URBAN GREENING

The role of international organizations and civil society

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Introduction

Achieving truly sustainable cities is one of the great global challenges of the twenty-first century. The increase, from about 7.5 billion people in the world with 55 percent in cities, covering some 1,500,000 to 2,000,000 km² (depending on definitions of ‘urban area’) in 2018 to some 9.5 billion people, 68 percent of whom will be in cities by 2050, will require an expansion in urban areas equivalent to an area roughly the size of Mongolia (1,564,116 km²). Most of this growth will occur in developing countries, although many developed nations will also experience expansion, particularly in larger cities (United Nations 2018).

It is in cities where by far the most energy, food, and materials are consumed, albeit at lower per capita rate than in rural areas (Day and Hall 2016). If we are to reverse global biodiversity loss, tackle climate change, and sustainably manage natural resources, it is likely many of the solutions will be developed in urban centers. Cities are also where many of the impacts arising from environmental change will be felt most acutely. For example, climate change induced flooding already disproportionately affects urban areas and the poorest in society (Anguelovski et al. 2016). These problems are particularly acute in Africa where the unprecedented speed of urbanization is leading to serious health and environmental impacts whilst, in the medium term at least, also presenting opportunities for both people and nature (Güneralp et al. 2017).

There is an emerging consensus that if we are to fix the many social and economic challenges of rapid urbanization, planning and design will need to be nature-based or, at the very least, a blend of nature-based solutions alongside innovative technical, hard engineered approaches (Nesshöver et al. 2017). To achieve this will involve rethinking how we perceive our cities, seeing them as ecosystems in their own right, rather than separate and distinct from the geology, soils, water, and vegetation upon which they are founded.

A compelling body of science that has emerged in recent decades has revealed the multiple benefits that can be gained from conserving, restoring, and enhancing green infrastructure in cities (Elmqvist et al. 2015). The ecosystem services provided by healthy stocks of natural capital in cities reduce flood risks, ameliorate the urban heat island effect, clean air, secure and protect water supplies, and enhance both inward investment and resilience to economic volatility. The positive impacts from such enhanced ecosystem service flows for physical health, mental well-being, and social cohesion are well documented (Bragg et al. 2018).
The international conservation movement recognizes the need to urgently deliver nature-based solutions in urban environments whilst fully engaging and empowering city people in the process of so doing. If we succeed in doing this in the coming years and decades we could begin to secure a range of highly cost-effective nature-derived benefits whilst also delivering environmental targets through reduced emissions and biodiversity recovery.

**International policy context**

Major policy commitments on the protection and restoration of urban nature are normally included as components within broader urban sustainability frameworks. For example, the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) held in Quito in October 2016 included an outcome to ‘Protect, conserve, restore and promote [urban] ecosystems, water, natural habitats and biodiversity, minimize their environmental impact, and change to sustainable consumption and production patterns’. This was one of eight outcomes contained in the final Habitat III document and, somewhat unhelpfully it could be argued, conflates two distinct aims; one on nature protection and restoration and one on the considerable challenge of changing human consumption and production patterns (United Nations General Assembly 2016).

UN Sustainable Development Goal 11 aims to ‘Make cities and human settlements inclusive, safe, resilient and sustainable’ and contains a target that ‘By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities’ (United Nations Economic and Social Council 2017). Whilst this commitment is welcome, as with Habitat III specific commitments and targets on protecting and restoring the condition of urban ecosystems, it forms only a small part of these international policy initiatives.

Partly in response to the gap in focused and coordinated international policy commitments for urban nature, in 2016, the IUCN (International Union for Conservation of Nature) passed a Resolution on ‘Incorporating urban dimensions of conservation into the work of IUCN’ at the World Conservation Congress in Hawaii in September 2016. This called for a new IUCN Urban Alliance with a remit which includes promoting awareness of the crucial role that nature performs in urban places and encouraging actions that reinforce the role of nature in the planning and management of urban areas (World Conservation Congress 2016).

The IUCN Urban Alliance has since been established and is now taking forward implementation of the urban Resolution. One priority for action includes the development of a standard ‘City Nature Index’ knowledge product designed to assess the underlying health of natural capital within any town or city in the world. This will provide national and local governments, city authorities, civil society organizations, researchers and other stakeholders with systematic and comparable metrics for measuring the condition of their urban ecosystems and enable them to set clear targets and action plans for improvement.

The IUCN Urban Alliance will seek to build on and collaborate with a range of other international practical and policy initiatives including the ICLEI (Local Governments for Sustainability) ‘Cities with Nature’ program; The Nature Conservancy’s cities work stream; the work of the World Resources Institute Ross Centre for Sustainable Cities; and the IUCN’s own World Commission on Protected Areas Urban Conservation Strategies Specialist Group. In doing so, the IUCN will aim to bring much-needed international coordination, commitments, and target setting, together with the development of powerful tools and methodologies for assessing and taking action for nature and people in urban areas.
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**Emerging themes**

International and national level organizations have been working to restore urban nature for decades. Such initiatives have traditionally been focused on the protection and management of urban parks and semi-natural protected areas within cities and occasionally their hinterlands. More recently we are seeing a trend towards integrating ecological thinking into the design of gray, green, and blue urban spaces, implementing projects at multiple urban scales with recognition of the key role of ecological connectivity whilst increasing efforts to reconnect people with nature within cities. Large-scale, city-wide initiatives are becoming more common, as are natural capital valuation approaches which seek to calculate the monetary or non-monetary value of a range of ecosystem service that flow from stocks of urban natural capital, including air, water, soil, and urban habitats (Rouquette 2017).

I explore some of these approaches below in the context of international trends in applied urban ecology.

**Nature-based solutions**

The nature-based solutions (NbS) concept has emerged within the last decade from an ever growing body of research that has demonstrated that by working with the ‘grain of nature’, humanity can cost-effectively adapt to and mitigate climate change impacts, secure sustainable livelihoods whilst at the same time safeguarding ecosystems and biodiversity. Nature-based solutions are defined by IUCN as ‘actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits’ (Cohen-Shacham et al. 2016). NbS have been classified by the IUCN into five approaches:

I. ecosystem restoration approaches e.g. ecological restoration, ecological engineering, and forest landscape restoration;
II. issue specific ecosystem-related approaches e.g. ecosystem-based adaptation, ecosystem-based mitigation, and ecosystem-based disaster risk reduction;
III. infrastructure-related approaches e.g. natural infrastructure and green infrastructure approaches;
IV. ecosystem-based management approaches e.g. integrated coastal zone management and integrated water resources management;
V. ecosystem protection approaches e.g. area-based conservation approaches including protected area management.

Infrastructure-related approaches are particularly important to urban areas where hard-engineered solutions have predominated yet have not always delivered the function for which they were designed, e.g. failed flood defenses and inefficient and polluting transit infrastructure (see Chapters 57 and 58).

The application of the concept of NbS continues to gain traction. It is now a core part of the European Commission’s strategy for tackling environmental challenges in Europe and beyond. The Commission view is that ‘working with nature, rather than against it, can further pave the way towards a more resource efficient, competitive and greener economy. It can also help to create new jobs and economic growth, through the manufacture and delivery of new products and services, which enhance the natural capital rather than deplete it’ (European Commission n.d.).

Significant research funding has been put into NbS by the Commission’s Horizon 2020 program, including through BiodivERsA, a network of national and regional funding...
organizations promoting pan-European research on biodiversity and ecosystem services, and offering innovative opportunities for the conservation and sustainable management of biodiversity (BiodivERsA, n.d.). The URBES project (Box 68.1) is an example of an NbS research-into-practice initiative funded through BiodivERsA. As NbS projects are implemented around the world the body of case studies will grow and hopefully generate momentum for NbS approaches to be more systematically embedded in urban planning and infrastructure projects.

**Box 68.1 Regional action: URBES Urban Biodiversity and Ecosystem Services project**

The URBES project ran from 2012 to 2015 with the principal aim of bridging the knowledge gap on urbanization processes and the ecosystem services sustaining them.

The project generated a number of important outcomes and is a good example of a multi-partner collaborative approach to urban ecosystem protection and restoration. The main outcomes were:

- identification of significant scientific knowledge gaps on the role of urban biodiversity and ecosystem services for human well-being;
- provision of support and advice to European cities on how to adapt to climate change and reduce ecological footprints;
- development of innovative ways of integrating monetary and non-monetary valuation techniques in urban landscapes by pioneering the development of The Economics of Ecosystems and Biodiversity (TEEB) approach;
- delivery of a professional communication and training program for cities;
- active contribution to international policy mechanisms and global partnerships like the Convention on Biological Diversity (CBD), TEEB, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), as well as to the EU 2020 EU Biodiversity Strategy and the Thematic Strategy on the Urban Environment.

IUCN’s role in the project was an important one, focused on influencing local, regional, and international policy arenas through an extensive communication and capacity building program developed together with ICLEI (Local Governments for Sustainability). This firstly focused on translating the outcomes of the project in accessible messages, which were disseminated to several audiences in Europe. Secondly, ICLEI and IUCN presented examples of ecosystems services for cities to a variety of stakeholders in Europe and built capacities in a selected group of local authorities in Europe on the sustainable management of ecosystems services and natural resources.

The project was an excellent example of how coordinated regional and global partnerships can assist cities and local governments to become better informed on the value of natural capital for sustainable urban life and increasingly contribute to biodiversity conservation and improved management of ecosystems services.

URBES was a transdisciplinary collaboration between nine European research institutes and partners: Stockholm Resilience Centre, The Humboldt University, Technical University of Munich, University of Salzburg, Beijer Institute of Ecological Economics, Kiel Institute for the World Economy, Mistra Urban Futures, Erasmus University Rotterdam, University of Helsinki, ICLEI and IUCN.
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**Ecological urbanism**

Having established the wide-ranging benefits of healthy ecosystems within cities, the question arises of how it might be possible to maintain and increase those benefits through planning, design, and other interventions. The concept of ecological urbanism attempts to answer this question. It has been defined as ‘an approach to urban planning which puts nature at the centre of the design process in order to create better places and provide solutions to the multiple social, economic and environmental challenges facing the 21st century city. This approach integrates green infrastructure into the built environment in a way that minimizes loss of natural capital assets and optimizes the healthy functioning of the urban ecosystem so they provide a range of benefits to people’ (Hughes et al. 2018). Ecological urbanism is therefore similar to the NbS concept but more explicitly attempts to bring in wider principles of sustainable or ‘new urbanism’ of the kind promoted by the Congress of New Urbanism in their Charter (Congress for the New Urbanism 2018).

Urban ecosystems are comprised of different, often fragmented, semi-natural components ranging from the micro-scale (green roofs, individual street trees, or small gardens for example) through to the macro-scale (such as large river corridors or major semi-natural parks). These components can, if well designed, link together to form a connected system or green infrastructure. Once these different elements and different scales are understood, then it becomes easier to take practical actions that enhance the health of the whole urban ecosystem.

Aside from the total amount of green infrastructure, there are three key principles that determine the degree to which urban ecosystems can deliver ecosystem services which have interesting counterparts in the principles of sustainable urbanism:

- the level of connectivity – or how joined up large and small patches of green infrastructure are;
- the degree of naturalness – or how similar is the current flora and fauna to the natural ecosystem which existed on the site before the urban area was constructed;
- the structural diversity – or the degree of complexity and ecological niches present within urban greenspace habitats.

Interestingly, these three ecological principles have counterparts in certain urbanism principles. By flipping from green to gray, the underlying ecology of the green infrastructure in the first set becomes the overlying urbanism in the second set (Figure 68.1). Thus:

- connectivity translates to integrated sustainable and active transport networks;
- naturalness translates to locally adapted design styles and building materials;
- structural diversity translates to vibrant, relatively dense mixed-use neighborhoods.

We now know that connectivity of greenspace is a critical factor determining the health of the urban ecosystem. Large areas of unbroken gray infrastructure are not only impenetrable to nature but, from an urbanism perspective, can often mean much of the urban population has little, or no, daily contact with nature.

When it comes to naturalness, the proportion of native plant species is a good indicator. Native plants usually support more species of birds, mammals, and invertebrates than exotic, introduced species. Similarly, the more structural diversity within vegetation, the more ecological niches are available to support a greater diversity of species and by extension ecosystem functionality and service provision.
By designing large and small greenspaces that are connected to each other, are rich in native species and have diverse habitat structure, it should be possible to significantly increase the ecological condition of the urban ecosystem and its capacity to provide services to both people and wildlife. Permeability for nature also improves permeability for people, not just along classic green corridors but throughout the gray–green interfaces of the city.
Ecological urbanism therefore sees cities as complex ecosystems in which green and gray infrastructures are so inextricably bound together they need to be managed together, as a system. For example, improving the quality and connectedness of the green infrastructure encourages walking and cycling which in turn could reduce car use and increase the vibrancy of places. Because more people are using the urban landscape, this in turn might increase the community sense of security and reduce crime. This may in turn attract new talent to the settlement and encourage businesses to invest in the area leading to greater investment in green infrastructure which leads to further improvements in air quality and the health of the local population and so on. Clearly these are not linear relationships but highly complex networks of connections similar to the web of life in nature. Ecological urbanism should perhaps not be seen as a rules-based approach, but more a broad philosophy that seeks to combine some fundamental ecological principles with fundamental principles of sustainable urbanism.

Reconnecting urban people and nature

At the same time new insights from research in urban ecology have encouraged nature-based solutions and ecological urbanism approaches, there is now growing recognition that urban people are becoming increasingly disconnected from the experience of nature in cities. Richard Louv has written extensively about the phenomenon of ‘nature deficit disorder’ and its negative effects on mental health and well-being. It is in the city that these effects are often most acutely felt (Louv 2010).

Reconnecting people with nature is now a global priority and one which will need a combination of grassroots, bottom-up projects supported by top-down policy development, advocacy, and knowledge provision from organizations such as the IUCN, ICLEI Local Governments for Sustainability, World Parks Association and others. There is also a need for platforms which share successes in mobilizing and inspiring people to engage with nature in cities. One such platform is the Nature of Cities, an international web-based resource for transdisciplinary dialogue on urban solutions with a mission to facilitate the ‘sharing of diverse, transformative ideas about cities as ecosystems of people, nature, and infrastructure’ (The Nature of Cities n.d.).

As Sustainable Development Goal 11 recognizes, there is also a particular need to focus on the plight of the child in the city (Shine et al. 2017) as well as conditions for women, the older generation, and disabled people. The IUCN, in partnership with others, is leading global policy development in this important area (Box 68.2), recognizing that green infrastructure interventions need to be designed for and with the people who live in cities in an equitable and inclusive way (see also Box 68.3).

Conclusion

Rapid urbanization in the developing world and an imperative for urgent climate change adaptation in cities across the globe means the science of urban ecology is more vital than ever. We are perhaps on the cusp of a golden age of applied urban ecology which, if we succeed in getting it right, could have a profound and widespread impact on the character of the twenty-first century city and the lives of the billions of urban people.

There is much to be hopeful about. The terms green and blue infrastructure have not just entered the lexicon of the urban design and planning dictionaries, they are now beginning to shape place-making and place-mending in a way that would have been unthinkable before 2000. The concepts of natural capital and nature-based solutions are being embraced by local and national governments and other influential institutions like the European Commission.
Box 68.2 Global action: The Salzburg Statement on the Child in the City: Health, Parks and Play

To address the interconnected issues of urbanization, loss of natural environment and connections to nature, declining public health, and rising resource conflict risks, Salzburg Global Seminar and IUCN launched the Parks for the Planet Forum in 2015. Developed with an expanding range of partners, this ten-year collaborative platform aims to position nature – including urban green spaces and protected and conserved areas – at the very heart of human health and well-being, security, and prosperity.

Awareness of the importance of nature for human health and well-being has grown substantially in the past decade. Arguably, this started with the inaugural International Healthy Parks Healthy People Congress in 2010. Bridging planning, community development, climate change, health, education, conservation, and tourism sectors, the Congress explored the many ways that protected areas contribute to the well-being of individuals and communities.

A key outcome was to place the Healthy Parks Healthy People approach firmly on the radar for government, education, and business sectors. This pivot was furthered by The Promise of Sydney, adopted by over 6000 participants at the IUCN World Parks Congress in 2014, which set an agenda for change based on the affirmation that ‘nature is the ultimate foundation of life, our economy and our aspirations, and underpins our human existence, cultural identity, health and prosperity’.

In 2017, the third session of the Forum took forward outcomes from the inaugural session, Nature, Health and a New Urban Generation. It focused squarely on the needs of the very youngest in our societies, taking account of the broad agenda laid down by the Sustainable Development Goals. The session built directly upon Salzburg Global’s strategic 2014 session on Early Childhood Development & Education, which led to the adoption of the Salzburg Statement on Quality Early Childhood Development and Education for All Girls and Boys.

This policy statement called for public–private coordination on poverty reduction, maternal and child health, education, social protection, gender equality, workforce policies, water, sanitation, energy, and housing. Recognizing that countries and communities can only flourish long-term if their children are healthy, safe, and curious, the session explored the intersect of play, nature, and outdoor experiences around the world. Making the links between poverty relief, food security, health, education, urban design and planning, education and culture, Salzburg Global Seminar and IUCN convened an interdisciplinary group of early child development experts and educators, health workers, urban planners, and activists.

Participants adopted the Salzburg Statement on the Child in the City: Health, Parks and Play, which calls for all children to have the ‘right to a safe and healthy city’ where they can play, explore, and experience nature and the outdoors. The Statement sets a cross-sector agenda for healthier child-friendly design and development, highlighting the multiple benefits of urban parks, public greenspaces, and nature-based infrastructure for the development of human capital and genuinely sustainable communities (Shine et al. 2017).
Box 68.3 Local action: Edinburgh Living Landscape: a replicable multi-scale approach to urban ecosystem enhancement

Edinburgh Living Landscape (ELL) is a long-term practical vision which aims to ensure nature is at the heart of Scotland's capital city. Although a single city based initiative, it seeks to deliver international policy priorities and provide a scalable ‘Living Landscape’ model for other cities around the world to replicate.

ELL will demonstrate that investment in green infrastructure makes economic sense as well as increasing biodiversity and creating healthier urban ecosystems for people. To achieve this, it is seeking to integrate nature into neighborhoods across the city.

The project will reinforce and expand existing green networks and reconnect the people of Edinburgh to their natural environment and work to benefit local people and wildlife with an aim to make the city one of the most sustainable in Europe by 2050.

Edinburgh Living Landscape is a group of organizations working in partnership to connect green infrastructure at multiple scales, from window boxes, green roofs, and street trees through to large parks and urban woodlands. It is about making the links between a healthy environment, a healthy economy, people's well-being, and ultimately the prosperity and economic resilience of Edinburgh.

The Living Landscape will lead to changes across the city, from bringing wildlife into people's gardens to integrating green infrastructure into Edinburgh's larger green networks. In densely populated urban areas the project is working with communities and developers to turn redundant or gray space into functional greenspace. In the already greener areas of the city, the Living Landscape will make sure these areas become more natural, connected, and structurally diverse over time using the principles of 'ecological urbanism' (Figure 68.2). For parks and greenspaces, this will

Figure 68.2 Medium density housing connected to natural river corridor in the heart of Edinburgh – an example of ecological urbanism from the nineteenth century from which twenty-first century planners might learn
mean changes to how some of the outdoor spaces look, with the creation of meadows and more natural areas with native trees that can be explored and enjoyed. For new developments, nature will be seen as an asset and natural features will be built into the infrastructure.

ELL is a partnership project led by the Scottish Wildlife Trust, The City of Edinburgh Council, Royal Botanic Garden Edinburgh, Edinburgh & Lothian’s Greenspace Trust, The University of Edinburgh, and Butterfly Conservation Scotland. Working in partnership, the Edinburgh Living Landscape aims to improve the ecosystem health of Edinburgh for the benefit of local people and wildlife.

A large number of people, organizations, and businesses have been supported to improve the ecosystem health of Edinburgh for its residents, economy, and wildlife. Highlight impacts have been through the five flagship projects – Nature in Your Neighbourhood, Square Metre for Butterflies, Pollinator Pledge, Grey to Green Shoreline, and Tree Time. Much more has been done behind the scenes to work with policy-makers to improve the green infrastructure in our built-up areas, and researchers are gathering evidence of the benefits. Figure 68.3 provides a snapshot of recent outputs.

Moreover, these concepts are being translated into tangible and successful projects on the ground at town and city level. Researchers and practitioners increasingly have access to a huge portfolio of ecological planning and design case studies from which to draw inspiration and drive concerted action.

However, the fact remains that many of these initiatives tend to be bottom-up, city specific, and not easily scalable. Whilst locally based initiatives have many obvious advantages, many
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cities are being left behind as they lack the capacity, tools, and policy frameworks to change. What is missing are clear and compelling international policy commitments similar to those we have for climate change and biodiversity loss. There is no ‘Convention on Urban Nature’, and it shows. It shows in the patchiness of implementation and the relegation of the urban nature agenda to a line or two in wider urban sustainability strategies. This is despite the tireless efforts of organizations like ICLEI (Local Governments for Sustainability) who continue their work in building capacity in local governments on every continent.

The IUCN Urban Alliance aims to fill this gap by coordinating the development of high level governmental and civil society policy commitments. The Alliance will also work with partners such as ICLEI to provide tools, indices, methodologies, advice, and resources to cities, particularly those in the Global South experiencing rapid urbanization and lacking the capacity and expertise to implement the concepts and models discussed in this chapter.

As we strive to embed nature-based solutions thinking and practice into all tiers of planning, design, and decision-making in the coming decades, one challenge must not be forgotten – the relationship between cities and their hinterlands. This is a topic still poorly understood and more research in this area would help practitioners design solutions which extend well into the peri-urban environment as well as the urban core. A green city cannot be green if it is simply parasitizing the natural capital from its hinterlands. Our challenge is therefore to create or restore a functional ecology within and beyond the city limits. Cities depend on their hinterlands and it is in these surrounding catchments where action on flood amelioration, water management, sustainable food production, and provision of integrated green transport systems must begin. As Daniel Haberman concludes in his thesis on this subject: ‘Sustainable cities should account for their distal [remote] ecological impacts in addition to their ecological impacts nearby [and] although cities drive ecological degradation, cities can also be part of the solution by harnessing their potential for urban innovation to create transitions toward positive outcomes’ (Haberman 2016).

In conclusion, at a global level, urban ecology has come a long way and we stand on the edge of finally putting nature-based solutions at the heart of urban thinking, planning, and practice across the world. If this is to happen we need firmer global leadership, bolder international policy frameworks, better availability of high-quality standardized tools and metrics, and more research on the interdependency of cities and their hinterlands.

References


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