# Urban Parks and Open Space: Underpinning
# A City's Future Resilience

**Abstract:** As pressures of urban development and renewal impact the fabric of contemporary cities, parks and open space are increasingly under threat, which is compounded by the general lack of strategic open space planning at the state level. Simultaneously, as cities compete to attract global companies, start-ups, new residents and visitors and to build future resilience, the creation of new parks, or upgrading existing open space, is essential to underpin a city's long-term liveability and sustainability.

This discussion paper deliberates on four current concepts that are influencing the discourse on urban resiliency, and argues why urban parks and open space should be included in the conversation. These concepts are: urban ecology, smart cities, healthy built environments, and compact cities. Urban ecology, as a contemporary framework, conceptualises the city as interdependent systems of living things—humans, plants, animals—and their environments. The notion of smart cities, as outlined in Australia's *Smart Cities Plan*, can encompass urban parks and connected greenspace as they align to opportunities for smart investment, partnerships, and technology. Parks and open space are critical to informing healthy planning and achieving successful compact cities ("density done well"), and we need to give them higher priority in strategic planning, and agree on standards for provision that acknowledge their capacity to enhance the social and economic performance of cities, as well as the environmental. In this paper, each concept is discussed individually and collectively in the context of theorising how urban parks help build a city's resilience.

**Key Words:** urban parks; open space; resilience; drivers of change

## 1. Introduction

This paper firstly defines and discusses the key concept of 'resilience' as it relates to cities. It then addresses four key approaches to contemporary urban planning that are influencing the discussion of 'urban resilience'; namely: urban ecology, smart cities, healthy planning, and compact cities. We are interested to explore the connection between urban parks and open space and urban resilience with these four paradigms.

Resilience is the latest buzzword that urbanists, commentators, academics and city authorities are using to shape and measure urban practice and research. Despite some of the hype, when one looks into the concept in detail, key words and meaningful urban drivers are noted. Terms like sustainability, liveability, and productivity are underpin this concept.

As pressures of urban development and renewal impact the fabric of contemporary cities, parks and open space are increasingly under threat, which seems to be compounded by the general lack of strategic open space planning by many government authorities. Simultaneously, as cities compete to attract global companies, start-ups, new residents and visitors and to build future resilience, the creation of new parks, or upgrading existing open space, is essential to a city's long-term sustainability, liveability and productivity – the very concepts that underpin resilience.

## 2. Urban Resilience

A general operating definition of *resilience* is offered by Douglas and James (2015, p. 10) as "...the capacity of a system (a city) to deal with changes and continue to develop. Resilience thinking is based on the belief that humans and nature are strongly coupled and should be conceived as one socio-ecological system."

The Rockefeller Foundation in 2013 took on the concept of *urban resilience* as a major global challenge, financially supporting 100 world cities in attempts to ensure they can 'survive and thrive' – regardless of the challenge put to them (Rockefeller Foundation 2017). "Urban resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. *Chronic stresses* weaken the fabric of a city on a day-to-day or cyclical basis. Examples include: high unemployment, inefficient public transportation systems, endemic violence, and chronic food and water shortages. *Acute shocks* are sudden, sharp events that threaten a city. Examples include: earthquakes, floods, disease outbreaks, and terrorist attacks" (Rockefeller Centre 2017, website).

According to the Rockefeller Foundation there are seven qualities that any city needs to 'survive and thrive' – "cities need to be:

- Reflective: using past experience to inform future decisions,
- Resourceful: recognizing alternative ways to use resources,
- Robust: well-conceived, constructed, and managed systems,
- Redundant: [having] spare capacity purposively created to accommodate disruption,
- Flexible: willingness and ability to adopt alternative strategies in response to changing circumstances,
- Inclusive: prioritize broad consultation to create a sense of shared ownership in decision making, and
- Integrated: bring together a range of distinct systems and institutions" (2017, website).

A more academic, and science-oriented definition of urban resilience is one put forward by Newman, Beatley and Boyer (2017 p. 10) which describes a resilient city as one that "should be able to anticipate, plan for, and mitigate the risks, and seize the opportunities, associated with economic, environmental, and social change. It needs to 'bounce forward,' not just bounce back." According to Newman Beatley and Boyer there are six principles of urban resilience and they maintain that a resilient city should be focused on removing fossil fuels from cities. As quoted by them, "cities should:

1. Invest in renewable and distributed energy,
2. Create sustainable mobility systems,
3. Foster inclusive and healthy cities,
4. Shape disaster recovery for the future,
5. Build biophilic urbanism in the city and its bioregion, and
6. Produce a more cyclical and regenerative metabolism" (2017, p. 10).

No matter what definition of resilience is adopted, the focus on cities makes sense. With the concentration of population, development and wealth, cities are at risk of incurring significant losses of sustainability, liveability and productivity in the face of natural disasters; the incremental damage caused by climate change; or the usual pressures incurred by social fraction and dysfunction.

World leaders and local urban authorities are banding together to make their own cities, and the global network of urban centres, more resilient. They are attempting to ratify the Kyoto Protocol, signing Mayoral Climate Protection Agreements as exampled in the USA, joining the Rockefeller Foundation's 100 Resilient Cities—of which Sydney and Melbourne are two, joining the International Carbon Neutral Cities Alliance, and the International Council for Local Environmental Initiatives, to name just a few collaborative initiatives. As Newman, Beatley and Boyer (2017) suggest, leadership is often found at the local level and these authorities and individuals can make an impact in cities where they have some power and control over the management of their jurisdiction.

## 3. Concepts Driving the Urban Resilience Discourse

This section of the paper deliberates on four current concepts that are influencing the discourse on urban resiliency, and argues why urban parks and open space should be included in the conversation. The concepts of urban ecology, smart cities, healthy built environments, and compact cities are the drivers of change influence the underpinnings of resiliency. Each concept is discussed individually and concludes with how they collectively intertwine with urban parks and a city's resilience.

### *Urban Ecology*

As a contemporary framework, urban ecology conceptualises the city as interdependent systems of living things—humans, plants, animals—and their environments. Many definitions of urban ecology have emerged over the years. Cadenasso and Pickett's (2013) comprehensive statement captures the interactions of human and nonhuman species in concert with the inputs and outputs of energy and materials in the urban metabolic processes, while also acknowledging geographic variances: "urban ecology is the study of the relationship of human and nonhuman organisms in urban areas, the interactions of these organisms with the native and built physical environment, and the effects of these relationships on the fluxes of energy, materials, and information within individual urban systems and between urban and non-urban systems" (p. 30).

For this discussion, Douglas and James' definition firmly grounds urban ecology in the built environment context of the 21st century city: "urban ecology is the study of urban areas as a series of habitats for human beings and other organisms; the relationships among all those organisms under changing urban environmental conditions; and the interactions of living things with natural and people-made flows of energy, water and materials, both deliberate and accidental, in the varied and diverse conditions of the world's towns and cities" (2015 p. 11). They go on to note that the study of urban ecology is inherently interdisciplinary and draws from the natural sciences, the physical sciences, and the social sciences; looking both at how urbanization impacts natural systems and how flora and fauna in turn affect the urban built environment (Douglas and James 2015).

Urban green spaces include a range settings, more than just parks. Some areas are formally zoned and designated as parks, including parklands, sports fields, agricultural land and community gardens. Other greenspace in cities includes ecologically sensitive areas which may be conservation 'no go' zones or nature reserves, river corridors and constructed wetlands. These specific landscapes within the urban fabric provide functional areas for city dwellers to access and thus they contribute to human health and well-being. As well, they provide habitat, food and sources for non-human species and so enhance the quality of the urban ecological systems.

When we analyse aerial photos of cities, it is easy to identify the parks and open space that appearing throughout the region in contrast to the built-up areas of the city. It is easy to identify these patches and green and blue systems that interlink with the built environment systems of the city. Across the metropolitan region, the ecosystems of the human habitat provide essential services that support life, including: air and water quality, healthy soil to support agriculture and food production, the natural materials we use to construct elements of the built environment. Equally important are the potential these areas offer in instances of natural disaster—the acute shocks of change—as well as the incremental change associated with climate change. Urban parks and open space, as described above, comprise important elements of a city's "green infrastructure".

Urban development is an example of a chronic stress as defined by the Rockefeller Foundation. It is incremental and cumulative, as urban land is cleared in preparation for new building. Urban ecology as a field of study is relatively new, but has come sharply into focus in recent years with the rapid urbanization of cities around the world.

Urban ecosystems and the associated services provided by nature contribute to community health and wellbeing and the economic sustainability of cities, but urbanisation can also cause ecological decline and change. In fact, research documents the fact that urban biodiversity and ecosystems are indeed being lost in our cities, due to a variety of factors, associated with the associated effects of urbanization, such as: land clearing, habitat fragmentation, the decline of habitats, introduction of invasive species. The quantity and quality of habitats is also disturbed by changes in microclimate, lighting, hydrological regimes, nutrient availability, and built interventions such as 'grey' infrastructure, including hard paved surfaces, roadways, drainage channels, etc (Davies, Corkery, Nipperess 2017).

Unfortunately, the natural environments in cities are not generally given high regard, particularly in relation to their contribution to a city's wellbeing or economic outcomes. Addressing this lack of understanding requires being more explicit about the co-benefits enjoyed by city dwellers, such as the ecosystem services which are often largely invisible. In Australian coastal cities such as Sydney, a city that is by national parks, contains significant areas of bushland, and are typified by coastal outlooks and waterways, there is a perception that our cities are "green enough." This tends to confuse the issues and contributes to conflicting views about urban ecology (Davies, Corkery, Nipperess 2017).

### *Smart Cities*

The term 'smart cities' was first used in the 1990s and is often synonymous with the terms 'intelligent city,' 'digital city' and 'ubiquitous city' (Albino, Berardi and Dangelico 2015). Many academics believe smart cities have three elements – smart technologies, smart people and smart collaborations (Meijer, and Bolívar 2016). World organisations such as the UN and the European Union have also taken great interest in this topic with projects like their 'Global Smart Cities Project', and 'Mapping Smart Cities in the EU', respectively which are just two amongst many (UN 2014-2015).

For the purposes of this paper, and not dissimilar to the intent of the Commonwealth of Australia's initiatives on smart cities, a useful definition is thus: a "smart city is a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create a sustainable, greener city, competitive and innovative commerce, and an increased life quality" (Bakıcı,

Almirall and Wareham 2012, p. 135). In addition to this, Caragliu, Del Bo and Nijkamp (2011, p. 5) state "social and environmental sustainability is a major strategic component of smart cities".

Linked to the smart cities movement was Australia's first *Infrastructure Plan* which is an 'investment roadmap' for infrastructure over the next 15 years and solutions improve productivity and enhance Australian standards of living (Australian Government 2016a). As part of this *Infrastructure Plan* it wrote a *Smart Cities Plan* to develop visions and opportunities for more liveable urban centres.

The *Smart Cities Plan* (Australian Government 2016b) has three pillars: 'smart infrastructure investment', 'smart urban policy', and 'smart technology'. As stated in this plan, "we will become smarter investors in our cities' infrastructure; we will coordinate and drive smarter city policy; we will drive the take up of smart technology, to improve the sustainability of our cities and drive innovation" (Australian Government 2016b, p. 4). These lofty goals focus on jobs, housing, transportation, energy efficiencies, communications, and healthy environments. Specifically related to the 'smart' aspect of the plan, "We will embrace new technology with the potential to revolutionise how cities are planned, function, and how our economy grows" (Australian Government 2016b, p. 4). The government will be linking all levels of government through 'city deals' to coordinate planning, investment, projects and urban reform in this arena (Australian Government 2016b).

Through a series of plans, projects, policies, and partnerships, the federal government is poised to realise the use of technology to make urban management more evidence-based, effective and efficient. The *Smart Cities and Suburbs Program* provides funding [$AUD 50 million dollars in grant monies across two years] "to support projects that apply innovative technology-based solutions to urban challenges (Australian Government 2017, p. 5). Barton, Goldie and Pettit (2015) also remind us that Australia has invested in the Australian Urban Research Infrastructure Network (AURIN) portal. "The portal serves as a securitised environment for data sharing, and as a repository of open-source analytical routines to support urban decision-making" Barton, Goldie and Pettit (2015, p. 311).

The Commonwealth is backing government and industry partnerships who have technological solutions to very practical governance activities – these activities include smart infrastructure delivery, smart precinct sustainability and liveability solutions, smart local government services, and the smart planning and design of cities and communities. The impact of technology use and having real time data in open data and accessible data sets may well have a great impact on the use and impact of technology in urban areas.

Some known smart cities identified by the Australian government to watch include: Dublin, New York City, Tel Aviv, Sheffield and Chicago. Other well-known smart cities include Barcelona, Vienna, Singapore and Tokyo.

### *Healthy Built Environments*

The healthy built environment movement is contributing to the development of different types and functions of public space. "It is well known that many of the determinants of health and well-being are linked to different features in our neighbourhoods – the people, their lifestyles and attitudes, the local economy, activities afforded in the built form and natural environments" (Marshall 2016, p. 188). The latter includes the provision of planning features such as walkable streets and neighbourhoods, good public transport, safe, accessible and equitable public open space, and access to a shortened food mile (Kent, Thompson & Capon 2012).

Empirical evidence increasingly supports the idea that the landscapes associated with urban open space has the potential to promote mental, physical and social wellbeing. Research over the past 20 years has identified the negative impacts on public health created by the ways cities and residential development has been planned and constructed. Urban sprawl and now higher density residential development of the compact city, have been linked with the deleterious effects on air and water quality, less active lifestyles owing to a dependence on private transport (Frumkin et al, 2004). Other research provided insights to the positive health benefits associated with experiences in nature or natural settings, such as healing gardens in hospitals (Gerlach-Spriggs, et al. 1998) and links accessibility of green open spaces to human health.

The concept of biophilia, which maintains that humans are predisposed by our genetic makeup to feel an affinity for living things and a preference for certain combinations of natural systems and processes (Kellert, 2005), is now widely accepted. It is a foundational concept on which research into the relationship between the environment and social and health benefits is based.

Green open space has also shown to contribute to good mental health and wellbeing by improving attention restoration, stress reduction, and the evocation of positive emotions. Proximity to urban open spaces encourages physical activity which in turn improves general overall wellbeing. Open space in cities, particularly when it is well programmed, contributes to social wellbeing by encouraging social integration, social engagement and participation, and social support and security.

## *Compact Cities*

A compact city ('density done well') is now a major aim for most urban centres in the developed world. It has been long understood that development in many world cities needs to be of a higher density for efficiency of land use, infrastructure, transportation, housing and the overall efficient use of the network of good and services that exist in an urban centre.

The OECD has studied the compact city, and how to monitor their urban performance, especially how these cities may contribute to the 'Green Growth' movement. As the OECD notes (2012, p. 3) their documents are for use by "national, sub-national and municipal governments as they seek to address their economic and environmental challenges through the development and implementation of spatial strategies in pursuit of Green Growth objectives. It also illustrates best practices (which present key elements of successful compact city policies) based on empirical evidence that can be shared across OECD member countries".

In the academic realm, "the literature on sustainability and urban form, the terms 'sustainability' and 'consolidation' have a corresponding resonance. Consolidation often doubles as 'densification', 'urban containment' or 'urban intensification'. These terms are used as binary opposites to 'urban sprawl' and 'suburbanisation' (Cuthbert 2006, p. 169). "The question of density is one of how much activity, population ad built form can be concentrated into a given urban area. Density shortens distances between people and the places they need access to" (Dovey 2016, p.16).

Globally, urban sprawl and other low density developments have seen planning and policy responses that include active city growth strategies, population growth caps, urban consolidation and infill strategies and city design by-laws that promote higher density development. More recently, the drive for a '30-minute city' has gone hand-in-hand with a compact, sustainable city. Australia is no exception in trying to curb its low density living. The urban consolidation debate and Australia's approach to it historically, and both the pros and cons of such a complicated matter has been written about in many key readings (Bunker 1983, McLoughlin 1991, Troy 1996). Despite the long-running discussions, "there is a lack of knowledge about effective implementation of intensification policies" (Searle and Filion 2011, p. 1419).

Australia has seen a major urban consolidation movement in most cities. In housing markets, where much of the change in density has occurred, the Australian dream of owning a house on a quarter-acre block has become less and less available and affordable in capital cities, especially Sydney and Melbourne. Planners and designers have pursued much more mixed residential areas and have begun to infill vacant lots, use brownfield sites for development and build high-density, high rise apartment buildings and complexes. Poly-nucleic urban conurbations are now actively being developed where 'inner-city', high-density living is occurring in more than one location (eg. In the Sydney basin, city centres with higher density living exists in Sydney proper, North Sydney, and Parramatta).

According to ABS statistics, the Sydney Statistical Division called 'Sydney (C) – East' is where the most densely populated Statistical Local Area (SLA) exists in Australia. Its density is 8,800 people per sq km). "At the other extreme, there were almost 250 SLAs in Australia with less than 1 person per sq km, close to one-third of which were located in Western Australia" (ABS 2012, website).

The drive for a compact city is becoming mainstream in Australia, having existed in other cities around the world such as Singapore, Hong Kong and New York City, for years. With compact city components, the value placed on green and open space becomes ever more critical. Fewer and fewer backyards exist, and hence the need and want for public space (and a public social life) is directly increased. "The private household backyard, in some nations, used to provide extensive open space for a family and community social life. However, the reality of urbanisation and high-density living encourages an extension of life out from the private home and into public parks, plazas, playgrounds, and third spaces" (Marshall 2016, p. 188).

Whilst the move to more compact cities is admirable, it does come with its challenges. For the efficient use of land use, infrastructure and government services, compact cities are critical. The reality is though, for many residents, low density living is preferred. Many people, acculturated to a western style of living actually prefer low-density living. Cities will always need some areas that are low density (eg. light industrial land uses) in order to contribute to the flows of goods and services within an urban centre. The sociological and physical challenges of gentrification are also well documented.

## *Urban Ecology, Smart Cities, Healthy Built Environments and Compact Cities – Links to Urban Parks and Urban Resilience*

The *challenges* that contemporary urban parks and open space have are many and varied. Many people do not believe that their city has enough public open space. Some open spaces are underutilised generally because they have not instrumental purpose for the urban fabric (Carmona et al 2010). Designers often conclude that some spaces are out-of-date in their design or have contain inappropriate amenities for its users, or none at all. Users of open space complain that there is poor maintenance of their local parks and not enough investment is made by the local authorities. Landscaping may be scant or inappropriate for the climatic conditions or of poor quality (Cooper Marcus, Francis & Russell 1998).

Potential users of some spaces suggest that safety and lack of programming are reasons why open space is not well-used. They also suggest that no affordances exist for potential users which results in underutilisation of the space or reappropriation of it by the marginalised or undesirable users (Malone 2006). Finally, accessibility is also often an issue with respect to open spaces– either they are poorly located and hence difficult to get to, or their amenities are not designed for all abilities., or in fact, the public open space has been privatised. "With the increasing numbers of public-private partnerships providing public open space, some might argue that access is not really public or open at all times" (Marshall 2016 p. 200).

As Cho, Heng and Trivic (2016 p. xiii) suggest, in some Asian cities "public spaces have been erased to make way for extensive high-density real estate developments driven by expedience and the maximization of profits." They go on to suggest that some of the public domain is in fact being replaced "by exclusive private open spaces" (Cho, Heng and Trivic 2016, xiii).

In western cities, "public spaces have historically been provided by public administrations but now, privately owned public open space (POPOS) are becoming more prevalent as cities struggle to fund the provision and maintenance of its open spaces. Governments now often rely on its public-private partnerships for key public infrastructure. As compact developments are built the provision of more POPOS, essentially the privatisation of public land will be on the rise.

Some of the major risks associated with urban intensification and population expansion are that there will continue be further losses in the number and diversity of species and habitats for flora and fauna. The loss of biodiversity has the potential to impact human well-being because these species' interactions enable the provision of ecosystem services, such as contributing to air and water quality, reducing the risk of flooding, providing shade to ameliorate the effects of associated with the urban heat island effect, etc.

The *opportunities* that contemporary urban parks and open space have, especially now with the concept of urban resilience driving urban practice and research are as many and varied as the challenges. One of the means of bolstering urban resilience is the implementation of green infrastructure systems throughout urban areas, and a parks and open space systems comprise a major dimension of urban green infrastructure.

"Green, sustainable cities—with tree coverage and green spaces—provide significant benefits to their residents. They improve the quality of air and water, reduce the heat island effect, protect biological diversity and threatened species, and enhance general amenity. They also give people greater connection with nature and provide important places for recreation and healthy lifestyles" (Australian Government 2016b. p.13). An important link between urban parks and resilience is their capacity to help moderate the physical environment, including extreme temperatures and provide refuge when, for example, the tree canopy cover is dense. Rose (2016, p. 232) refers to this as a 'tempering' effect of nature.

Parks and open space are critical elements of the built environment that must be included in healthy planning approaches, to support both human health and ecological/environmental health. It is well established in the planning literature that connected and accessible greenspaces throughout a

metropolitan context not only enhance the experience of city living, but also contribute to individual and collective human health, and are essential to the health of urban ecosystems (Corkery 2015)

The Australian government clearly has a new found focus on **compact cities** and **smart cities** and the challenges and opportunities that come with most of its population living within them with the introduction of the Australian government's *Infrastructure Plan* and *Smart Cities Plan*. All levels of governments understand that high density living and the elements of a compact city automatically means less access to backyards and private green spaces. This is creating an elevated importance for the green network within a city which might include larger regional parks, sports fields for organised play, community gardens, incidental green spaces and vacant lots, and green walls and roofs as options in high density living (Australian Government 2016b).

"Many world cities are currently governed by the ideologies of contemporary neoliberal governments and their associated economic rationalisation principles (Campbell, Tait & Watkins 2014). With this value system greatly influencing **compact urban form** and public policy, the value of public open space, especially green infrastructure, is constantly being defended by its champions – it seems always to be at risk of not being provided for by public authorities. The neoliberal land use and the property principle of 'highest and best use' does not favour public open space (Marshall 2016). As well as the challenges this value system brings, there are opportunities for urban authorities to demand more from developers to ensure the provision of public spaces. These could include negotiating tougher development incentives, allowing businesses to provide an income stream for that public/private space, requiring developers to contribute more to public lands or amenity funds and to be more innovative in the provision of public facilities.

Linking back to Newman et al (2017, p. 10) and their principles of urban resilience, a compact, smart and healthy city will directly address the necessity to "foster inclusive and healthy cities" and "build biophilic urbanism in the city and its bioregion." These two principles, in particular, can be embedded in the planning and design of urban parks and open spaces. Through their inclusion, the value of these areas of the city can be elevated and made more explicit.

Linking back to the Rockefeller Foundation's (2017) qualities of resilient cities, compact, smart and healthy cities will ease the 'chronic stresses' that weaken the fabric of most contemporary cities.

## 4.  Conclusion: Envisioning the Future Resilient City

Much research has proved that good quality green and grey urban open space can contribute to the health, wellbeing, and (social, cultural, economic and physical) sustainability of a city (Lang and Marshall 2017). Open space should be given higher priority in the strategic planning process, and agree on standards for provision that acknowledge their capacity to enhance the social, environmental and economic performance of cities.

Planners, urban designers and landscape architects need to develop a better understanding of "how much is enough" when we analyse the provision of parks and open space in the densifying city. We might start by looking for examples of "density done well" in other world cities, where new residential projects that are regarded as providing a high quality of life may also demonstrate how to sustain and renew the ecosystems that service them. Healthy ecosystems also provide improved prospects for urban resilience.

What does the resilient city look like in relation to the provision of urban parks and open space? Is there a more qualitative approach to anticipating open space provision in relation to demographic change, rather than simply applying a formula? Or, another question will be how do we measure urban resiliency in relation to this land use provision?

The challenges that are imposing stress on urban centres are many but the opportunities for sustainable, liveable and productive cities are equally robust and possible. A reframing of urban parks and open space using the lens of resilience, especially as it relates to contemporary ways of discussing urbanisation, could ensure that remains key to those outcomes.

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