the world (Chitiga et al. 2014). The municipal area forms part of the Maputaland-Pondoland-Albany global biodiversity hotspot (Critical Ecosystem Partnership Fund n.d.). By 2012, 54 percent of the municipal area had been transformed for agricultural and urban development, and an additional 17 percent was considered degraded (McLean et al. 2016). Despite the loss, Durban's environments provide ecosystem services worth at least US\$350 million annually and the total asset value of these areas is estimated to be at least US\$4–5.16 billion (Turpie et al. 2017) (Figure 72.2). In terms of the Constitution of South Africa (South African Government 1996), nature conservation is primarily the responsibility of national and provincial government, but the Municipality also plays an active role as part of its planning mandate and providing local services.

The eThekweni Municipal standard for the supply of public parks is 0.4 ha per 1,000 people (CSIR 2012). The standard is applied to current and future needs and is not mandatory. Other standards apply to sports fields, but no standards have been developed for green belts, coastal amenities, biodiversity areas, and community gardens. Previous standards were more generous, but the scarcity of flat, affordable land, the infrequent or non-use by people in areas well-endowed with parks, and good access to other open spaces like beaches and nature reserves led to the reduction of the standard (CSIR 2010). The quality and maintenance of eThekweni's parks need improvement and a survey revealed that people would prefer access to fewer, larger parks that are better maintained and secure rather than many small, poorly maintained parks with limited facilities (CSIR 2010).

Using the current Municipal standard, an analysis using a maximum travel distance of 2 km (i.e. a reasonable walking distance) showed that the percentage of the population that had adequate access to parks was 66 percent (CSIR 2012). Furthermore, the level of service in urban areas was far higher than for sparsely settled rural areas (CSIR 2012). Using this information, 140 locations were identified where new parks could be provided adjacent to existing sports fields (to increase usage and minimize costs) and where a minimum of 1000 people live within 1 km of the site (CSIR 2012). Adding the proposed new parks will increase access to parks within the prescribed standards to 80 percent (CSIR 2012). These locations are where the greatest backlogs exist and are predominantly in the more peripheral, under-served, racially segregated townships established before and during the Apartheid era.

With respect to nature reserves, 40 percent of the overall population of the Municipality has good access and the central urban population has excellent access (99 percent), a legacy





Figure 72.2 Collecting rushes for making mats

of good provision by the former Durban City Council in a much smaller area mainly of formal suburbs where resources were more plentiful (CSIR 2008). The amalgamation of multiple local authorities into a large metropolitan eThekweni Municipality authority since 1994 has generally not been matched by provision of nature reserves in these areas. The Municipality aims to address this and is focusing on critical biodiversity areas identified by a fine-scale systematic conservation assessment (SCA) (McLean et al. 2016). The Durban Metropolitan Open Space (D'MOSS) Plan was first adopted by the former Durban City Council in 1989 and includes an environmental layer which is currently based on the SCA. Areas included within D'MOSS are important for biodiversity conservation and the supply of ecosystem services. Since the mid-2000s, the D'MOSS layer has been extended to the full municipal area and included in all spatial planning outputs from the Municipality, including all town planning schemes from December 2010, a first for South African cities (Boon et al. 2016).

Implementing plans in a developing and resource-constrained metropolitan area is challenging. By 2017, only 8.2 percent of D'MOSS areas (or <3 percent of the EMA) enjoyed some legal protection and 7.7 percent was managed for environmental purposes (eThekweni Municipality 2017b). These protection rates are well below the target of 17 percent by 2020 set by the Convention on Biological Diversity (CBD) (n.d.) for terrestrial and inland water. They also fall short of national and provincial targets for vegetation types, which range

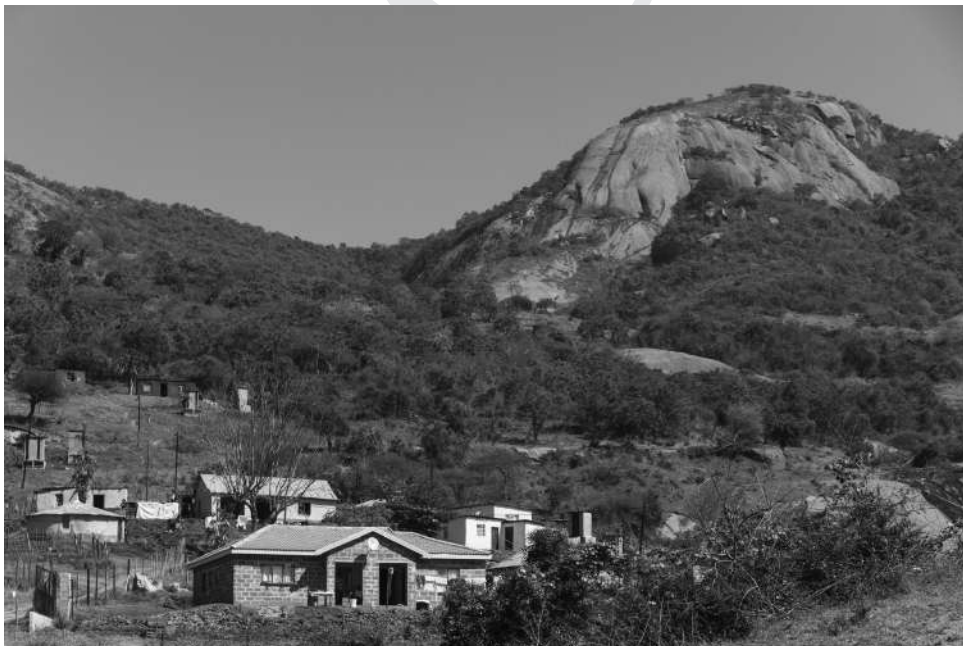
### *The role of targets and standards*

between 19 percent and 31.3 percent for non-forest targets and 61.6 percent to 100 percent for forest targets (Jewitt 2011), although these targets and the CBD targets are for larger geographical areas.

Since 2002, 646 ha of land have been purchased by the Municipality for new nature reserves, focusing on threatened ecosystems in areas where protection rates are lowest and very few protected areas exist. An offset bank is proposed to secure larger areas, which far exceed acquisition budgets, in a part of the city likely to soon experience significant development pressure due to the roll out of national strategic infrastructure projects. After acquisition, areas are rezoned and, where relevant, applications are made for proclamation in terms of national legislation. Currently 11 existing municipal nature reserves are being proclaimed to improve legal protection and two new applications for nature reserve proclamation are in preparation.

Acquisition and management of environmental assets by the Municipality alone will be insufficient and a municipal biodiversity stewardship program has been established to secure environmental assets through partnerships with various landowners. This makes good business sense because in South Africa it costs 70–400 times less to establish a protected area through biodiversity stewardship than through state acquisition; and managing a biodiversity stewardship site costs 4–17 times less than state managed areas (SANBI 2017). A successful example is the 350 ha Giba Gorge Environmental Precinct, which is a very popular recreational resource and is funded and managed jointly by the Municipality and private landowners through small additional property tax contributions.

The many successes to date are dwarfed by the challenge that ~44 percent of the EMA is communal land and is jointly administered with the Ingonyama Trust (Figure 72.3). Many of the key environmental assets in the EMA are on communal land, but none has been set aside for nature conservation. The Municipality is attempting to tackle this through its biodiversity



*Figure 72.3* Sithumba Mountain and rural settlement Inanda Valley

stewardship program, but progress appears to be too slow given the rapid development of this land for low density residential uses and the unsustainable use of natural resources.

Nonetheless, the Municipality remains dedicated to contributing to global and national efforts to protect important biodiversity and to ensure that its citizens enjoy the benefits that flow from well protected and managed landscapes. There is some hope that the task may be eased as the contribution of the environment to human well-being becomes more widely known by decision-makers and the public. Hints of increasing acceptance can be found in the support provided by politicians, officials, and the public for environmental and biodiversity issues in the EMA whereas in the past development priorities have often taken precedence (Roberts 2008).

### Case study 3: Greenspaces in Surabaya, Indonesia

#### *Timoticin Kwanda*

Surabaya, the second largest city in Indonesia after the capital of Jakarta, has been transformed into the most successful green city in the country. Surabaya has received national and international awards for green and sustainable cities, such as the 2011 ASEAN Environmentally Sustainable City Award, the 2013 United Nations Asian Townscape Award for Bungkul Park, the Adipura Kencana (the highest national Indonesian sustainable city award) for the last seven years from 2010 to 2017, and recently the 2017 United Nations Sustainable City and Human Settlements Award for Global Green City. The achievement is related to a substantial governance shift in decision-making processes in the last seven years under the mayor of Surabaya, Tri Rismaharini, who has promoted changes in the city's administrative instruments and conditions. One of the recent changes relates to the provision of greenspaces in the city.

The provision of greenspaces in Surabaya follows the national standards for accessible greenspace which includes natural greenspace. These standards have been promoted by national regulation since 2001 through the Ministry of Human Settlement and Infrastructure *Guidance for Minimum Services Standard 2001* (Keputusan Menteri Perumahan dan Prasarana Wilayah No. 534/KPTS/M/2001 tentang Pedoman Standar Pelayanan Minimal), the National Standardization Body *Neighborhood Planning Techniques in Cities 2004* (Badan Standardisasi Nasional 03-1733-2004 tentang Tata Cara Perencanaan Lingkungan Perumahan di Perkotaan), and the Ministry of Public Works *Guidance for Provision and Usage of Green Open Space in Cities 2008* (Peraturan Menteri Pekerjaan Umum No. 05/PRT/M/2008 tentang Pedoman Penyediaan dan Pemanfaatan Ruang Terbuka Hijau di Kawasan Perkotaan). These three national standards and guidance operate at different urban scales:

- in a sub-neighborhood unit (*rukun tetangga*) of 250 population, at least one accessible greenspace of 250 m<sup>2</sup> or 1 m<sup>2</sup> per person and that is located within 300 m from home;
- in a neighborhood unit area (*rukun warga*) of 2500 population, at least one accessible greenspace of 1250 m<sup>2</sup> or 0.5 m<sup>2</sup> per person and that is located within 1 km from home;
- in a sub-district area (*kelurahan*) of 30,000 population, at least one 9000 m<sup>2</sup> site or 0.3 m<sup>2</sup> per person and that is accessible from home within the same sub-district;
- in a district area (*kecamatan*) of 120,000 population, at least one 24 ha site or 0.2 m<sup>2</sup> per person and that is accessible from home within the same district.



The implementation of these standards for greenspace by local authorities is visible in Indonesia especially for new buildings and residential development that are controlled through approval of building and site planning permits. The standards are hard to implement in the existing densely developed areas, namely the kampung neighborhoods. From the 1990s onwards, Surabaya has promoted the Kampung Improvement Programs to add greenspace through land consolidation and from 2005 through the Surabaya Green and Clean program to educate the residents of the kampungs to participate in improving the local quality of the environment. One of the activities besides reducing waste is planting productive plants in front and back yards and along roadsides.

In delivering greenspace, the national government through the Planning Act 2007 (Undang-Undang Republik Indonesia Nomor 26 Tahun 2007 tentang Penataan Ruang) designates 30 percent of the urban area for greenspace, comprising 20 percent public and 10 percent private greenspace. Surabaya has attempted to reach the compulsory proportion of 30 percent public and private greenspace by delivering the local 2007 Spatial Plan Year 2010–2030.

In this 2007 Spatial Plan, the city has revised the planned land use for 2600 ha of the eastern coastal plains from new residential land to the original land uses of mangrove conservation area, fishponds, and marshland ecosystem. In addition, the city government has also converted derelict plots and gas stations located in the road median strip into active greenspace. This is a great change in relation to urban sustainability. In the 1990s, Surabaya lost around 600 ha in the western part of the city from its original land use of urban forest as stated in the Surabaya Master Plan 2000 to become a new residential development of five golf courses and housing developed by private investors. In 2018, the city has started to collaborate with the Indonesian Institute of Sciences to develop 60 ha of the eastern coastal area as the first phase of a mangrove botanical garden.

As of 2016, Surabaya manages 6692 ha of public greenspace such as parks, cemeteries, sports areas, rivers and coastlines, lakes, reservoirs, and forests, including 43.45 ha of public greenspaces comprising 282 passive recreation parks and 110 active recreation parks that are accessible in 31 districts of the city. Based on a survey undertaken in 2014 (Kwanda et al. 2014), the visitors to the parks were mostly from nearby communities (60 percent) and were getting to the parks within 10–15 minutes either on foot (26 percent) or on motorcycles (72 percent). Public greenspace is 20.25 percent of the area of Surabaya (33,048 ha) which meets the 20 percent public greenspace as mandated by the national and local regulations.

The 27 popular active parks in the city are visited by families and young people for sport and recreation including Bungkul Park, Flora Park, Surya Park, and Pakal City Forest. Bungkul Park (1.55 ha) is located at the main road of Darmo Street and opened in March 2007. The park has an amphitheater for sports activities, music and art performance; the park is equipped with various features such as a jogging track, sitting out areas, and a path for disabled people; there is Wi-Fi Internet access, a bicycle BMX track, children's playgrounds with slides and glides, swings, seesaws, a skateboard arena, and a culinary location selling various local food and drinks (Figure 72.4).

Flora Park (3.38 ha) opened to the public in August 2007 and is a vibrant location noted for its diverse greenery with many trees beneath which people can sit in the shade whilst enjoying cool breezes and birdsong. It has a mini zoo with deer, an aviary, a fishpond, children's playgrounds, and an outdoor area for rope and tree climbing. There is a pavilion for music and art performance, and a learning center equipped with computers and Internet access for public use and for entertainments (Figure 72.5).

Surabaya is one of the most successful green cities in Indonesia and has achieved the 20 percent public greenspace as required by the national and local regulations. This achievement is



Figure 72.4 Bungkul Park: a bird's-eye view showing planting around the amphitheater (top) and greenspaces with seating area, skateboard arena, and reflexology pathway in Bungkul Park (bottom)

not only associated with the important role of the mayor of Surabaya, who is the driver of changes in the city's greenspace, but it is also due to other key actors. Among them are private companies that allocate funds for the greenspace projects as part of their Corporate Social Responsibility (CSR) programs, and the communities who actively participate in the annual Surabaya Green and Clean programs and Environmental Cadres programs.

#### **Case study 4: Regulating greenspaces: initiatives, documents and standards in Belgrade, Serbia**

*Aleksandra Stupar*

The green features of the city of Belgrade have always represented an important element of its identity. The major development strategies and documents have followed the contemporary paradigms of urban planning and design by thoroughly elaborating the issues of distribution, typology, and quality of greenspaces.

The crucial moment of the post-World War II development and transformation was marked by the 1972 Master Plan (approved in 1973), which envisioned the development of Belgrade



Figure 72.5 Flora Park is a vibrant spot noted for its diverse greenery with many trees, an aviary and a fishpond (top) and a mini zoo with deer (bottom)

until 2000. Based on latest global trends and knowledge, the plan extended the spatial limits of the city, tracing urban growth along three main expansion axes (Stupar 2015). This approach directed the development via new settlements, promoting the idea of the ‘archipelago of new towns in the sea of greenery’. An important focus of the Master Plan was a general improvement of living conditions, as well as environmental upgrading of residential and industrial areas and traffic networks. Underlining the necessary interaction between the city and its two rivers





Figure 72.6 The natural core of Belgrade – the confluence of the Sava and Danube and the view toward New Belgrade

(Sava and Danube), it introduced regional natural systems into urban areas and anticipated a so-called ‘primary (green) network of climate infrastructure’, composed of green corridors and spaces. The 1972 Master Plan envisaged public greenspaces, recreational/sports centers, and protective green belts (without residential and industrial areas and corridors) which would occupy 48.5 percent of the total metropolitan area (Figures 72.6 and 72.7).

The revision of the Master Plan (1985) revealed problems in implementation: green infrastructure was incorporated into riverbanks, recreational and sports areas, industrial areas and main traffic corridors, but the planned protective green/forest belts were not created and the greening of the urban core was neglected. The quality of greenspaces was inadequate and exposed to degradation and discontinuity. The revised Master Plan compared the standards achieved in 1940 (28.5 m<sup>2</sup>/inhabitant), 1971 (23.84 m<sup>2</sup>/inhabitant), and 1983 (19.20 m<sup>2</sup>/inhabitant) confirming a negative trend. Consequently, the issues of quality improvement, connectivity, and extension of green areas were addressed, while the previously anticipated standard of inner-city green areas (24.71 m<sup>2</sup>/inhabitant) was decreased to the more realistic 20 m<sup>2</sup>/inhabitant.

The problems of defragmentation and unequal development of green infrastructure continued and the next planning document – The Master Plan 2021 (Generalni plan Beograda 2021) approved in 2003 – particularly emphasized the negative role of poor maintenance and illegal construction in green areas. According to this document, the overall standard of greenspace in Belgrade was 18.45 m<sup>2</sup>/inhabitant, but central areas were drastically below this number – e.g. one of the central municipalities (Vračar) provided only 2.41 m<sup>2</sup>/inhabitant.



Figure 72.7 The natural core of Belgrade – Belgrade Fortress and the historical area

The Master Plan 2021 and its several revisions upgraded and further extended the concept of greenspaces defined in previous documents, stressing the importance of a protective green belt around the city and its connections to central urban areas. The plan proposes a higher (primary) urban status for green infrastructure and the necessity of new ‘green regulation’. The elements of sustainability and environmental awareness are also embedded, while the importance of greenspaces and the concept of urban resilience have been officially recognized in a number of documents focused on different aspects of urban development (national and metropolitan), both on the level of regulation and the level of legislation. Currently, the regulation framework includes the *Spatial Plan of the Republic of Serbia* (Prostorni plan Republike Srbije) 2010, *Regional Spatial Plan of the Administrative Territory of the City of Belgrade* (Regionalni prostorni plan administrativnog područja Beograda) 2004 (revised 2011), *Master Urban Plan of Belgrade* (Generalni urbanistički plan Beograda) 2016, and *General Regulation Plan of the Building Area of the Local Self-Government Unit – City of Belgrade, units I–XIX* (Plan generalne regulacije građevinskog područja sedišta jedinice lokalne samouprave – Grad Beograd, celine I–XIX) 2016 and 2017. The legal framework consists of a number of laws and decisions – *Law on Environmental Protection* (Zakon o zaštiti životne sredine), *Law on Strategic Environmental Impact Assessment* (Zakon o strateškoj proceni uticaja na životnu sredinu), *Law on Nature Protection* (Zakon o zaštiti prirode), *Law on Forests* (Zakon o šumama), *Water Law* (Zakon o vodama), *Law on Communal Activities* (Zakon o komunalnim delatnostima), *Decision on Regulation and Maintenance of Parks, Green and Recreational Spaces* (Odluka o uređivanju i održavanju parkova, zelenih i rekreacionih površina), and *Regulation on Ecological Network* (Uredba o ekološkoj mreži).



The *General Regulation Plan of the Building Area of the Local Self-Government Unit – City of Belgrade* defines the general concept of greenspaces, based on the Master Plan 2021, recognizing categories of ‘core’, ‘inner ring’, ‘outer ring’, ‘green links’, continually built urban fabric and discontinuous built area. It provides the typology of greenspaces, elements, and rules of implementation. The General Regulation Plan also recognizes the following standards of accessibility and availability:

- regional parks and forests – area of 500 ha within 10 km of a residential area;
- parks – local (2 ha within 300 m of a residential area); municipal (20 ha within 1.2 km); city park (60 ha within 3.2 km);
- ecological parks/nature reserves (minimum of 1 ha/1000 inhabitants);
- green corridors – 80 trees/km;
- communal spaces, courtyards, mini-parks – minimum 1 ha/1000 inhabitants.

In conjunction with these planning documents, an exceptional effort has been made by the Urban Planning Institute of Belgrade, in charge of the project *Green Regulation of Belgrade* (Zelena regulativa Beograda). Initiated by the Executive Assembly of the City of Belgrade in 2002, the project aimed at solving numerous problems which limited the implementation of the integral system of greenspaces. These problems included the lack of valid studies and information on condition, monitoring, comprehensive land recording and ownership of greenspaces, as well as the issues of illegal construction in green areas; inefficient management and maintenance; and application of laws and regulations. The first phase resulted in the *Draft of the Law on Protection and Improvement of Green Spaces of Belgrade* (Nactr Zakona o zaštiti i unapređenju zelenih površina) 2003. The second phase in 2004 focused on the establishment of a geographic information system (GIS) database of greenspaces and the mapping of biotopes; these were completed in the third phase (*Mapping and Evaluation of Belgrade's Biotopes* (Kartiranje i vrednovanje biotopa Beograda) 2005–2007). The fourth phase resulted in the document *Concept of the Plan of General Regulation for the System of Green Areas of Belgrade* (Koncept plana generalne regulacije sistema zelenih površina Beograda) 2014, with a comprehensive elaboration of standards for planning and design of greenspaces. The standards were defined in accordance with a quantitative analysis of availability and accessibility to greenspaces and features taking account of selected European standards (e.g. Miess and Miess 1987); local needs were assessed and deficiencies in greenspaces identified.

The proposed standards for green areas, with recreation as the dominant activity are: 6 m<sup>2</sup>/inhabitant at the local level; 13 m<sup>2</sup>/inhabitant at the municipality level; 25 m<sup>2</sup>/inhabitant at the city level. The draft of the *Plan of General Regulation for the System of Green Areas of Belgrade* (Plan generalne regulacije sistema zelenih površina Beograda), based on the Concept document from 2014, is currently in the adoption procedure. It suggests additional standards – a minimum of 7 m<sup>2</sup> of greenspace/inhabitant at a distance of 300 m from the regulation line of an urban block (urban reconstruction), a minimum of 10 m<sup>2</sup>/inhabitant for urban transformation and a minimum of 23 m<sup>2</sup>/inhabitant for new housing areas. The draft plan also defines very precise rules for different types of greenspaces, their protection, reconstruction, and the design of new spaces.

Although positioned at the confluence of the rivers Sava and Danube, Belgrade has never fully used its natural resources, especially its natural core consisting of riverbanks, river islands, and forests. Nowadays, these natural resources are recognized as an important competitive advantage which could improve the ‘green’ perception of the urban environment and facilitate its development in a sustainable way. The recent plans definitely express increased levels

of ecological awareness, but their implementation remains challenged by the turbulent socio-economic context. Integrating nature into urban space is not an easy task, but it could be achieved through sensitive minor changes, multi-functionality, and adaptability of the landscape of Belgrade, conducted by both formal and informal initiatives. Hopefully, the advanced concepts embedded into planning documents will become a part of urban reality, highlighting the natural features of the capital of Serbia.

Jenna H. Tilt

### **Case study 5: Emerging issues and changing metrics: Portland Metro Region (Oregon), United States of America**

In the USA, there is no one set standard for the amount of park and greenspace a community should strive to achieve. Standards are often set at the local jurisdiction level with recommendations stemming from state and national non-profit organizations such as the National Recreation and Park Association (NRPA). The NRPA recommended the national 'Level of Service' (LOS) for urban park and greenspaces until 2016, after which the organization recommended individual jurisdictions create their own LOS to reflect their individual resource capacities and needs (National Recreation and Park Association 2016). Prior to this change, LOS standards were based on ratio between the type of park or greenspace and population size. For example, Oregon Parks and Recreation Department uses a LOS standard of 2–6 acres (0.81–2.43 ha) for nature parks (e.g. greenways, natural areas, and preserves) and a LOS of 1–2 acres (0.40–0.81 ha) of neighborhood park space (e.g. playgrounds, sports fields) per 1000 residents based on previous NRPA standards (Oregon Parks and Recreation Department 2013). The shift away from national standard recommendations to specific individual standards reflects the dynamic changes in the understanding and management of park and greenspace functionality in complex urban socio-ecological systems. These changes also reflect the tightly constrained operation and maintenance budgets that many jurisdictions currently face. In the absence of national standards for parks and greenspaces, communities have created their own.

Increasingly, the management of greenspaces across jurisdictions includes new goals or policies to address socio-economic inequities. Researchers have found disparities in the proximity, type, and quality of amenities offered in parks and greenspaces available to low-income and ethnic minority neighborhoods compared to higher income and/or predominately white neighborhoods (Chona et al. 2010; Taylor et al. 2007). Low-income and ethnic minority communities also face more barriers when accessing parks and greenspaces, such as busy streets without safe pedestrian crossing, lack of streetlighting, and/or lack of recreation programming offered within the park (Cohen et al. 2016; Finkelstein et al. 2017). Together, these factors can limit park and greenspace access and use for low-income and ethnic minority populations, thus lowering their exposure to the multiple physical, mental, and social benefits these spaces can offer (see Frumkin et al. 2017 for review).

To facilitate the identification of areas of inequities in greenspace access and other essential community services, the Regional Equity Atlas Project was launched in the Portland, Oregon Metropolitan Area (Metro) region in 2007. The project analyzes the differential patterns of greenspace access and demographics, highlighting access disparities across the region. These equity maps provide clear guidance to where municipalities ought to focus their efforts to increase greenspace and/or improve access to existing greenspaces (<http://regionalequityatlas.org/>). For example, the city of Portland (Oregon) Parks and Recreation (PPandR) has included a policy standard to provide a 0.5 mile access to a park or natural area for all Portland households (Portland 2020 vision) for the past 20 years; currently approximately 80 percent of

Portland households meet this standard. However, moving the needle on that last 20 percent of households has proven difficult and these households are more likely to be low-income/minority households. In effort to address this and other equity issues, PPandR restructured its organization in 2015 to include a new Equity and Inclusion division that works collaboratively across the agency to ensure policies and programs align with Portland's racial equity goals (PPandR 2017). The 2017–2020 PPandR Strategic Plan highlights several initiatives aimed at improving park and greenspace access and amenity/facility equity, such as tree planting programs in low-income neighborhoods, and completing a new comprehensive park plan that will include an in-depth demographic forecasting analysis to guide future park planning.

However, researchers have noted that, in some instances, heavy investments in park and open spaces in low-income and ethnic minority neighborhoods have given rise to new threat: 'green gentrification'. Researchers have noted a trend in some cases where increased park and greenspace investments is followed by displacement of local residents as housing costs and property values rise (Curran and Hamilton 2012; Wolch et al. 2014). To protect against green or eco-gentrification, researchers suggest a collaborative, bottom-up community planning approach that aims to increase access and park and greenspace improvements as specified by and for low-income and minority communities, while actively discouraging speculative development that may accompany the greenspace investment (e.g. high-priced park cafes) (Curran and Hamilton 2012).

The city of Portland has witnessed widespread gentrification in the past decade (Gooding et al. 2015). In an effort to slow the rate of gentrification, the draft city-wide comprehensive plan includes stipulations to provide equitable access to parks and recreation and community centers. However, the plan does not stipulate measures for community involvement in selecting park areas or providing improvements (Bureau of Planning and Sustainability 2014). It should be noted that the city of Portland is addressing gentrification and equity issues in other program areas, namely via transportation and affordable housing programs. In addition, regional organizations such as the Portland, Oregon and Vancouver, Washington regional alliance, The Intertwine Alliance, are currently focusing their efforts to increase equity in their programs and projects. The Intertwine Alliance is comprised of governmental, non-profit, and for-profit organizations that provide or support the regions' network of parks, trails, and greenspaces ([www.theintertwine.org/](http://www.theintertwine.org/)). The Alliance encourages an 'equity lens' to be applied to the projects it promotes and supports. Currently, the Intertwine Alliance is focused on extending its reach of partner organizations that work directly with low-income and minority populations and neighborhoods to facilitate urban nature projects that are meaningful and culturally appropriate ([www.theintertwine.org/equity-and-inclusion-strategy](http://www.theintertwine.org/equity-and-inclusion-strategy)).

Another emerging trend in the USA, and elsewhere, is the recognition of critical ecosystem services that many parks and greenspaces provide. Capitalizing on these spaces to increase stormwater management, urban cooling functions, and other green infrastructure services is increasingly important as climatic patterns change and many urban communities continue to develop and grow. For example, Portland, Oregon has extensive green infrastructure programs that operate within parks and greenspaces, as well as on private property (see Mell 2014 for review). Many of these programs encourage, and increasingly require, stormwater management abatement through best management practices (such as rain gardens, bioswales, porous pavement, and green roofs; extensive urban forestry practices) together with low impact development practices such as residential clustering and conservation and restoration of riparian corridors (Ahiablame et al. 2012) (Figure 72.8). At the regional scale, the Portland, Oregon/Vancouver, Washington region includes four National Wildlife Refuges that provide essential ecosystems services such as natural flood control, water quality improvements, and critical



Figure 72.8 Tanner Springs Park in downtown Portland, Oregon. The park functions as a gathering space for the community, improves stormwater quality prior to entering major waterways, and mitigates flood risk in the neighborhood

wildlife habitat (United States Fish and Wildlife Service 2016). The urban refuges also have extensive environmental education programs and partner with local non-profit organizations to increase volunteerism across the refuge system in an effort to connect the refuges with local communities (United States Fish and Wildlife Service 2016).

Calculating the cost–benefit ratios of these ecosystem services is rapidly becoming necessary as more local jurisdictions and regional organizations require a cost–benefit analysis for park and greenspace management and acquisition in times of sharp budget shortfalls. The NRPA Water Value Calculator (<https://nrpaprorgis.com/parks/index.html>), Green Values: National Stormwater Management Calculator (<http://greenvalues.cnt.org/national/calculator.php>), and the National Tree Benefit Calculator ([www.treebenefits.com/calculator/](http://www.treebenefits.com/calculator/)) calculate the value of green infrastructure in terms of ecosystem services; development and long-term maintenance costs; and property value, stormwater abatement, and air quality. Yet missing from these calculations is an assessment of the social and health co-benefits of green infrastructure and conservation practices (Meerow and Newell 2017; Frumkin et al. 2017). Omitting these important human benefits may undervalue important parks and greenspaces, making them more vulnerable to management decisions that may not fully protect these spaces or the benefits within them (Meerow and Newell 2017; Frumkin et al. 2017). Encouragingly, the NRPA offers a ‘Park Values’ calculator that captures both ecosystem service benefits as well as health benefits to the community (<https://nrpaprorgis.com/EcoBenefit.aspx>). However, more research and development is needed to quantify the multi-functional benefits that parks and greenspaces provide.

Park and greenspace standards in the USA have shifted from one-size-fits-all recommendations to a more specific, tailored approach for each jurisdiction. This shift reflects the unique socio-ecological challenges facing urban park and greenspace management today, such as addressing inequities in park access and greenspace amenities and creating/managing park and greenspaces

that support important ecological functions while providing human benefits. These changing standards have given rise to changes in defining, identifying, and measuring park and greenspace access, community vulnerability and gentrification, as well as quantifying the multiple costs and benefits of creating and maintaining park and greenspaces. The Portland, Oregon/Vancouver, Washington regional area, through the Intertwine Alliance and the urban refuge system, is at the forefront of meeting those challenges and provides a framework for other regions in the USA and elsewhere to follow.

## Case study 6: Urban greenspace standards in Chile

*Alexis Vásquez*

The most frequently used indicator in Chile, and in Latin America to assess the supply of urban greenspaces is the area of public greenspace per number of inhabitants of a given administrative unit, usually expressed in  $\text{m}^2/\text{inhabitant}$  (Flores and González 2010; Reyes and Figueroa 2010; Laredo and Mirtha 2011).

A widely used standard in both the scientific literature and public policy documents is an alleged WHO recommendation referring to a minimum standard of  $9 \text{ m}^2$  of green open space for each urban resident (see Kuchelmeister 1998). However, it has not been possible to find the original WHO publication supporting this standard, making it remarkable for the speed and degree of adoption of this metric. Therefore, the main questions remain: why is  $9 \text{ m}^2/\text{inhabitant}$  the recommended standard, why does everybody support it, and what positive effects on health would that standard ensure?

There could be two main reasons for the rapid adoption of this indicator and its widespread use in the region and especially in Chile. Firstly, the Inter-American Development Bank supported the development of two seminal publications derived from a seminar organized in 1996: Krishnamurthy and Rente Nascimento (1997) and Sorensen et al. (1998) which both refer to this indicator. Due to the magnitude of this collaborative effort in the region and the close link to potential Inter-American Development Bank financial support for urban greenspace development, it was very likely that national governments adopted the standard of  $9 \text{ m}^2/\text{inhabitant}$  to justify the request for resources and to use it as a monitoring mechanism. Secondly, the indicator is relatively simple to calculate since it only requires information on the size of the population and the area of greenspaces within an administrative unit. This information is easily available in the countries of the region, since it is collected in population censuses and cadasters (land records) of municipal greenspaces.

In Chile, the availability standard of  $9 \text{ m}^2/\text{inhabitant}$  has been widely used in research and scientific articles as well as in public policies (Reyes and Figueroa 2010; Ministry of the Environment 2011; Aravena et al. 2012) drawing attention to two fundamental issues. The first is the level of inequality in the distribution of greenspaces when comparing different regions and cities in Chile (for example, Arica y Parinacota has  $0.7 \text{ m}^2/\text{inhabitant}$  and Maule has  $7.2 \text{ m}^2/\text{inhabitant}$ ), and also when comparing different communes or neighborhoods within the same city (e.g. in Santiago, El Bosque  $1.8 \text{ m}^2/\text{inhabitant}$  and Vitacura  $56.2 \text{ m}^2/\text{inhabitant}$ ) (Reyes and Figueroa 2010; Ministry of the Environment 2011). The second is the identification of zones with the greatest deficit of greenspaces and the subsequent development of mechanisms to improve this deficit. Both these issues have emerged strongly in the last two decades within the social debate and public agenda resulting in very important actions taken by



the national government through the Ministry for Housing and Urbanism, such the development of the *Chile Greenspace Plan* (Plan Chile Área Verde).

One of the main causes for the deficit of greenspaces in the poorest municipalities is the small amount of resources available for their construction and even more for their maintenance. To address this, the Ministry for Housing and Urbanism has developed the Chile Greenspace Plan that enables the construction and maintenance of large and high-quality parks in low-income cities and municipalities with the largest deficit of greenspaces (Ministry for Housing and Urbanism 2014a).

In Chile, as in other regions of the world, there are formal references to accessibility standards for greenspaces (the maximum distance to a greenspace – according to their size – from every resident) that go beyond the simple metric of the area of greenspace for each inhabitant (the availability of greenspaces). However, these accessibility standards seem to have had less of an impact on the public agenda in Chile. This could be due to the complexity of their calculation since this involves the use of geographic information systems and network analysis.

The use of accessibility standards has not been widely used in Chile with few examples from the scientific literature and technical studies (Reyes and Figueroa 2010; Cea et al. 2017), and there is only one official guideline that incorporates an accessibility standard of 500 m (Resolución No. 1596 Exenta 2010). In Chile, the distance to a greenspace has been the most important indicator of accessibility but this does not take into account other accessibility factors such as entry fees and other physical barriers.

This demonstrates that Chile is lacking in qualitative urban greenspace standards. This could be partly explained by the current legal definition of greenspaces: ‘a space eminently for recreation or pedestrian circulation that can contain vegetation and other complementary elements’ (Urbanism and Construction Act 1992). Accordingly, a greenspace in Chile does not have to contain any vegetation and, therefore, areas covered by impervious surfaces such as skate parks and cement soccer courts can be officially defined as greenspaces. Clearly, this does not allow for all the ecological and social benefits over and above those related to recreation such as vegetation cover, biodiversity, noise level, and air temperature which could be covered by qualitative urban greenspace standards.

A new National Urban Development Policy was enacted in 2014 that incorporates a greater concern for environmental aspects and the quality of the urban habitat (Ministry for Housing and Urbanism 2014b). An important part of the implementation of this policy is the discussion and definition of new urban standards, including those referring to greenspaces. This process has disclosed the need for a new legal definition of greenspace that highlights the multiple social, economic, and environmental benefits, as well as the need to define indicators and standards for each of these three categories of benefits (Cea et al. 2017).

The progress in the definition of standards and targets in the quantity, the accessibility, and the quality of urban greenspaces in Chile needs to take account of the large differences in the climatic gradients. The area of greenspace per inhabitant, the distance to a greenspace (walking time), the amount and type of vegetation in a greenspace, as well as the park facilities should not be the same in cities such as Calama, Santiago, Valdivia or Aysén with, for example, mean annual precipitation totals varying from 27 mm and 350 mm to 2231 mm and 2940 mm respectively (Figure 72.9).

The most widely used standard in Chile is the availability standard of 9 m<sup>2</sup>/inhabitant. Despite the lack of a well-known technical foundation, this standard has had a major impact on public debate and on the development of public policies to mitigate the inequality of the distribution of urban greenspaces in Chile. Progress is needed in the definition of context-specific standards



Figure 72.9 An urban greenspace in Caldera located in the arid zone of Chile

for different climatic zones. The process of the implementation of the new National Urban Development Policy offers opportunities to address the lack of qualitative urban greenspace standards and to develop mechanisms to incorporate them into strategies, guidelines, and masterplans.

## Conclusions

Lawton et al. (2010) argue eloquently that our approach to wildlife conservation needs to move from hanging on to what we have to achieving large-scale habitat restoration and recreation, underpinned by the re-establishment of ecological processes and ecosystem services, for the benefit of both people and wildlife. The mantra of their report *Making Space for Nature* brilliantly summarizes what needs to be done in four words: 'More, Bigger, Better, Joined'. What is needed are coherent and resilient ecological networks where habitats are joined up by green and blue corridors extending across landscapes to allow species to colonize new areas and to allow nature to thrive. This report is a superb example of how to present good science to policy-makers (Rose et al. 2018). It is written for England but the principles can be applied to the conservation of wildlife and biodiversity in different contexts and geographies. Having a green/ecological network plan provides the opportunity to articulate the different types of green and blue spaces, functions and initiatives set within a strategic vision. The perspective of green and blue spaces as a spatial and functional system requires those involved to consider desired features such as connectivity between sites and accessibility for everyone.

Urban greenspaces are likely to be multi-functional by providing ecosystem services (such as flood regulation, amelioration of temperature, noise and air quality), recreational areas, landscape quality, physiographic and geological features, and habitats for plants and animals. Much can be achieved for people and wildlife through the promotion of multi-functional urban

greenspace where multiple land uses are recognized (Barker 1997; Douglas and Ravetz 2011). The value of such multi-functional urban greenspaces can be costed in terms of their natural capital and ecosystem services (e.g. flood regulation, air quality amelioration) (for example, Millennium Ecosystem Assessment 2005, Chapter 67 and Chapter 73). Such economic data increases the importance of urban greenspace and helps to counter the argument that only built development is required in urban areas.

Large sites are more likely to be able to accommodate multiple uses with less damage and trade-offs amongst ecosystem services thus providing a greater variety of opportunities for local people to use and enjoy. But in many urban areas the severe constraints of high land values and existing land uses mean that only small sites are practicable as urban greenspaces. For example, many of the road medians in Surabaya are transformed into urban greenspace such as the Indonesia–South Korea Friendship Park (Taman Korea). The quality of an urban greenspace is a critical factor in terms of their ecological and educational benefits and their contribution to the health and well-being of the local communities (van den Berg et al. 2015; World Health Organization 2016; Zhang et al. 2017). Design and maintenance are critical factors to maximizing the benefits to the public from small urban greenspaces.

Some may argue that there is no room for more accessible urban greenspace in crowded urban areas. But why not create and restore these areas? In dense urban environments, green roofs, green walls, and pocket parks offer opportunities to provide ecosystem services and maintain wildlife communities. Existing greenspaces of all types could be made bigger and habitats that have become degraded could be restored as better habitats and joined up to other habitats. Local authorities, public bodies, and developers should be challenged to incorporate accessible urban greenspace that is rich in habitats for wildlife into new developments through strategic planning and through the pragmatic application of planning policies to proposed urban developments. Addressing areas in towns and cities that are deficient in wildlife habitats is likely to provide significant positive outcomes in any cost–benefit analysis given the demonstrated benefits for health and well-being from the easy access to nature for those living and working in urban areas.

Sustainability demands that environmental capital is not diminished from one generation to the next (United Nations 1987). The next generation will only know what it finds and will not be able to fully comprehend past losses. Urban greenspaces that are rich in wildlife and accessible to the public need systems and processes which can deliver good site management in order to maintain the quality of the resource in the long term. Standards and targets with timescales for urban greenspace involving availability, accessibility, and quality are required to deliver sustainability and environmental quality. Those standards and targets that include both wildlife and people can be powerful levers for change and their use to influence the behavior of urban planners, designers, and developers should not be underestimated.

## Appendix

Table 72.1 Provision of local nature reserves in 27 urban local authority areas in England from 1993 to 2018

Urban Local Authority Area	1993 assessment (62 LNRs)		2006 assessment (160 LNRs)		2018 assessment (207 LNRs)		Comments on provision of LNRs from 1993 assessment onwards (in relation to standard of one hectare for every thousand population)
	Total LNR area (ha) (number of LNRs) <sup>a</sup> Population <sup>b</sup>	Population/ha LNR	Total LNR area (ha) (number of LNRs) <sup>c</sup> Population <sup>d</sup>	Population/ha LNR	Total LNR area (ha) (number of LNRs) <sup>e</sup> Population <sup>f</sup>	Population/ LNR	
<b>Barnet</b>	4.9 (1) 283,000	57,755	158.5 (6) 314,564	1985	152.1 (7) 356,386	2344	Large improvement since 1993. No LNR designation after 2005. Decline after 2006 because population has increased.
<b>Birmingham</b>	39.5 (4) 934,900	23,668	102.6 (7) 977,807	9530	317.3 (12) 1,073,045	3382	Continuing improvement since 1993 and recent LNR designations (most recently in 2016).
<b>Camden</b>	1.0 (1) 170,500	170,500	1.85 (4) 198,020	107,038	1.93 (4) 220,338	114,165	Slow improvement from 1993 onwards in this inner London area. Decline after 2006 because last LNR designation was in 2011 and population has increased.
<b>Canterbury</b>	143.0 (3) 127,100	889	177.7 (10) 135,278	761	416.3 (11) 151,145	363	Target achieved in 1993 assessment in a local authority area with a small city and large rural area. No LNR designation after 2002.
<b>Coventry</b>	48.0 (3) 292,500	6094	216.7 (14) 300,848	1388	207.5 (15) 316,960	1527	Large improvement since 1993. A major program of LNR designations in 2001 but no subsequent designations.
<b>Derby</b>	9.3 (1) 214,000	23,011	143.2 (7) 221,708	1548	190.8 (11) 248,752	1304	Large improvement since 1993. No LNR designation after 2012.
<b>Dudley</b>	181.7 (4) 300,400	1653	274.6 (7) 305,155	1111	273.7 (7) 312,925	1143	Improvement from 1993 and target in sight, but no LNR designation after 2005.

The role of targets and standards

<b>Gloucester</b>	4.3 (2) 91,800	21,349	169.5 (7) 109,885	648	158.4 (7) 121,688	768	Target achieved by 2006, but no LNR designation after 2006.
<b>Haringey</b>	36.2 (3) 187,300	5174	32.6 (3) 216,507	6641	109.9 (5) 254,926	2319	Large improvement since 2006 in this inner London area. No LNR designation after 2013.
<b>Hereford</b>	6.1 (2) 49,800	8164	14.4 (3) 50,149	3483	15.7 (3) 53,516	3417	No LNR designation after 1995.
<b>Islington</b>	2.5 (1) 155,200	62,080	5.3 (3) 175,797	33,169	5.8 (3) 206,125	35,724	No LNR designation after 1996 in this inner London area.
<b>Leeds</b>	605.4 (5) 674,400	1114	613.0 (8) 715,402	1167	710.9 (14) 751,485	1057	Large area of LNRs at time of 1993 assessment. Further LNR designations with six in 2015. Target almost achieved.
<b>Leicester</b>	2.0 (1) 270,600	135,300	139.0 (7) 279,921	2014	168.44 (9) 329,839	1958	Large improvement after 1993. Some improvement after 2006, but no LNR designation after 2010.
<b>Liverpool</b>	21.0 (1) 448,300	21,348	134.1 (3) 439,473	3277	156.1 (4) 466,415	2988	Large improvement after 1993. Small improvement after 2006, but no LNR designation after 2007.
<b>Newcastle upon Tyne</b>	8.0 (1) 263,000	32,875	113.0 (6) 259,936	2300	83.5 (6) 280,177	3356	Large improvement after 1993. A decline after 2006 and no LNR designation after 2005.
<b>Norwich</b>	52.5 (5) 120,700	2299	136.2 (8) 121,550	892	140.1 (8) 132,512	946	Target achieved by LNR designations in 1994, but no subsequent designations.
<b>Oxford</b>	2.2 (2) 109,000	49,545	6.4 (3) 134,248	20,976	6.6 (3) 151,906	22,912	No change after 2006. No LNR designation after 1995.
<b>Peterborough</b>	51.4 (2) 148,800	2895	81.2 (5) 156,061	1922	82.2 (5) 183,631	2233	No change after 2006. No LNR designation after 2006.
<b>Plymouth</b>	105.0 (5) 238,800	2274	146.1 (7) 240,720	1648	260.0 (10) 256,384	986	Continuing improvement from 1993. Target achieved.
<b>Portsmouth</b>	119.0 (1) 174,700	1468	119.0 (1) 186,701	1569	119.7 (1) 205,056	1713	No improvement. The only LNR was designated in 1974.

(Continued)



Table 72.1 Cont.

Urban Local Authority Area	1993 assessment (62 LNRs)		2006 assessment (160 LNRs)		2018 assessment (207 LNRs)		Comments on provision of LNRs from 1993 assessment onwards (in relation to standard of one hectare for every thousand population)
	Total LNR area (ha) (number of LNRs) <sup>a</sup>	Population/LNR	Total LNR area (ha) (number of LNRs) <sup>a</sup>	Population/LNR	Total LNR area (ha) (number of LNRs) <sup>a</sup>	Population/LNR	
<b>Salford<sup>s</sup></b>	0.0 (0)	–	134.9 (4)	1602	147.3 (6)	1588	Large improvement after 1993. No LNR designation since 2014.
	230,726		216,103		233,933		
<b>Sandwell</b>	30.3 (2)	9307	205.8 (9)	1375	288.6 (9)	1067	Large improvement after 1993. Target in sight, but no LNR designation after 2000.
	282,000		282,904		308,063		
<b>Southampton</b>	14.0 (1)	13,886	14.0 (1)	15,532	47.6 (5)	4980	No change after 1993. Large improvement after 2006. Most recent LNR designation in 2017.
	194,400		217,445		236,882		
<b>Southwark</b>	29.9 (1)	6572	32.4 (4)	7558	52.1 (7)	5528	Continuing improvement after 1993 with most recent LNR designations in this inner London area.
	196,500		244,866		288,283		
<b>Stoke-on-Trent</b>	82.0 (1)	2985	246.4 (9)	977	253.1 (9)	984	Large improvement after 1993. Achieved target by 2006 assessment, but no LNR designated after 2006.
	244,800		240,636		249,008		
<b>Telford and Wrekin<sup>s</sup></b>	103.0 (2)	1354	194.0 (4)	816	339.4 (9)	491	Target achieved by 2006. Continuing improvement and recent LNR designations.
	139,500		158,325		166,641		
<b>Wakefield</b>	313.0 (7)	979	401.5 (10)	785	613.9 (16)	531	Achieved target by 1993. Progressive improvement from 1993 onwards, but no LNR designated after 2008.
	306,300		315,172		325,837		

<sup>a</sup> LNR areas and numbers for April 1993 (English Nature data).

<sup>b</sup> Population data are preliminary 1991 Census figures (*Whitaker's Almanac*, 1993).

<sup>c</sup> LNR areas and numbers for December 2006 (local authority data).

- <sup>d</sup> Population data are 2001 Census figures.
- <sup>e</sup> LNR areas and numbers at February/March 2018 (Natural England designated sites database <https://designatedsites.natureengland.org.uk/> and Multi Agency Geographic Information for the Countryside (MAGIC) website [www.natureonthemap.natureengland.org.uk](http://www.natureonthemap.natureengland.org.uk) supplemented by current Local Authority data where there are omissions or errors in the Natural England database and the MAGIC website).
- <sup>f</sup> Population data are 2011 Census figures (Office for National Statistics [www.nomisweb.co.uk/](http://www.nomisweb.co.uk/)).
- <sup>g</sup> The assessment was undertaken for Salford City Council and Telford & Wrekin Council in 1993 and in 2006 but the data was not included in the published papers.

<sup>a, c, e</sup> There can be differences in the area of individual LNRs, and hence the total area of LNR for a local authority, due to the different sources of the data used in the three assessments.

**Decision rules for geographical anomalies in the 2018 Assessment.** A few LNRs extend outside the boundary of the urban local authority. If an urban local authority owns and manages the whole of the LNR, including the area outside its boundary, this area is included in the total LNR area in the 2018 assessment because local taxpayers and ratepayers are supporting the LNR outside the local authority boundary. This includes the situation where a LNR is wholly outside the urban local authority area but is owned and managed by the local authority, although the formal LNR declaration was by the adjacent local authority for legal reasons (Scraptoft LNR, Leicester City Council). If a LNR is declared, owned, and managed by a county council (a higher-level local authority) and part of that LNR is within the urban local authority area, only the part of the LNR in the urban local authority area is included in the 2018 assessment. The rationale is that urban residents may have access to the whole LNR, but this assessment is about the provision of LNRs in urban local authority areas (e.g. Kent County Council declared, own and manage the South Bank of the Swale LNR which lies partly in the area of Canterbury City Council; the same situation exists with Derbyshire Council and Derby City Council with Elvaston LNR).

## References

- Ahiablame, L.M., Engel, B.A., and Chaubey, I. (2012) 'Effectiveness of low impact development practices: literature review and suggestions for future research', *Water, Air, and Soil Pollution*, 223(7): 4253–73.
- Aravena, A., Torrejón, R., Oddó, V., Cerda, J., García-Huidobro, F., Larraín, G., and Emmons, R. (2012) 'Elemental', *ARQ*, 81: 20–7.
- Barker, G. (1997) *A Framework for the Future: Green Networks with Multiple Uses in and around Towns and Cities*, English Nature Research Report No. 256, Peterborough: English Nature (now Natural England), <http://publications.naturalengland.org.uk/publication/77041> [Accessed 28 August 2018].
- Boon, R., Cockburn, J., Douwes, E., Govender, N., Ground, L., Mclean, C., Roberts, D., Rouget, M., and Slotow, R. (2016) 'Managing a threatened savanna ecosystem (KwaZulu-Natal Sandstone Sourveld) in an urban biodiversity hotspot: Durban, South Africa', *Bothalia*, 46(2): a2112, <http://dx.doi.org/10.4102/abc.v46i2.2112> [Accessed 25 May 2018].
- Box, J. (2007) 'Increasing the supply of local nature reserves', *Town and Country Planning*, 76: 160–2.
- Box, J. (2011) 'Building urban biodiversity through financial incentives, regulation, and targets', in J. Niemelä, J.H. Breuste, T. Elmqvist, G. Guntenspergen, P. James, and N.E. McIntyre (eds), *Urban Ecology: Patterns, Processes, and Applications*, Oxford: Oxford University Press, 309–16.
- Box, J., Berry, S., Angus, I., Cush, P., and Frost, P. (2007) 'Planning local nature reserves', *Town and Country Planning*, 76: 392–5.
- Box, J.D. and Harrison, C. (1993) 'Natural spaces in urban places', *Town and Country Planning*, 62: 231–5.
- Bureau of Planning and Sustainability (2014) *Citywide Systems Plan: Proposed Draft*, City of Portland, The City of Portland, Oregon, [www.portlandoregon.gov/bps/65424](http://www.portlandoregon.gov/bps/65424) [Accessed 12 September 2018].
- Cea, M., Mora, P., Innocenti, D., and Correa, J. (2017) *Mesa de Áreas Verdes. Resumen Ejecutivo*, Santiago: Centro UC Políticas Públicas, <https://politicaspublicas.uc.cl/wp-content/uploads/2017/05/RESUMEN-EJECUTIVO-AREAS-VERDES.pdf> [Accessed 14 September 2018].
- Chitiga, M., Sekyere, E., and Tsoanamatsie, N. (2014) *Income Inequality and Limitations of the Gini Index: The Case of South Africa*, Pretoria: The Human Sciences Research Council, [www.hsrc.ac.za/en/review/hsrc-review-november-2014/limitations-of-gini-index](http://www.hsrc.ac.za/en/review/hsrc-review-november-2014/limitations-of-gini-index) [Accessed 5 June 2018].
- Chona, S., Wolch, J., and Wilson, J. (2010) 'Got green? Addressing environmental justice in park provision', *GeoJournal*, 75(3): 229–48.
- Cohen, D.A., Bing, H., Derose, K.P., Williamson, S., Marsh, T., Raaen, L., and McKenzie, T.L. (2016) 'The paradox of parks in low-income areas: park use and perceived threats', *Environment and Behavior*, 48(1): 230–45.
- Convention on Biological Diversity (n.d.) *COP 10 Decision X/22. Plan of action on subnational governments, cities and other local authorities for biodiversity*. [www.cbd.int/decision/cop/default.shtml?id=12288](http://www.cbd.int/decision/cop/default.shtml?id=12288) [Accessed 23 April 2018].
- Critical Ecosystem Partnership Fund (n.d.) *Maputaland Pondoland Albany Hotspot*, [www.cepf.net/our-work/biodiversity-hotspots/maputaland-pondoland-albany](http://www.cepf.net/our-work/biodiversity-hotspots/maputaland-pondoland-albany) [Accessed 23 April 2018].
- CSIR (2008) *eThekweni accessibility mapping and optimisation of community social services 2008: Section 13 – Parks*, Durban: eThekweni Municipality.
- CSIR (2010) *Survey of park usage and residents' perceptions of park space in eThekweni*, Durban: eThekweni Municipality.
- CSIR (2012) *Geographic accessibility study of social facility and government service points for the metropolitan cities of Johannesburg and eThekweni 2011/12*, Tshwane, South Africa: Department of Public Service and Administration.
- Curran, W. and Hamilton, T. (2012) 'Just green enough: contesting environmental gentrification in Greenpoint, Brooklyn', *Local Environment*, 17: 1027–42.
- Douglas, I. and Ravetz, J. (2011) 'Urban ecology – the bigger picture', in J. Niemelä, J.H. Breuste, T. Elmqvist, G. Guntenspergen, P. James, and N.E. McIntyre (eds), *Urban Ecology: Patterns, Processes, and Applications*, Oxford: Oxford University Press, 246–62.
- English Nature (1996) *A Space for Nature*, IN46, Peterborough: English Nature (now Natural England), <http://publications.naturalengland.org.uk/publication/73035> [Accessed 28 August 2018].
- eThekweni Municipality (2017a) *Integrated Development Plan. 5 Year Plan: 2017/8 to 2021/22*, Durban: eThekweni Municipality, [www.durban.gov.za/City\\_Government/City\\_Vision/IDP/Documents/Draft%202017%202018%20IDP.pdf](http://www.durban.gov.za/City_Government/City_Vision/IDP/Documents/Draft%202017%202018%20IDP.pdf) [Accessed 25 May 2018].

- eThekwini Municipality (2017b) *Durban State of Biodiversity Report: 2016/2017*, Durban: eThekwini Municipality, [www.durban.gov.za/City\\_Services/development\\_planning\\_management/environmental\\_planning\\_climate\\_protection/Publications/Documents/StateofBiodiversityReport.pdf](http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Publications/Documents/StateofBiodiversityReport.pdf) [Accessed 25 May 2018].
- Faculty of Public Health (2010) *Great Outdoors: How Our Natural Health Service Uses Green Space to Improve Wellbeing*, London: Faculty of Public Health, [www.fph.org.uk/media/1433/r\\_great\\_outdoors.pdf](http://www.fph.org.uk/media/1433/r_great_outdoors.pdf) [Accessed 28 August 2018].
- Finkelstein, D.M., Petersen, D.M., and Schottenfeld, L.S. (2017) 'Promoting children's physical activity in low-income communities in Colorado: what are the barriers and opportunities?', *Preventing Chronic Disease*, 14: 170111, doi:<http://dx.doi.org/10.5888/pcd14.170111>
- Flores, R. and González, M.D.J. (2010) 'Planificación de sistemas de áreas verdes y parques públicos', *Revista mexicana de ciencias forestales*, 1(1): 17–24.
- Frumkin, H., Bratman, G.N., Breslow, S.J., Cochran, B., Kahn Jr., P.H., Lawler, J.J., Levin, P.S., Tandon, P.S., Varanasi, U., Wolf, K.L., and Wood, S.A. (2017) 'Nature contact and human health: a research agenda', *Environmental Health Perspectives*, 125(7): 1–18.
- Goode, D.A. (1989) 'Urban nature conservation in Britain', *Journal of Applied Ecology*, 26: 859–73.
- Gooding, E., Green, J., and McClintock, N. (2015) 'Uneven development of the sustainable city: shifting capital in Portland, Oregon', *Urban Geography*, 36(4): 504–27.
- Handley, J., Pauleit, S., Slinn, P., Barber, A., Baker, M., Jones, C., and Lindley, S. (2003) *Accessible Natural Green Space Standards in Towns and Cities: A Review and Toolkit for their Implementation*, English Nature Research Report 526, Peterborough: English Nature (now Natural England), <http://publications.naturalengland.org.uk/publication/65021> [Accessed 28 August 2018].
- Harrison, C., Burgess, J., Millward, A., and Dawe, G. (1995) *Accessible Natural Greenspace in Towns and Cities: A Review of Appropriate Size and Distance Criteria*, English Nature Research Report 153, Peterborough: English Nature (now Natural England), <http://publications.naturalengland.org.uk/publication/62097?category=47017> [Accessed 28 August 2018].
- Ironside Farrar Ltd (2005) *Minimum Standards for Open Space*, Edinburgh: Scottish Executive Social Research, [www.scotland.gov.uk/Publications/2005/07/18104215/42175](http://www.scotland.gov.uk/Publications/2005/07/18104215/42175) [Accessed 28 August 2018].
- Jewitt, D. (2011) *Conservation Targets and Status for Vegetation Types in KZN*, Cascades, South Africa: Ezemvelo KZN Wildlife, [http://cpu.uwc.ac.za/KZN/KZN\\_vegetationtypes\\_conservationtargetstatusreport.pdf](http://cpu.uwc.ac.za/KZN/KZN_vegetationtypes_conservationtargetstatusreport.pdf) [Accessed 25 May 2018].
- Krishnamurthy, L. and Rente Nascimento, J. (1997) *Áreas verdes urbanas en América Latina y el Caribe*, Texcoco: Centro de Agroforestería para el Desarrollo Sustentable, Universidad Autónoma Chapingo, [www.rivasdaniel.com/Pdfs/Areas\\_verdes\\_LatAmerica.pdf](http://www.rivasdaniel.com/Pdfs/Areas_verdes_LatAmerica.pdf) [Accessed 12 September 2018].
- Kuchelmeister, G. (1998) *Urban Forestry in the Asia-Pacific Region: Status and Prospects*, Working Paper No: APFSOS/WP/44, Rome: FAO Forestry Policy and Planning Division and Bangkok: FAO Regional Office for Asia and the Pacific, [www.fao.org/tempref/docrep/fao/003/X1577E/X1577E00.pdf](http://www.fao.org/tempref/docrep/fao/003/X1577E/X1577E00.pdf) [Accessed 12 September 2018].
- Kwanda, T., Kartono, L., and Wonoseputro, C. (2014) 'The people's perceptions on aesthetic and uses of the active urban parks in Surabaya', *DIMENSI – Journal of Architecture and Built Environment*, 41(1): 1–10.
- Laredo, D.R. and Mirtha, D. (2011) 'La gestión del verde urbano como un criterio de mitigación y adaptación al cambio climático', *Revista de la Asociación Argentina de Ecología de Paisajes*, 2(2): 123–30.
- Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafé, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., and Wynne, G.R. (2010) *Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network*, Report to UK Department for Food, Environment and Rural Affairs, <http://webarchive.nationalarchives.gov.uk/20130402151656/http://archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf> [Accessed 28 August 2018].
- Lee, A.C.K. and Maheswaran, R. (2011) 'The health benefits of urban green spaces: a review of the evidence', *Journal of Public Health*, 33(2): 212–22.
- McLean, C.T., Ground, L.E., Boon, R.G.C., Roberts, D.C., Govender, N., and McInnes, A. (2016) *Durban's Systematic Conservation Assessment*, Durban: eThekwini Municipality, Environmental Planning and Climate Protection Department, [www.durban.gov.za/City\\_Services/development\\_planning\\_management/environmental\\_planning\\_climate\\_protection/Publications/Documents/DurbansSystematicConservation.pdf](http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Publications/Documents/DurbansSystematicConservation.pdf) [Accessed 25 May 2018].

- Meerow, S. and Newell, J.P. (2017) 'Spatial planning for multifunctional green infrastructure: growing resilience in Detroit', *Landscape and Urban Planning*, 150: 62–75.
- Mell, I.C. (2014) 'Aligning fragmented planning structures through a green infrastructure approach to urban development in the UK and USA', *Urban Forestry & Urban Greening*, 13: 612–20.
- Miess, B. and Miess, M. (1987) 'Untersuchungen zur Landschaftsplanung, Band 10', in *Materialien zur Grünordnungsplanung, Teil 1: Siedlungsökologische und gestalterische Grundlagen*, Karlsruhe: Ministerium für Ländlichen Raum, Landwirtschaft und Forsten Baden-Württemberg, [www.fachdokumente.lubw.baden-wuerttemberg.de/servlet/is/50040/?COMMAND=DisplayBerichtandFIS=200andOBJECT=50040andMODE=METADATA](http://www.fachdokumente.lubw.baden-wuerttemberg.de/servlet/is/50040/?COMMAND=DisplayBerichtandFIS=200andOBJECT=50040andMODE=METADATA) [Accessed 12 September 2018].
- Millennium Ecosystem Assessment (2005) [www.millenniumassessment.org/en/index.html](http://www.millenniumassessment.org/en/index.html) [Accessed 28 August 2018].
- Ministry of the Environment (2011) *Informe del Estado del Medio Ambiente 2011*, Santiago: Molina Flores S.A.
- Ministry for Housing and Urbanism (2014a) *Plan Chile Área Verde*, Santiago: Ministry for Housing and Urbanism, [http://56medidas.cumplimiento.gob.cl/wp-content/uploads/2014/03/Plan\\_Chile\\_Area\\_Verde.pdf](http://56medidas.cumplimiento.gob.cl/wp-content/uploads/2014/03/Plan_Chile_Area_Verde.pdf) [Accessed 14 September 2018].
- Ministry for Housing and Urbanism (2014b) *National Urban Development Policy*, Santiago: Ministry for Housing and Urbanism, <http://cndu.gob.cl/wp-content/uploads/2014/10/L4-Politica-Nacional-Urbana.pdf> [Accessed 14 September 2018].
- National Recreation and Park Association (2016) *2016 NRPA Field Report: Park and Recreation Agency Performance Benchmarks*, Ashburn, VA: National Recreation and Park Association, [www.nrpa.org/uploadedFiles/nrpa.org/Publications\\_and\\_Research/Research/Field-Report.pdf](http://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Field-Report.pdf) [Accessed 12 September 2018].
- Natural England (2010a) *Nature Nearby: Accessible Natural Greenspace Guidance, NE265*, Peterborough: Natural England, <http://webarchive.nationalarchives.gov.uk/20140605145320/http://publications.naturalengland.org.uk/publication/40004?category=47004> [Accessed 28 August 2018].
- Natural England (2010b) *Local Nature Reserves in England: A Guide to their Selection and Declaration, NE301*, Peterborough: Natural England, <http://webarchive.nationalarchives.gov.uk/20150303045141/http://publications.naturalengland.org.uk/publication/31039?category=43019> [Accessed 28 August 2018].
- Nilon, C.H., Aronson, M.F.J., Cilliers, S.S., Dobbs, C., Frazee, L.J., Goddard, M.A., O'Neil, K.M., Roberts, D., Stander, E.K., Werner, P., Winter, M., and Yocom, K.P. (2017) 'Planning for the future of urban biodiversity: a global review of city-scale initiatives', *BioScience*, 67(4): 332–42.
- Oregon Parks and Recreation Department (2013) *Statewide Comprehensive Outdoor Recreation Plan, 2013–2017*, Salem: Oregon Parks and Recreation Dept., [www.oregon.gov/oprd/PLANS/Pages/SCORP\\_overview.aspx#SCORP](http://www.oregon.gov/oprd/PLANS/Pages/SCORP_overview.aspx#SCORP) [Accessed 12 September 2018].
- Parliamentary Office of Science and Technology (2016) *Green Space and Health, POSTnote 538*, London: Parliamentary Office of Science and Technology, <http://researchbriefings.files.parliament.uk/documents/POST-PN-0538/POST-PN-0538.pdf> [Accessed 28 August 2018].
- PPandR (2017) *Portland Parks and Recreation Strategic Plan: 2017–2020*, Portland: Portland Parks and Recreation, [https://issuu.com/portlandparks/docs/pp\\_r\\_strategic\\_plan\\_v1a](https://issuu.com/portlandparks/docs/pp_r_strategic_plan_v1a) [Accessed 12 September 2018].
- Resolución No. 1596 Exenta (2010) Fija procedimiento para aplicación práctica del programa de espacios públicos y deroga Resolución N° 285 Exenta, Chile, <http://bcn.cl/20g77> [Accessed 14 September 2018].
- Reyes, S. and Figueroa, I.M. (2010) 'Distribución, superficie y accesibilidad de las áreas verdes en Santiago de Chile', *Revista Latinoamericana de Estudios Urbano Regionales*, 36(109): 89–110.
- Roberts, D.C. (2008) 'Thinking globally, acting locally: institutionalizing climate change at the local government level in Durban, South Africa', *Environment and Urbanization*, 20(2): 521–37.
- Rose, D.C., Brotherton, P.N.M., Owens, S., and Pryke, T. (2018) 'Honest advocacy for nature: presenting a persuasive narrative for conservation', *Biodiversity Conservation*, 27: 1703–23.
- SANBI (2017) *The Business Case for Biodiversity Stewardship*, SANBI Factsheet Series, Pretoria: South African National Biodiversity Institute, <http://biodiversityadvisor.sanbi.org/wp-content/uploads/2017/07/Biodiversity-Stewardship-Business-Case-Factsheet.pdf> [Accessed 25 May 2018].
- Sorensen, M., Barzetti, V., Keipi, K., and Williams, J.R. (1998) *Manejo de las áreas verdes urbanas*, Washington, DC: Inter-American Development Bank, <https://publications.iadb.org/handle/11319/4820> [Accessed 12 September 2018].
- South African Government (1996) *Constitution of the Republic of South Africa, 1996*, [www.gov.za/documents/constitution-republic-south-africa-1996](http://www.gov.za/documents/constitution-republic-south-africa-1996) [Accessed 23 July 2019].



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- Stupar, A. (2015) 'Cold War vs. architectural exchange: Belgrade beyond the confines?', *Urban History*, 42(4): 622–45.
- Taylor, W., Floyd, M., Whitt-Glover, M., and Brook J. (2007) 'Collaboration between the public health and parks and recreation fields to study disparities in physical activity', *Journal of Physical Activity and Health*, 4(Suppl. 1): S50–S63.
- Town and Country Planning Association and The Wildlife Trusts (2012) *Planning for a Healthy Environment: Good Practice Guidance for Green Infrastructure and Biodiversity*, London and Newark: Town and Country Planning Association and The Wildlife Trusts, [www.tcpa.org.uk/Handlers/Download.ashx?IDMF=34c44ebf-e1be-4147-be7d-89aaf174c3ea](http://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=34c44ebf-e1be-4147-be7d-89aaf174c3ea) [Accessed 28 August 2018].
- Turpie, J., Letley, G., Chyrstal, R., Corbella, S., and Stretch, D. (2017) *A Spatial Valuation of the Natural and Semi-Natural Open Space Areas in eThekweni Municipality*, Washington, DC: World Bank, <https://openknowledge.worldbank.org/handle/10986/26765> [Accessed 25 May 2018].
- Tzoulas, K. and Greening, K. (2011) 'Urban ecology and human health', in J. Niemelä, J.H. Breuste, T. Elmqvist, G. Guntenspergen, P. James, and N.E. McIntyre (eds) *Urban Ecology: Patterns, Processes, and Applications*, Oxford: Oxford University Press, 263–71.
- United Nations (1987) *Our Common Future, Report of the World Commission on Environment and Development*, New York: United Nations, [www.exteriores.gob.es/Portal/es/PoliticaExteriorCooperacion/Desarrollosostenible/Documents/Informe%20Brundtland%20\(En%20ingl%C3%A9s\).pdf](http://www.exteriores.gob.es/Portal/es/PoliticaExteriorCooperacion/Desarrollosostenible/Documents/Informe%20Brundtland%20(En%20ingl%C3%A9s).pdf) [Accessed 18 May 2018].
- United States Fish and Wildlife Service (2016) *2016 Report: Strengthening Relationships*, Urban Refuge Program of the Portland-Vancouver Metro Area, [www.fws.gov/refuge/2016UrbanProgramReport](http://www.fws.gov/refuge/2016UrbanProgramReport) [Accessed 12 September 2018].
- van den Berg, M., Wendel-Vos, W., van Poppel, M., Kemper, H., van Mechelen, W., and Maas, J. (2015) 'Health benefits of green spaces in the living environment: a systematic review of epidemiological studies', *Urban Forestry & Urban Greening*, 14: 806–16.
- Wolch, J.R., Byrne, J., and Newell, J.P. (2014) 'Urban green space, public health, and environmental justice: the challenge of making cities "just green enough"', *Landscape and Urban Planning*, 125: 234–44.
- World Health Organization (2016) *Urban Green Spaces and Health: A Review of Evidence*, Copenhagen: Regional Office for Europe, World Health Organization, [www.euro.who.int/\\_data/assets/pdf\\_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1](http://www.euro.who.int/_data/assets/pdf_file/0005/321971/Urban-green-spaces-and-health-review-evidence.pdf?ua=1) [Accessed 28 August 2018].
- Zhang, Y., van den Berg, A.E., van Dijk, T., and Weitkamp, G. (2017) 'Quality over quantity: contribution of urban green space to neighbourhood satisfaction', *International Journal of Environmental Research and Public Health*, 14: 535, [www.mdpi.com/1660-4601/14/5/535](http://www.mdpi.com/1660-4601/14/5/535) [Accessed 28 August 2018].