biodiverCITIES:

A Primer on Nature in Cities

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Local Governments for Sustainability

Toronto and Region Conservation
for The Living City®

ICLEI Local Governments for Sustainability

Toronto and Region Conservation for The Living City®

ICLEI is a champion of local governments. We are an international association of local governments that have made a commitment to sustainable development. We promote participatory, long-term strategic planning processes to support local-level sustainability, and have been working with communities on sustainability issues since 1990.

ICLEI Canada understands the unique needs of Canada's diverse communities. We work alongside practitioners in Canada and across the globe on climate change mitigation and adaptation strategies, sustainability management, green procurement, biodiversity management and community engagement. We deliver engaging projects, creative workshops, modern conferences, and extensive capacity building resources.

Local action moves the world. Join the movement!

With over 55 years of experience, the Toronto and Region Conservation Authority (TRCA) helps people understand, enjoy and look-after the natural environment. Our vision is for The Living City®, where human settlement can flourish forever as part of nature's beauty and diversity.

TRCA provides:

- Protection, enhancement and regeneration of natural resources on a watershed basis.
- Sound environmental information and advice to promote good land management practices.
- Community action on environmental projects.
- Outdoor recreation opportunities on over 13,000 hectares of open space, forest lands, campgrounds, conservation areas and Black Creek Pioneer Village.
- Conservation and heritage education programs

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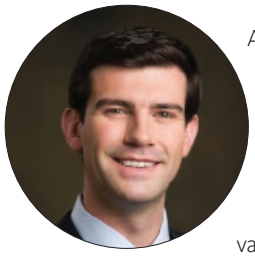
Foreword



As home to North America's largest urban parkland along the North Saskatchewan River, Edmontonians experience a strong connection with nature and biodiversity in our everyday life. It's this *"ribbon of green"* that's the backbone of our city's ecological network and natural spaces. We understand the immense value these natural areas provide as a habitat for native plants and wildlife, a place for recreation and leisure and an important link to our natural world.

For more than 100 years, our city has recognized the importance of protecting and enhancing this wonderful network of natural areas and has developed several key plans and policies to reflect our evolving approach to conservation. As our citizens have become more engaged to take action, we continue to build and strengthen our ecological network. Increasingly, nature can be found in the spaces between these larger protected areas—in backyards and schoolyards, in community gardens and constructed wetlands, on farms and in industrial areas.

In partnership with our citizens, businesses and non-profit organizations, Edmonton continues to strive to be an international leader in environmental conservation and sustainability.

Don Iveson
Mayor, City of Edmonton

The City of Vaughan has experienced tremendous growth and change which has had an impact on residents, businesses, roads, plants and species. *biodiverCities: A Primer on Nature in Cities* provides tangible and effective ways our municipality can adapt, thrive and achieve the goals of an eco-friendly urban lifestyle.

The City of Vaughan places great emphasis on improving the quality of life for our residents and fostering healthy communities. This resource offers new ways of making the connection between healthy people and healthy ecosystems. Vaughan, like its neighbouring municipalities and others across the country and around the world, is undergoing great change. Many issues are no longer local in context, but national and even global in their scope and ability to impact the natural environment. We are committed to environmental sustainability and creating a greener future for everyone.

I encourage you to consider the key messages in biodiverCities as we continue to build sustainable and livable communities.

Maurizio Bevilacqua, P.C.
Mayor of Vaughan

With a population of about 1.9 million inhabitants on an area of 499 km^2, the City of Montréal's urban area benefits from natural space which covers nearly one third of the area, including large waterscapes that surround the island.

Convinced of the numerous benefits associated with urban biodiversity, the City has undertaken many actions to support urban biodiversity such as "The Protection and Enhancement of Natural Habitats Policy", proposed an ambitious Canopy Action Plan and a pilot project aiming at increasing urban nature.

As host city of the Secretariat of the Convention on Biological Diversity and member of the Advisory Committee on Cities and Biodiversity, Montréal also contributes to the City Biodiversity Index (CBI) and since 2010 has been part of the Local Action for Biodiversity a project administered by ICLEI.

Montréal is proud to contribute to ICLEI and TRCA's *biodiverCities: A Primer on Nature in Cities,* which will without doubt inspire many local governments!

Denis Coderre
Mayor, City of Montréal

As Mayor of the City of Kelowna, I would like to extend our sincere thanks and appreciation to ICLEI Canada and the Toronto and Region Conservation Authority for developing *biodiverCities: A Primer on Nature in Cities*.

The Okanagan Valley is a precious resource for all species that depend on it, not the least of which is humans. As you can appreciate, our valley's wealth, prosperity and livability are inextricably linked to our ecosystems. The fact that nature does not respect political boundaries suggests that managing it requires a more collaborative and integrated approach than currently exists.

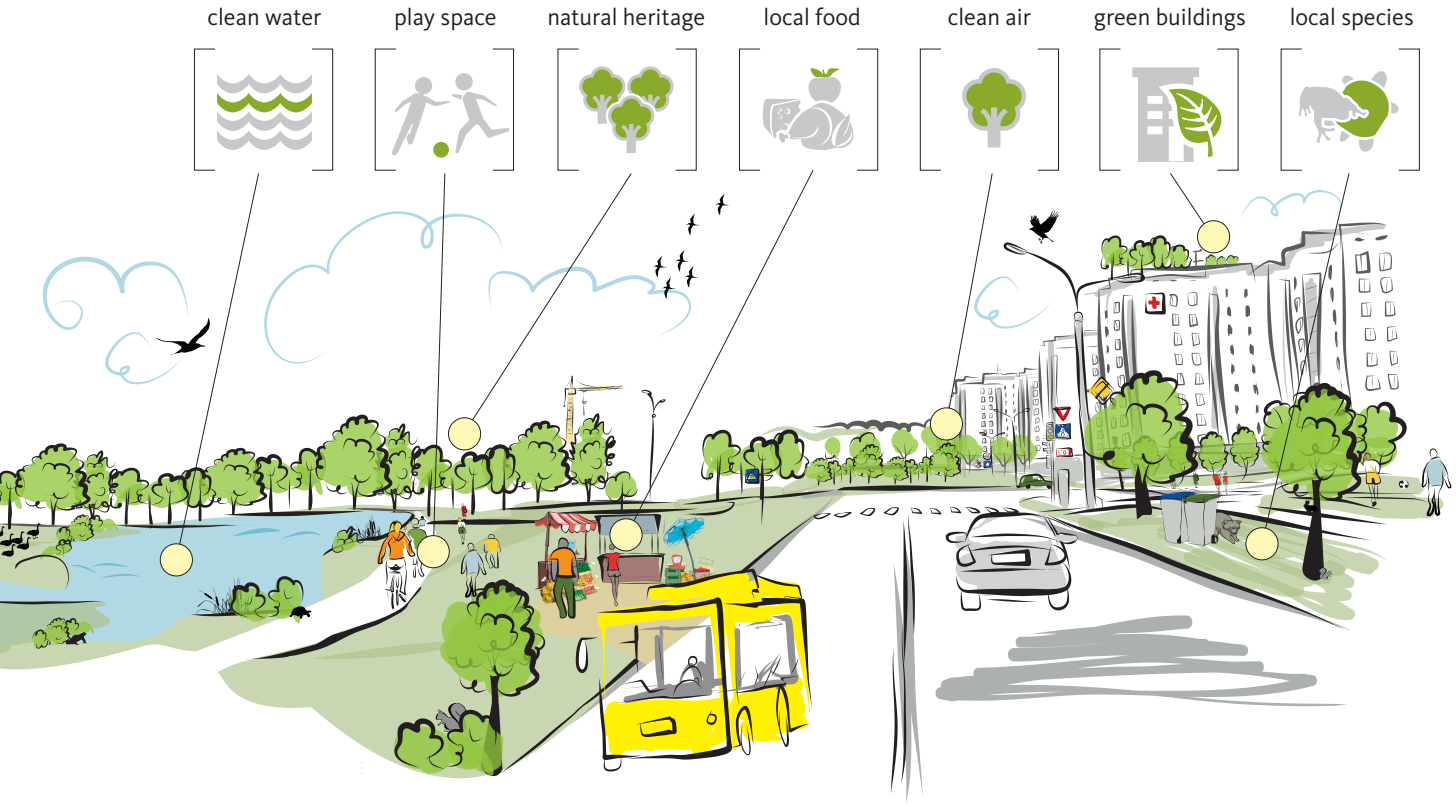
This Primer describes an effective way to increase coordination, align goals across scales, facilitate learning, and identify and preserve special ecosystems through the sharing of best practices. The City of Kelowna will continue to be a leader in protecting our special areas, which in turn, will continue to support the Okanagan's prosperity and livability for all species.

Walter Gray
Mayor, City of Kelowna

About this Publication

It is undeniable that city issues are trending; everywhere from mainstream news to twitter to the blogging world—people are talking and writing about **urban transit, infrastructure, greenspace** and **citizen engagement**. With a growing majority of the world's people now living in cities, it's time to ask how our urban areas can become more sustainable and more resilient. At least part of the answer is by successfully integrating the concept of biodiversity into their planning and management.

Biodiversity considerations should be the business of everyone committed to building more sustainable cities. We can no longer view biodiversity as a compartmentalized concern, an unnecessary luxury or even a constraint to economic development. Rather, urban biodiversity represents a foundation upon which greater social and economic sustainability can be achieved. When biodiversity considerations are integrated into all aspects of city building—urban planning, transportation, energy production, recreation, waste management, health and well-being, and so on—we can start to realize our shared sustainability goals and strengthen the resilience of our communities.



With this in mind, *biodiverCities: A Primer for Nature in Cities* is intended for municipal decision makers who want to explore new approaches to achieving broader sustainability and community liveability objectives. Full of examples and case studies, this publication features best practices that have produced positive results and can be replicated by other communities looking to do the same.

The Primer is a companion document to the *Urban Biodiversity Management Guidebook*, which operationalizes the themes within this document and presents a practical and action-orientated set of "milestones" or steps that municipalities can follow as they pursue a biodiversity management plan. Together, these documents provide the blueprint for integrating urban biodiversity into the creation of healthy, resilient and sustainable communities.

Message *for* Urban Decision Makers

People want to work, live, and play in cities

because cities are dynamic nodes of activity, idea centres and economic engines that offer wide-ranging services and amenities. To be sustainable, cities need to be vibrant and inspiring places where productive economic, social and ecological systems converge to support human health and well-being. Today, we face many challenges as we work towards achieving truly sustainable cities: a changing climate and a growing population will continue to place unpredictable stresses and demands on our municipal infrastructure and services.

In Canada, demographic shifts mirror the global trend of rapid rural-to-urban migration. Canada has become a nation of city-dwellers, with 80 per cent of the population living in urban areas. Our primary interactions with nature occur during our commute to work, while lazing in our

3%

Cities take up approximately 3% of the earth's surface and are located on sites of ecological significance, such as coastlines, wetlands, forests, and rivers.

50%

Cities hold more than 50% of the population. By 2050, the urban population will increase to 6.8 billion people.

75%

Cities consume 75% of natural resources. Biodiversity provides construction and industrial materials, food, and medicine.

own backyards and when exploring the parks and greenspaces found in cities and towns. The presence of urban biodiversity—and the personal connections to nature such contact engenders—plays a key role in developing citizens who care about living sustainably. City-dwellers that are disconnected from nature are much less likely to support local, national or global efforts to protect nature and promote more sustainable lifestyles.

New thinking and innovative approaches to city building, guided by strong and progressive leaders, will help meet the ever-increasing demands being placed on cities. A key to meeting these demands—and the focus of this Primer—is recognizing the foundational role that urban biodiversity plays in supporting all elements of a sustainable city: fresh air to breathe, clean water to drink, healthy food to eat and materials for shelter. Urban biodiversity—the nature right outside our front door—is vital to achieving our municipal goals and objectives; this makes urban biodiversity not a constraint, but an opportunity!

Defining Urban Biodiversity

"Urban biodiversity" describes the variety and richness of living organisms and habitats found in and on the edge of human settlements, including remnants of natural landscapes, traditional agricultural lands and urban-industrial areas. The study of urban biodiversity is expanding—beyond the simple cataloguing of species and habitats—to include many different angles, such as the consideration of green infrastructure, natural vegetation and vegetative technologies that provide society with products and services[i], the urban system that supports biodiversity, as well as the benefits humans gain from the provision of ecosystem goods and services (food and clean water, flood and disease control, cultural benefits and recreational opportunities).

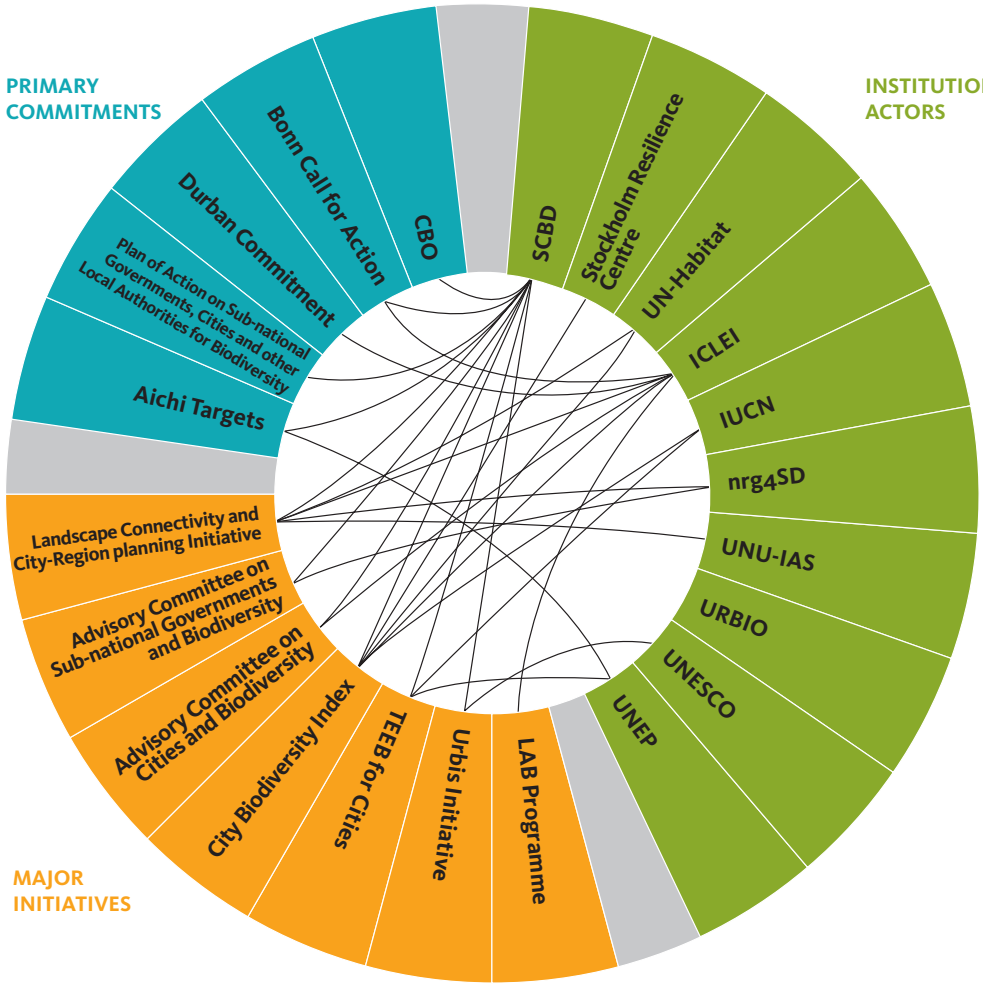
WHOSE RESPONSIBILITY IS IT TO PROTECT URBAN BIODIVERSITY?

Elected officials, municipal staff and decision makers have a responsibility to provide services and infrastructure, to protect municipal assets, and to secure the community's current and future well-being. In the context of increasing demands on municipal governments to grow the local economy, to create housing and to fix roads and infrastructure, some may question whether there is time to work on urban biodiversity?

However, integrating urban biodiversity into the political and physical landscape need not always require new staff, extended budgets and more resources. When the responsibility is shared across municipal divisions and among stakeholders, urban biodiversity can simultaneously benefit public health initiatives, community greening activities, stormwater management, recreational opportunities, community design and urban beautification.

Traditionally, federal and provincial governments have been responsible for the protection and management of biodiversity and natural resources. However, they have focused primarily on animal and plant species and natural features not typically found in cities. Consequently, municipal governments, conservation authorities and other local agencies, as well as non-governmental organizations (NGOs), have led the way on urban ecosystem management. Now, we are beginning to see a shift at higher levels of government towards a greater understanding of the value and benefits of urban biodiversity.

CONNECTING WITH THE INTERNATIONAL COMMUNITY



Since 1993, as parties to the United Nation's Convention on Biological Diversity (CBD), nearly 200 countries have worked to stem the loss of global biodiversity at a national and international scale. In addition, a growing and very active community of local governments and organizations, such as ICLEI—Local Governments for Sustainability, have brought attention to the role cities can play in mitigating biodiversity loss and implementing the objectives set by the Convention. In 2011, at the 10th meeting of the governing body of the CBD in Nagoya, Japan, local governments were officially acknowledged as key stakeholders in supporting this global cause. This was a landmark decision in recognizing local governments as stewards of biodiversity.

The **20 Aichi Targets** developed in Nagoya make up part of the **CBD's Strategic Plan for Biodiversity 2011–2020** and provide a framework for action by all stakeholders—including cities—to protect biodiversity and enhance its benefits for people. These targets are an important tool for local governments looking to align their work with the international movement to protect biodiversity.

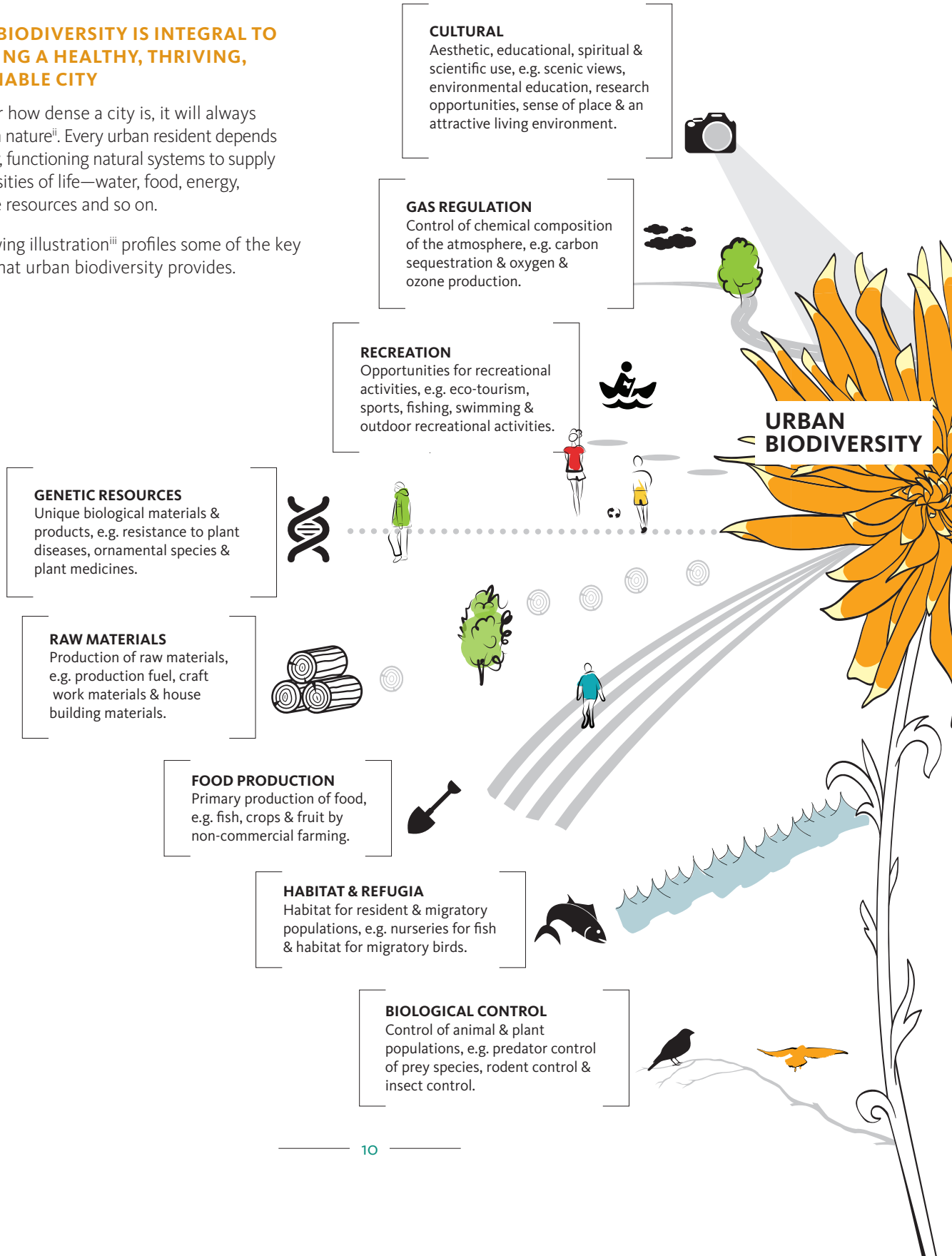
Graphic: Elmqvist, T., et al. (2013) *Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities*, New York, London: Springer, p. 565

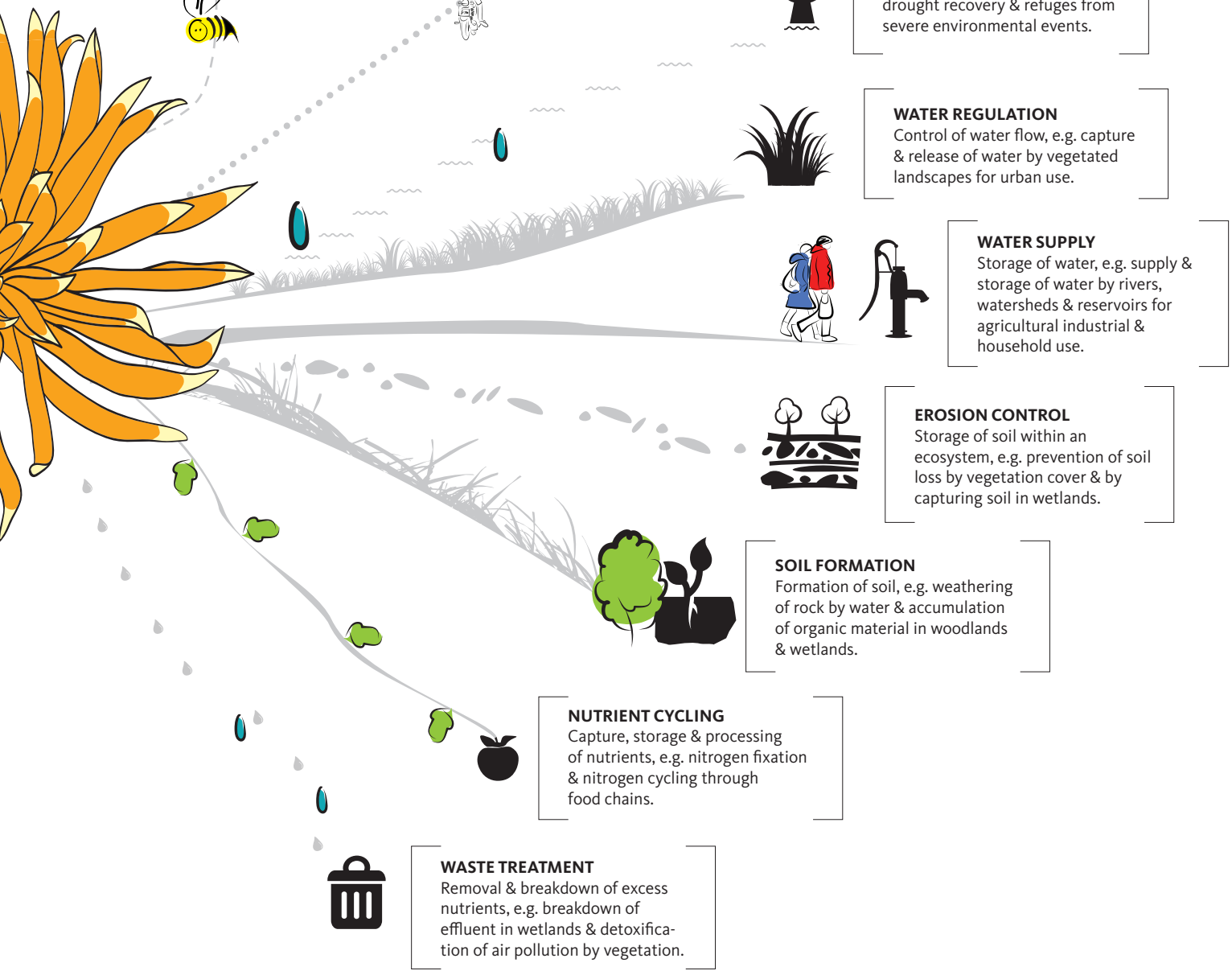
PROFILE OF THE KEY BENEFITS THAT URBAN BIODIVERSITY PROVIDES

URBAN BIODIVERSITY IS INTEGRAL TO ACHIEVING A HEALTHY, THRIVING, SUSTAINABLE CITY

No matter how dense a city is, it will always depend on nature[ii]. Every urban resident depends on healthy, functioning natural systems to supply the necessities of life—water, food, energy, renewable resources and so on.

The following illustration[iii] profiles some of the key benefits that urban biodiversity provides.





POLLINATION
Movement of pollen, e.g. pollination of flowers by bees to enable plant reproduction.

CLIMATE REGULATION
Control of temperatures, e.g. urban heat amelioration & wind reduction.

DISTURBANCE REGULATION
Control of large environmental fluctuations, eg. flood control, drought recovery & refuges from severe environmental events.

WATER REGULATION
Control of water flow, e.g. capture & release of water by vegetated landscapes for urban use.

WATER SUPPLY
Storage of water, e.g. supply & storage of water by rivers, watersheds & reservoirs for agricultural industrial & household use.

EROSION CONTROL
Storage of soil within an ecosystem, e.g. prevention of soil loss by vegetation cover & by capturing soil in wetlands.

SOIL FORMATION
Formation of soil, e.g. weathering of rock by water & accumulation of organic material in woodlands & wetlands.

NUTRIENT CYCLING
Capture, storage & processing of nutrients, e.g. nitrogen fixation & nitrogen cycling through food chains.

WASTE TREATMENT
Removal & breakdown of excess nutrients, e.g. breakdown of effluent in wetlands & detoxification of air pollution by vegetation.

WHAT IS URBAN BIODIVERSITY?

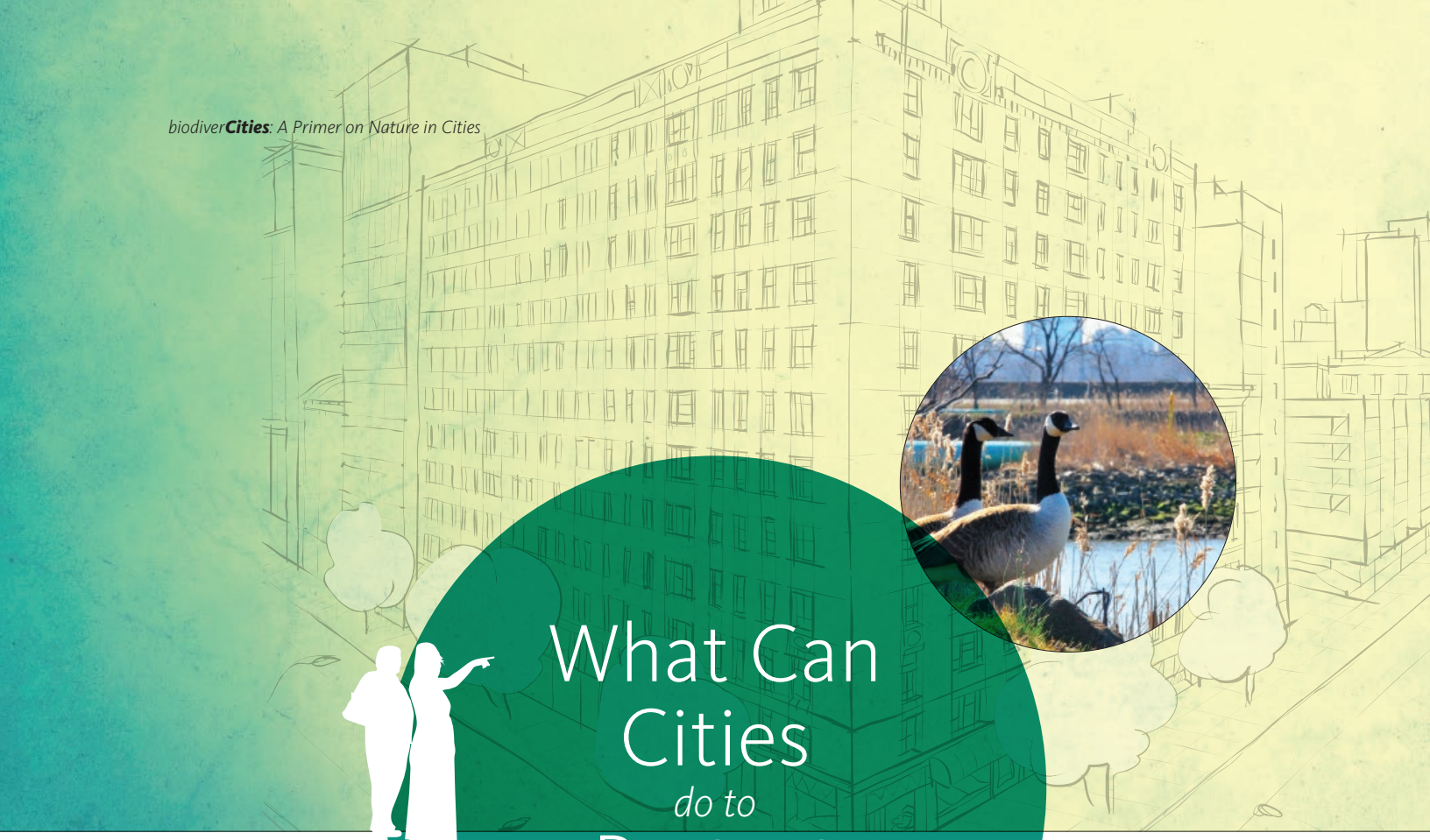
Feature	Description	Benefits[iv]
Protected and restored natural features	Protecting and restoring natural features provides opportunities to build connected ecological systems, protect essential habitat for local wildlife, and provide passivere creation sites of significant value such as natural heritage sites. Conservation and restoration of rivers, wetlands and coastlines also helps to ensure access to supplies of clean, fresh water for our communities.	Water regulation, water supply, erosion control, nutrient cycling, waste treatment, wildlife habitat, disturbance regulation (i.e., control of large environmental fluctuations, such as floods), cultural significance, recreation, protection of infrastructure
Naturalized parks and greenspaces	Adopting planting practices that incorporate local species and naturalized landscaping in parks and other greenspaces can re-establish natural heritage sites, provide wildlife habitat, regulate stream flow, reduce costs associated with upkeep of parks, allow for water absorption and reduce flooding. Encouraging residents to take a naturalized approach to private greenspace can help extend biodiversity throughout the urban fabric.	Pollination, recreation, biological pest control, water regulation, soil formation, nutrient cycling, habitat, genetic resources, food production, climate regulation
Urban tree canopy	Maintaining a healthy urban tree canopy provides important habitat and increases biodiversity. At the same time, the urban trees found along our streets, parking lots and yards improve air quality, reduce the urban heat island effect and provide a sense of well-being for residents. A commitment to frequent and effective pruning, careful maintenance, and strategic site and species selection on both public and private property will contribute to a thriving urban canopy that can provide the ecological services we depend on.	Greenhouse gas sequestration, habitat, pollination, climate regulation, disturbance regulation, water regulation, cultural significance, aesthetics

Feature	Description	Benefits[iv]
Green roofs and low-impact development	Small-scale, on-site interventions (such as green roofs and naturalized, low-impact stormwater management technologies) can reduce the ecological impacts of individual building sites on natural systems, provide microhabitats to support biodiversity and reduce the risk of flooding and other stresses on hard infrastructure.	Recreation, genetic resources, pollination, water regulation, food production
Local species and urban wildlife	An incredible array of animals and plant species share our cities with us. Their habitats can be supported by the types of green infrastructure listed above, but such measures must take the needs of local species into account. In some cases specific measures should be taken to protect urban species and minimize conflicts with humans. Efforts to control invasive plants and animals, support conditions under which key species can thrive, and limit clashes with human infrastructure and land uses are important to supporting the richness and diversity of animal life in cities.	Intrinsic value, biological resources, cultural significance, ecosystem health, pollination, cultural significance

BIODIVERSITY IS EVERYBODY'S BUSINESS

The need to protect and enhance urban biodiversity can be a 'hard sell' among those who believe natural heritage only exists in wild remote places, far from human interference. The presence of nature in cities tends to be overshadowed by the built environment, hidden by the day-to-day necessities of work, school and urban life. But the benefits of nature don't stop where the asphalt begins. Urban ecosystems provide billions of dollars' worth of ecological services to cities. Implementing new green infrastructure and restoring natural spaces within urban areas can save municipalities even more money. The ongoing health of these systems is directly and indirectly the result of collective decisions and actions taken by policy makers, residents, developers and others[v]—making biodiversity everybody's business.

There are many mechanisms available to Canadian cities to raise the profile of biodiversity and incorporate urban nature concerns into everyday governance, planning and design. The following section considers how cities can sustainably incorporate biodiversity into social, business and development practices.



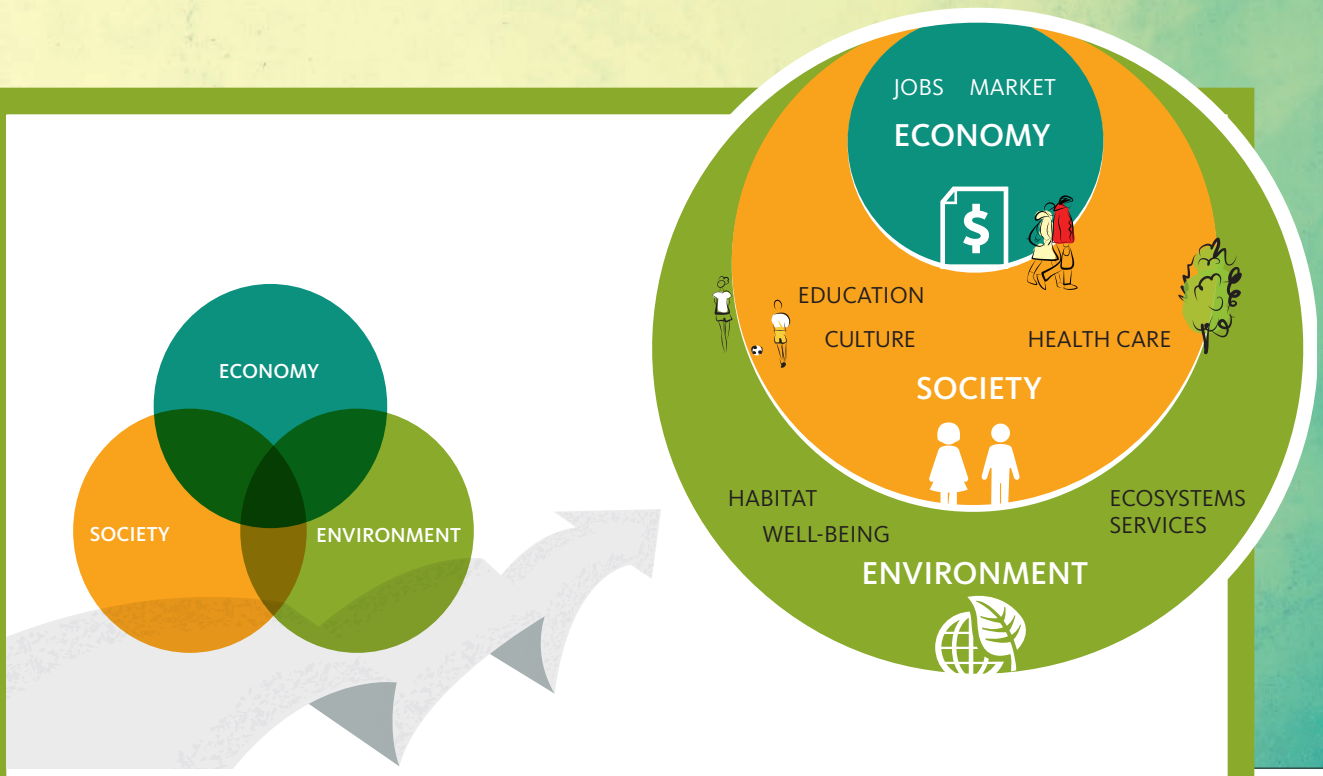
What Can Cities *do to* Protect Biodiversity?

A growing set of practices

has been developed to integrate the values of biodiversity into municipal decision-making. Dramatic change or radical intervention is not always necessary, as many of the most effective tools and policy processes already exist and only need to be repurposed to address biodiversity. This section explores management practices for, as well as barriers and solutions to, the implementation of biodiversity management approaches, and highlights areas where municipalities have the greatest ability to effect change.

CONNECTING BIODIVERSITY AND MUNICIPAL SERVICES

Municipal governments have a unique ability to respond to the needs of their residents. In order to foster a city that is healthy and thriving, consider the services and procedures needed to ensure overall public health and wellbeing, economic development, and environmental protection.



Applying the Triple-Bottom-Line

Municipal governments are increasingly realizing that the path to a healthy, thriving city requires social, economic and environmental sustainability. However, most work to achieve a "triple-bottom-line," by managing environmental concerns separately from social and economic issues. We propose a shift to the model on the right, whereby all aspects of municipal decision-making are embedded in thinking about environmental sustainability, including urban biodiversity. This shift in thinking shows how urban biodiversity is critical to the delivery of municipal services; both economic and social sustainability are dependent on healthy local and global environments.

There are many compelling reasons to protect urban biodiversity, even in the most densely populated and heavily developed regions. Fortunately, biodiversity considerations can be incorporated into many of the services municipal governments regularly deliver to their communities. These services, "Local Action Mechanisms," allow local governments to:

1. Ensure that they have the tools in place to align municipal action with a vision of a sustainable city;
2. Develop plans that offer solutions for integrating urban nature into all functions through delivery by all departments; and
3. Engage with residents to foster a local culture that values natural areas and to promote everyday practices that protect the environment.

OBJECTIVES OF HEALTHY, THRIVING CITIES

Public Health and Well-being

Economic Development

Environmental Protection

Local Action Mechanisms

Local Action Mechanisms are a combination of **tangible measures** (profiled in yellow) that generate direct outputs and **supporting measures** that assist in institutionalizing more tangible services. To mainstream biodiversity into various municipal operations, there should be an equal focus on both the direct and the supporting actions in order to build support within the organization and among external stakeholders, including businesses, residents, organizations and developers.

LOCAL ACTION MECHANISMS

Urban Planning and Design

A key role of local government is to manage urban spaces in a coordinated and planned way that reflects the community's needs and shared vision. Municipalities can incorporate urban biodiversity by integrating green infrastructure into urban designs and site plans.

Examples:
Green roof design, ecological corridors, parks planning, zoning bylaws and building codes, policy and official plan development, ecological network models, development of design guidelines, environmental assessments, scenario planning, risk management

Regulation

Local governments set the local regulatory regime through assessments and approval processes, the use of surcharges and rebates, and the enforcement of bylaws to implement and enforce biodiversity management and protection policies.

Examples:
Development limitations in sensitive and hazard prone areas, development permits, subdivision controls, conservation covenants and easements, tree by-laws conservation tax incentives, top soil by-laws

Leadership and Awareness

Local governments are in close contact with community organizations, businesses, residents and other stakeholders. The influence that results from this contact can be used to develop a shared understanding and encourage community-wide responses to biodiversity loss.

Examples:
Town hall meetings, canvassing, development of education brochures and promotion materials, awards and recognition, open forums, public comment periods, advocacy, attending and speaking at conferences, establishing committees and networks

Community Engagement and Service Delivery

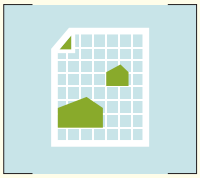
Local governments are committed to protecting the health, safety and well-being of residents, while ensuring opportunities for active civic participation. They do this by delivering services to the community and through programs, partnerships and projects.

Examples:
Community gardens, pollinator friendly residential gardening, school greening programs, pilot programs, strategy development, resident and business incentives, learn and serve programs, advisory committees, restoration, land acquisition, risk management, maintaining website and social media

Operations and Workforce

As responsible corporate citizens, local governments can act as leaders in environmental protection by ensuring sustainable business practices are integrated into the services they deliver, the management of public spaces and buildings, and workforce development programs (through training and educational campaigns).

Examples:
Campaigns that promote biking to work and work from home days, greening municipal buildings, economic development, staff training programs, lunch and learns, property management, interdepartmental communication, awards and recognition, procurement



Urban Planning and Design

Examples

Road Ecology: The **City of Edmonton** is incorporating ecosystem functions into city building, and their *Wildlife Passages Engineering Guidelines* provide engineers with a simple methodology for maintaining connectivity at different scales. The guidelines were designed to target locations that have been negatively affected by engineering works and, as a result, require more ecologically sensitive planning.

Risk Management: Canadian cities have shown leadership in developing climate change adaptation and disaster risk management strategies. Increasingly biodiversity management objectives are being integrated into climate response strategies. The City of Vancouver, for example, has displayed leadership in planning for climate change by participating in the Coastal Cities at Risk (CCaR) program and the **Building Adaptive & Resilient Communities (BARC) Program**.

Re-Greening: The City of St. Paul, Minnesota replaced the crumbling buildings of a 1960s strip mall with the site's original wetlands to create the **Phalen Wetland Park**. This created lakefront property that attracted private investment, the first of its kind in 40 years, to this previously low-income neighbourhood. Restoration of the local ecology and the local economy was the outcome of this project.

Water Management: Ontario's conservation authorities are introducing guidelines to help better manage the natural hydrology of watersheds and the natural features within them through urbanization. Examples include Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation's (CVC) **Low Impact Development Guidelines**, **Water Balance for Natural Features Guidelines**, and **Headwater Drainage Features Guidelines**.

Regulation

Examples

Green Roof By-Laws: The **City of Toronto** is developing the tools and resources needed to increase urban green roof cover with: a bylaw requiring the construction of green roofs on most types of new building development; the Eco-Roof incentive program; and the *Guidelines for Biodiverse Green Roofs*, which identifies best practices for creating habitat and promoting biodiversity on green roofs.

Sustainability Guidelines: Sustainability guidelines and metrics are being used to encourage measures in development that provide ecosystem services, such as improved tree planting and landscaping and low impact development measures for stormwater management. Some notable best practices include the City of **Toronto Green Standard** and the City of Kelowna's **Sustainability Checklist**.

Leadership and Awareness

Examples

Collaboration: The cities of **Brampton, Vaughan and Richmond Hill** partnered to complete *Measuring the Sustainability Performance of New Development in Brampton, Richmond Hill and Vaughan,* a planning tool to help reduce the overall ecological footprint of new developments and redevelopment projects. Through the development of sustainability guidelines and metrics, the project establishes sustainability scores for new developments and helps communities measure their efforts to reduce environmental impacts.

Innovative Promotional Materials: Inspired by a **TED talk on the accessibility of local government notices**, City of North Vancouver staff changed their traditional methods of signage style and content to become more accessible and engaging to residents. Changing the way they approached communications with the public allowed them to reconsider how they traditionally engaged with residents and to make the consulting process more inclusive. Transforming traditional methods of communication is important for mainstreaming biodiversity and promoting municipal projects and programs.

Fostering Public Engagement in Decision-making: The City of Lethbridge branded their public engagement process as "**idesign**—connecting people, parks and places," whose engagement efforts included a storefront design studio, site touring, social media and advertising as some of the ways they gathered public input. Their efforts won them awards and contributed to a shared vision for the future North Lethbridge Regional Park. Programs like this can help to develop a stewardship culture and create opportunities for residents to be meaningfully engaged in the planning process.

Community Engagement and Service Delivery

Examples

Environmental Education: Municipalities can partner with Environment Canada to develop interactive **BioKit** programs that are used to explore parks and natural areas and learn about local biodiversity. The City of Montréal produced Urban BioKits, designed to take children through the city's urban parks in a fun and engaging way so participants could learn about local species and document their observations.

Pollinator-friendly Residential Gardening: The **City of Guelph** established the Healthy Landscapes Program to connect with residents on local environmental issues. Staff organize pollinator-friendly gardening and native species planting workshops, produce brochures and other information resources, and conduct door-to-door visits. This helps to connect individual residents to a global issue and offers solutions that help grow the ecological network of the city by utilizing each resident's front and back yard.

Citizen Science: Bioblitz events are organized in communities around the world, making it the world's biggest effort at cataloguing animal, insect and fungal species. This event increases public participation in measuring local biodiversity and engages the community with researchers and scientists[vi].

Learn and Serve programs: Edmonton residents have the opportunity to become **Master Naturalists** by completing 35 hours of training and field trips in areas such as: natural area monitoring, inventory, and naturalization, and in turn volunteer for 35 hours in activities that support natural areas management, protection, and education. The program is rooted in providing participants with hands-on education to become stewards of their natural areas.

Operations and Workforce

Examples

Staff Programs: The **City of Cape Town**, South Africa, has developed an 'Environmental Awareness, Training and Education Strategy for City Staff and Councillors' that supports the goals of its Integrated Metropolitan Environmental Policy by ensuring that all city staff have the necessary understanding of environmental issues to take collective responsibility for urban sustainability.

Procurement: The **City of Markham** adopted a local food procurement policy, which sets standards for food and catering services in all their facilities. The objective of this certification program is to support local farm economies, reduce pesticide use, protect farmland and promote sustainable farming and purchasing practices. Their goal is to have 30 per cent of all food products come from local sustainable sources.

Moving Beyond Barriers:

CONSIDERATIONS FOR SUCCESSFUL IMPLEMENTATION

Each community has its own set of barriers that may slow or derail action on urban biodiversity. However, such barriers—both perceived and real—can be addressed and resolved when a municipality is able to recognize them, understand the available solutions and take a proactive stance.

Misconceptions about biodiversity

Urban biodiversity can be a difficult concept for some people to grasp. Although the term "biodiversity" has been used for many years by scientists and conservationists, it is not widely understood by the general public. To some, the term may indicate a diversity of human cultures; to others, it may mean a diversity of plant and animal species. A lack of resonance and clarity can be a barrier to promoting biodiversity work and getting 'buy-in' from stakeholders. However, educating a community about the importance of biodiversity will assist in mainstreaming the issue. Regardless of terminology, support for urban biodiversity is the goal and each community should find a communication strategy or approach that accurately reflects both the urgency of the issue and how people's lives may be affected.

How to Frame the Biodiversity Message

The Royal Ontario Museum (ROM) has had to think creatively about how to successfully maintain their biodiversity message while making the term understandable to the general public. To meet this challenge, they continually validate the term's importance with context-dependent statements that include: "biodiversity is nature" or "biodiversity is all about connections and life around us." ROM staff members reinforce the term's meaning in their programs, outreach and promotional material with the goal that, one day, the term biodiversity will be in the mainstream and no longer require explanation.

COMMON BARRIER #2

A disconnect between scientific research and policy development

It is important that biodiversity-related policies are supported by scientific research. With the impacts of climate change, shifts in soil composition due to development, fluctuating river flows and patterns of species dispersal, the environment is in a constant state of flux and biodiversity policies need to reflect that. However, the interactions between science and policy are not necessarily simple or straightforward [vii] as research findings and recommendations do not always lead to the development of complementary policies and legislation.

There are many opportunities for scientists and policy-makers to bridge that gap. The following examples show where municipalities, organizations, conservation groups and universities can come together[viii]:

- Produce time-critical research quickly enough to affect political outcomes.
- Use transdisciplinary approaches that link science with such fields as economics, sociology, health and politics.
- Discuss research ideas with conservation, management or nongovernmental organizations to build interest, engage a diverse group and determine potential research questions that are most relevant to those working at the landscape level.
- Communicate with the public in a more direct manner to advance and stimulate discussions that are informed by science.
- Utilize citizen science programs to engage community members and, at the same time, collect valuable monitoring data.

COMMON BARRIER #3

A lack of meaningful public awareness and engagement

Social connectedness has a role to play in the collective management of nature: to help build trust among community members, to develop new norms and social practices, and to make local environmental issues more prevalent. There is growing evidence that suggests when people are well connected and engaged in groups or networks—and when their input is sought and incorporated into planning and decision-making processes—they are more likely to become/remain environmental stewards.[ix]

Urban greenspaces provide a pathway for people to come into contact with nature. However, natural areas need to be carefully designed to facilitate meaningful interactions, educate visitors and provide exploration opportunities. Developing social norms on environmental protection activities does this.[x] The term 'social capital' is widely used to describe the role a community or group can play in the collective, multi-stakeholder management and protection of nature.[xi] In order to create meaningful public awareness and engagement, as well as influence social behaviours, communities must act together towards a common goal. Often this will manifest through: aid societies, naturalist and sports clubs, forest and fishery management groups and other local community organizations.

The Scientific Literacy Gap

Most Americans can identify hundreds of corporate logos but fewer than ten native plant species. The study by Miller (2005)[xii] suggests that there is a lack of meaningful interaction between people and the environment. Collective indifference is a real threat to biodiversity protection efforts. The study shows that simply being outside isn't enough; more efforts are needed to help people understand the importance and function of urban ecosystems.

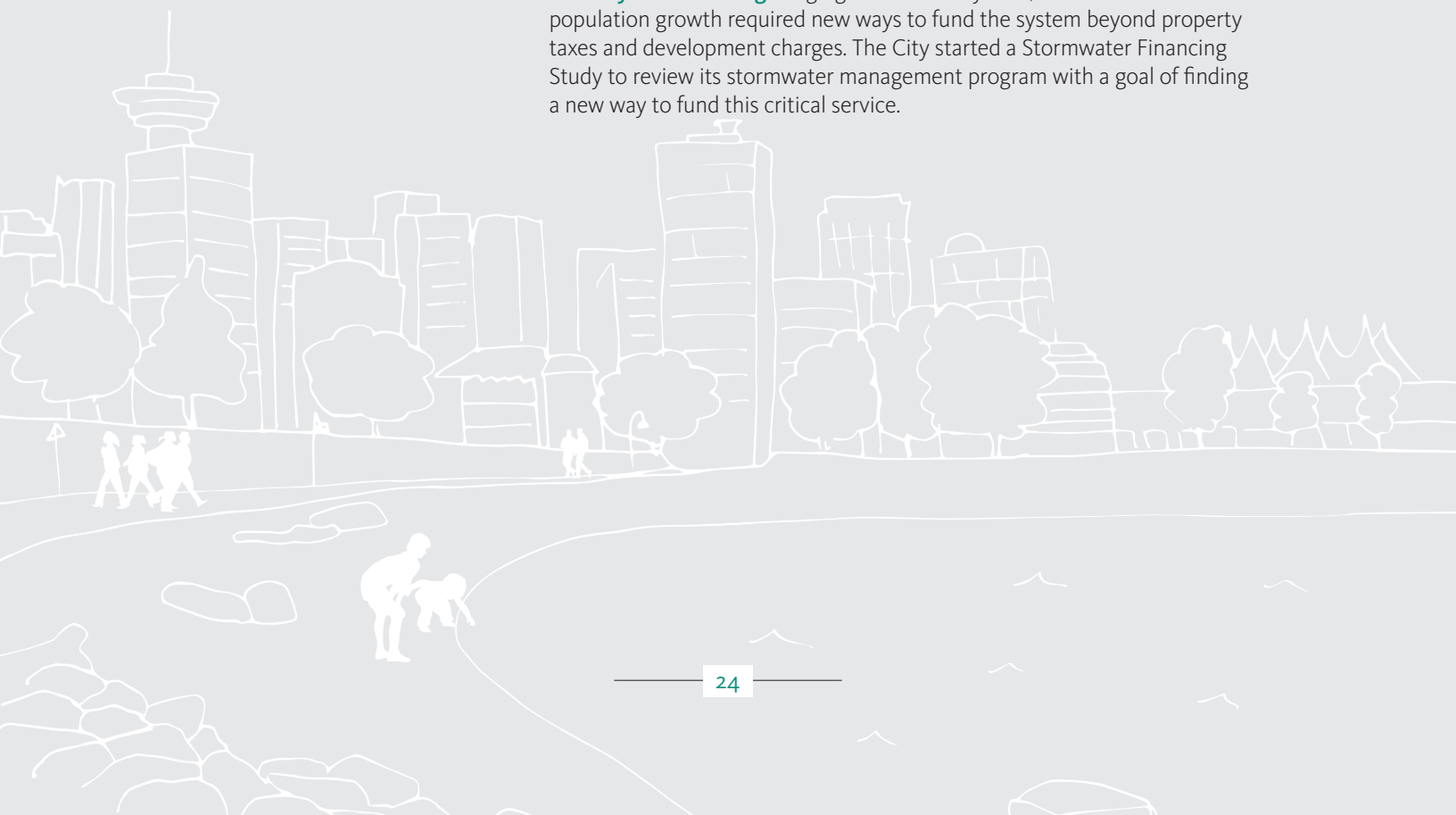
COMMON BARRIER #4

Lack of funding for biodiversity initiatives

For many municipalities, the need to fund biodiversity initiatives is the most frequent constraint. However, it can also be a driver: there is a wide range of revenue sources available to those local governments that are willing to think creatively about partnerships and entrepreneurship (both essential where resources are limited) and establish funds for targeted programs. Examples of revenue streams that could be leveraged to fund local biodiversity initiatives are described below.

Development charges: These are the fees collected by municipalities to offset capital costs incurred to support growth-related infrastructure projects. The fees can be used as an incentive to implement city policies that protect or manage biodiversity. For example, fees can be waived for developments that support ecological designs, species protection or the development of constructed wetlands. Development charges can also be used to support biodiversity initiatives near development sites.

- **Brampton Valley's Re-naturalization Planting Program**, which has replanted more than 280 acres of sensitive valley lands with locally appropriate plants, has been supported by development charges since its inception in 2002.
- The **City of Mississauga**'s aging stormwater system, financial limitations and population growth required new ways to fund the system beyond property taxes and development charges. The City started a Stormwater Financing Study to review its stormwater management program with a goal of finding a new way to fund this critical service.



User fees: These are fees charged to users for city-run services, including transit fares, recreational programs, childcare fees and utility charges, such as water use rates, garbage pickup and sewer surcharges.

- Municipalities usually pay for stormwater management through property taxes, but the **City of Kitchener and Waterloo** adopted a progressive user pay and credit system that helps fund the municipal stormwater program and provides credits to private land owners that conserve water and reduce stress on municipal infrastructure through low-impact (or green) development.

Compensation: Involves a payment made by a development proponent to a conservation body to pay for the replication of ecosystem services. These can fund land acquisitions, natural heritage feature restoration and long-term monitoring and maintenance.

- Kelowna created a **Habitat Compensation Bank** as a means of addressing appropriate compensation for unavoidable environmental impacts associated with city infrastructure projects. The city and its partners work together to direct compensation and restoration efforts to the Mission Creek Restoration Initiative where they can be most effective in restoring valuable fish habitat and providing additional flood protection throughout the city.

Grants: Municipalities have the opportunity to apply for allocation-based funding and competitive funding applications to support specific environmental projects and programs, such as feasibility studies, restoration work, case studies and watershed management. Funding is usually provided by provincial and federal agencies, as well as programs like the Federation of Canadian Municipalities' (FCM) Green Municipal Fund.

- The **City of Ottawa** received funding from FCM's Green Municipal Fund to develop software that calculated the benefits of urban forest cover in order to attain data on stormwater storage, reduction in air pollutants, and stored and sequestered carbon. The city plans to use this information when factoring forest cover into planning and development processes and profiling the costs of forest cover loss.

Habitat banking: Habitat banking is a market-based mechanism that rewards those who restore or improve habitat. In exchange for constructing, restoring or protecting a habitat site, a landowner can sell credits to developers who need to meet requirements for mitigating and compensating for the environmental impacts of development projects. Well run banks save time, money, and improve efficiently.

- The **Port of Metro Vancouver** currently operates a habitat banking program as a proactive measure to ensure that potential impacts to existing fish and wildlife habitat can be offset.

Think creatively about funding

When funding is scarce, these alternative solutions can help offset monetary limitations and increase capacity to undertake a diverse range of programs, including biodiversity management:

- Private and public partnerships, which create opportunities for local government and business partners to build, design, manage, operate and maintain a service;
- Regional collaborations for service delivery or protection efforts;
- Clear and detailed strategies for addressing biodiversity issues, which include time frames, measurable benchmarks, regular reviews and public feedback; and
- Pilot social financing projects, such as community bonds and crowd-sourcing.

THE 'TAKE HOME' MESSAGE

Cities differ from one another. They are all built differently, vary in size, demographics and culture, and have unique regional climates and landscapes. For the effective management of urban biodiversity, there simply cannot be a 'one-size-fits-all' solution. Fortunately, there are *many* solutions, as every local government can approach the subject in a variety of ways depending on what its overall goals, objectives and targets may be. This section explored the degree to which local action can influence how a community develops and changes. The diversity in scope, management tools and goals that can be implemented by local governments is forcing a re-examination of the ways cities have traditionally been planned and the role that nature has traditionally played in creating thriving cities. Biodiversity—and the overall accessibility of natural areas and ecological services—is reshaping what it means to be "urban."

The next section, *The Benefits of Integrating Urban Biodiversity into our Cities*, will take a descriptive approach and paint a more detailed picture of what a healthy, resilient community integrated with urban nature looks like. Detailed examples will show how biodiversity outcomes were successfully integrated into municipal operations, as well as how they can be replicated by other communities looking to do the same.

Urban Biodiversity *in our* Cities: Local Examples

Every city, each in its own way,

integrates nature into the urban landscape. Each has its own natural heritage, unique development and planning histories, mix of social cultures and visions for the future of the community. Molded by these dynamic factors, it's not surprising that each city has its own distinct approach to environmental protection that, in turn, helps shape the urban form and function.

In previous sections, this Primer examined **why** biodiversity is important to our communities and **what** local governments can do to become better stewards of the environment through the management of their operations and the services they provide. The third and final section will explore both the benefits of urban biodiversity and **how** local governments are creating better communities by prioritizing biodiversity in planning and management.

A BIODIVERSE COMMUNITY IS RESILIENT TO CHANGE

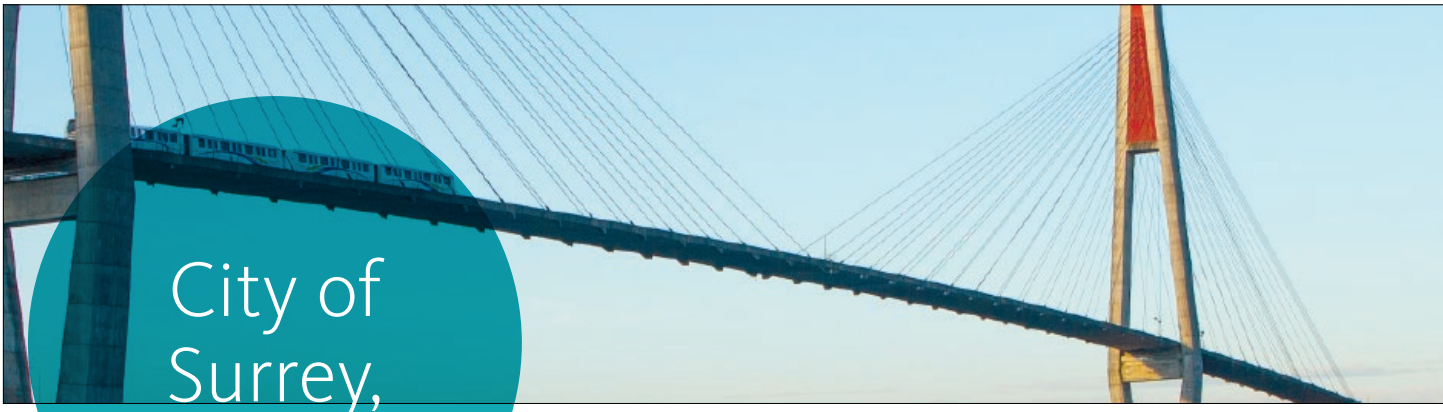
The City of Surrey has developed a comprehensive Climate Adaptation Strategy and a Biodiversity Conservation Strategy that make green infrastructure an integral part of creating a resilient city. From expanding the urban tree canopy... to mitigating and adapting to the impacts of climate change... to ensuring naturalized stormwater management infrastructure is in place to deal with increasingly powerful storms, biodiversity is helping Surrey adapt to uncertain future conditions.

A BIODIVERSE COMMUNITY CREATES THRIVING AND CONNECTED NEIGHBOURHOODS

Brampton's Mount Pleasant Village strives to increase connectivity between neighbourhoods and to connect people with nature through a place-making strategy focusing on Brampton's natural heritage. Maintaining greenways, natural systems and habitat corridors is preserving connections that are essential to the integrity of ecological communities, help residents build relationships within neighbourhoods, connect people to their city through a 'sense of place,' and help to form meaningful connections and engagement with nature.

A BIODIVERSE COMMUNITY IMPROVES HEALTH AND WELL-BEING

Many adverse health effects can be remedied by increasing the amount of nature in our cities. The case studies presented here demonstrate how urban design can successfully integrate biodiversity into public spaces. These examples also illustrate the importance of local and municipal programs that offer outdoor activities for children and youth. By viewing biodiversity through the lens of public health, there is an opportunity to better connect urban nature to people's lives in a meaningful way.



City of Surrey, BC

Building a resilient community through biodiversity conservation

The City of Surrey is one of the fastest growing urban regions in Canada; in the next 30 years, Surrey's population will grow by over 60 per cent. To provide services that contribute to a healthy and thriving community in the face of this projected growth, the city established a Sustainability Charter in 2008 that serves as the overarching policy document to guide city actions. This document, though broad in scale, includes a detailed implementation strategy to ensure that it remains a relevant 'living document', sets appropriate targets and progress metrics, and identifies specific roles, responsibilities and timelines.

The Charter serves as the basis for the City's Climate Adaptation Strategy (CAS) and draft Biodiversity Conservation Strategy (BCS). Both strategies highlight the City's commitment to improving resiliency—the capacity to withstand, adapt to and thrive in changing conditions—by addressing climatic impacts on their infrastructure (both grey and green) and by protecting ecosystem services to achieve broader sustainability objectives.

The CAS stands out as a comprehensive adaptation and mitigation plan, outlining the current state of specific regions, what climate impacts are anticipated and specific actions that the municipality intends to

Community Sustainability Dashboard

Surrey has developed a **Sustainability Dashboard** as an on-line tool to track and share progress made on achieving its sustainability targets. Using maps and charts, the dashboard shows how the Sustainability Charter is implemented through specific indicators that measure progress. Themes explored in the dashboard include ecosystems, food and farming, transportation, and many other sustainability indicators.

undertake to ensure it is resilient. The adaptation actions include six departmental areas: flood management and drainage, infrastructure, natural areas and ecosystems, urban trees and landscaping, agriculture and food security, and human health and safety. These were determined by a multi-division working group (including planning, engineering, transportation, stormwater engineering, community development and parks employees), and each division provided input on policies that would meet certain targets. This participatory approach allowed the group to improve operational efficiency, identify cross-departmental applications, develop tangible indicators, and reduce the duplication of work that already exists. Through this process, each department was able to assess the list of potential actions and rank them according to their risk levels, costs and benefits, political acceptability, urgency and capacity in order to prioritize actions throughout their operations. This approach allowed for a streamlined planning process that considered the ways municipal services and ecosystems will be impacted by climate change. By strongly emphasizing the delivery of ecosystem services, the CAS illustrates how urban resiliency is reliant on urban nature.

Throughout this process, Surrey drew on the five "milestones" for developing an adaptation plan by participating in the Building Adaptive & Resilient Communities (BARC) Program. The result is an adaptation strategy that increases the city's adaptive capacity to respond to climate change impacts, improves awareness of adaptation options for the community, and builds capacity among municipal staff to ensure that resources are available to deal with future impacts.

The actions identified in the CAS place Surrey at the forefront of efforts to integrate biodiversity into climate change adaptation and resilience planning. The draft Biodiversity Conservation Strategy complements their existing climate adaptation and mitigation work by highlighting the capacity of green infrastructure and protected/restored natural features (such as rivers, wetlands and coastlines) to provide the environmental services the city needs (such as stormwater management and flood control).

The objective was to provide a long-term vision and preserve local natural heritage through a series of policy recommendations to manage and enhance its network of natural systems, parks, greenspaces and ecosystem services. The result is a resource that builds on and supports existing plans and strategies—the Official Community Plan, the Sustainability Charter and Integrated Stormwater Management Plans—to inform the acquisition of parklands, and to improve and expand the green network and delivery of ecosystem services.

When communicating the meaning of biodiversity to residents, City of Surrey staff thought about the term at its most basic level—"nature."

The draft BCS employs a planning framework with three main components: an analysis of the current state of Surrey's biodiversity; management criteria and strategies for the green infrastructure network; and a series of best approaches, policies and monitoring practices that will help achieve conservation objectives. The assessments have identified a number of hubs, sites and corridors, which will be the target of protection measures based on the habitat characteristics of that region. These targeted locations expand the green infrastructure network by enhancing the interconnected natural areas and open spaces that form the regional natural network and is the backbone of the biodiversity strategy.

Together, these two strategies position Surrey as a leader in planning for a resilient city. Their approach marries hard infrastructure with green infrastructure, preparedness with mitigation, and urban growth with enhanced natural systems and services. These strategies offer other municipalities looking to improve resiliency with a sound framework for developing comprehensive climate action and biodiversity management policies that prioritize environmental protection.

City of Brampton, ON

Using planning to connect people with nature

Creating a 'sense of place' can be accomplished by engaging people with the environment in their neighbourhoods and, ultimately, their city. Brampton's natural heritage and green space strategies strive to increase connectivity between communities to connect people and nature through place-making associated with the city's natural heritage.

Brampton's approach to protecting and enhancing its natural heritage system shows that the health of the community can be enhanced by creating interconnected systems of parks, river and valley corridors, woodlands and wetlands, trails and green infrastructure. By providing pathways for people to move about their daily lives without the need for automobiles, Brampton is establishing communities where people spend more time outside being active, helping to reverse trends in obesity and adult onset diabetes. By planning communities to foster physical and emotional connections with nature, Brampton's natural heritage system helps to build a strong sense of place.

For the City of Brampton, natural heritage system planning is all about enhancing biodiversity and building connections by:

- Establishing an integrated natural heritage and open space network that provides opportunities for wildlife to move from one place to another and maintains connections between the habitats they require.
- Maintaining healthy habitat corridors through river and valley corridors, protected and restored natural features, and networks of naturalized parks and green infrastructure helps to build and sustain connections that are essential to the integrity of social, economic, and ecological communities.
- Integrating the natural heritage system with a network of connected cycling and pedestrian trails running through open spaces and parks, linking neighborhoods to active transportation corridors.
- Protecting natural heritage features that help residents build relationships within neighbourhoods and connect people to their city and, in turn, increase meaningful public awareness and engagement with biodiversity.

Put into practice, new neighbourhoods—like the Mount Pleasant Community in the award winning Mount Pleasant Village—feature an interconnected system of parks, environmental restoration areas, naturalized stormwater management infrastructure, and trails

running through large protected watercourse corridors. These corridors form key linkages to transit-oriented, 'walkable' developments at the centre of the community. Mount Pleasant serves as a model for other municipalities looking to integrate ecological, social, and economic connectivity into new green field communities, by working with developers to ensure that biodiversity and other environmental goals are addressed.

Development of a Natural Heritage and Environmental Management Strategy

Through the development of its Natural Heritage and Environmental Management Strategy (NHEMS), Brampton is expanding the traditional focus on the protection of natural areas to include parks and open spaces, green infrastructure such as stormwater management ponds and hydro corridors and the urban forest. This Strategy will also recognize trails, and privately owned green spaces. The goal of the NHEMS is to establish natural heritage preservation and biodiversity conservation and enhancement as the guiding principles for managing Brampton's open spaces. In the Mount Pleasant Villages neighbourhood, Brampton has developed community engagement materials that educate residents on the importance of the natural heritage features and how they can ensure that those features develop into diverse, healthy, thriving environments. These documents instruct residents on everything from stormwater management, to how to relate to local wildlife, and using the trail system. Developing an effective strategy for community engagement and public awareness around the goals of the project, and changing perceptions about naturalizing open spaces and planting local species, will be crucial to achieving buy-in from residents.

At the same time, Brampton has worked closely with local conservation authorities—Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC) —to present the case for protecting natural features to stakeholders, such as land owners and residents, and to ensure that conservation actions are based on solid science. The technical expertise and mandate for conservation these agencies embody reinforces Brampton's goals of preserving and restoring natural habitats and functions.

Maintaining and enhancing the health of Brampton's natural heritage system involves addressing a number management and maintenance issues, including public perception of natural spaces, public encroachment into natural features, climate change risks, invasive species, and extreme weather. Brampton is in the midst of developing an integrated environmental management plan that responds to these issues and recognizes the benefits of comprehensively planned and managed solutions that build on the linkages between the natural heritage system and open spaces.

The strategy also identifies an education and communication plan to engage City Council and municipal staff, partners, residents and developers to respect and support the City's natural heritage system. Brampton has consistently worked with developers and residents to build awareness that the natural heritage system adds value to new developments and provides important ecological functions and recreational amenities that help create thriving urban neighbourhoods.

The City of Brampton, together with residents, conservation authorities and developers, is implementing innovative ways of creating urban communities that are connected through a healthy natural heritage system, a network of open spaces, and pathways that celebrate urban nature. In this way, protecting natural systems and maintaining biodiversity can be central components in building connected and thriving communities.

Focus on Health

A Spotlight on Health and Biodiversity

THE HEALTH NATURE CONNECTION

The role of the physical environment in promoting and improving public health is better understood today than ever before. The opportunity to experience nature on a daily basis has a beneficial effect on our mental and emotional health. A regular and personal connection with nature—a walk in the park, a jog along a nature trail, even looking at trees and other greenery through a hospital or office window—can significantly reduce stress levels, improve our ability to concentrate, and decrease the incidence of emotional and mental disorders[xiii, xiv].

In linking personal health and the way cities are built, three key conclusions may be drawn[xv]:

- Access to greenspace is important for good health.
- The quality of the greenspace has a direct correlation with the health benefits derived.
- Planning decisions that affect greenspace have significant and complex impacts on health.

The term "health" can mean different things to different people. For some, it simply indicates the absence of illness. For others, it connotes our overall physical, emotional and social condition.

This raises the question, how can we best incorporate nature and biodiversity into the planning of our cities to support healthy, active choices? And how can we ensure that all citizens have access to nature and are able to enjoy the health benefits such access provides? The answers to these questions are increasingly important and impact how municipalities deliver health services.

For example, many urban and suburban residents face rising levels of chronic illnesses associated with physical inactivity as a result of increasingly sedentary modern lifestyles. A lack of sufficient physical activity has been estimated to cost the Canadian health care system more than $2 billion yearly in direct treatment costs and as much as $6.8 billion when indirect costs, such as losses in productivity, are considered.[xvi] Access to nature in cities plays a key role in reducing the incidence of obesity, and research suggests that residents of neighbourhoods

with access to high quality greenspace with associated recreation amenities have increased rates of physical activity.[xvii]

Green infrastructure—as embodied by a well-maintained urban tree canopy, well-functioning watersheds, and interconnected, biodiverse greenspaces—is essential to maintaining urban biodiversity, while imparting a number of positive health benefits for communities. According to a recent report published by Trees Ontario, respiratory diseases account for 36,800 visits to emergency rooms every year in Ontario alone, a condition strongly linked to poor air quality, especially in urban environments.[xviii] Maintaining healthy, thriving urban forests can greatly improve air quality and reduce respiratory incidents, as trees play a vital role in filtering and removing the airborne particulates that cause them.[xix] In addition, access to clean water can prevent a number of health conditions caused by disease vectors and waterborne contaminants. Healthy urban rivers provide important ecological services that can enhance the quality of drinking and recreational waters and serve as important indicators of the overall health of the communities they traverse.

The following case studies show how incorporating nature into the design of the built environment—and simply providing opportunities for people to spend more time outdoors in properly designed greenspaces—can help to deliver three key objectives:

- integrating health-related needs into municipal planning practices;
- addressing health inequalities; and
- creating programs and opportunities to get children outside and experiencing nature.

PEEL REGION'S HEALTHY DEVELOPMENT INDEX

In 2009, Peel Region developed the **Healthy Development Index**, a municipal planning and guidance tool for building a healthy built environment. With the use of evidence-based examples, the index supports the evaluation of urban spaces, through planning projects and transportation systems, from a health-impact perspective. The index also clearly identifies the key urban elements that impact human health—density, proximity to transit and services, land use mix, street connectivity, streetscape characteristics, parking, aesthetics and the human scale—and offers practical ways to integrate recommendations into the municipal planning process. This innovative and targeted resource emphasizes the role that the natural environment plays in supporting healthy and active communities[xx].

VICTORIA'S HEALTHY PARKS HEALTHY PEOPLE

The state of Victoria, Australia, developed its **Healthy Parks Healthy People** program[xxi], which focuses on managing public greenspace with a focus on ecosystem services and a holistic approach to wellbeing that emphasizes public engagement with nature through parks[xxii]. The Active In Parks initiative works with health and community development agencies to encourage targeted groups to engage with nature in their cities through visiting parks[xxiii]. This program, and others like it, shows the key role that public engagement strategies can play in enhancing public health and increasing awareness of the great resources and services that urban biodiversity delivers.

ONTARIO CHILDREN'S OUTDOOR CHARTER

In 2013, the province of Ontario partnered with a number of outdoor organizations to develop an outdoor charter for children to encourage them to get outside and explore nature. The **Ontario Children's Outdoor Charter** is designed to be 'kid-friendly' and outlines 12 outdoor activities that children should experience before they reach their teenage years. These activities are: following a trail, camping under the stars, harvesting something to eat, swimming in a lake, paddling a canoe, playing in the snow, observing plants and wildlife, building an outdoor fort, visiting a farm, exploring a park, going fishing, and creating an outdoor adventure. The goal is to nurture environmentally responsible citizens that experience and enjoy Ontario's cultural and natural heritage.

Final Thoughts

Urban biodiversity provides ecological services

that are the foundation of healthy, resilient, and sustainable communities. As Canada's growing population becomes increasingly concentrated in cities and our climate becomes more and more unpredictable, decision makers and managers are challenged to maintain existing service levels. Integrating nature into urban landscapes provides some of the best—and often the only—opportunities to meet city objectives while helping to achieve local and global sustainability goals. But when we begin to see it with a fresh perspective it becomes clear that urban nature can enrich our lives on a daily basis by delivering services that allow communities to thrive.

Meeting the challenge of protecting and enhancing urban biodiversity will not be possible without effective community engagement and public awareness. Unless people value the nature around them, they will not wish to dedicate resources to its protection. Already, greenspaces and natural systems within cities are some of the most treasured places in modern urban landscapes. People need to be able to see the benefits to themselves and their community; it is the role of municipalities to advocate the benefits of biodiversity and how its protection will be an important step towards building a sustainable urban future.

A CALL TO ACTION

Getting serious about integrating biodiversity into urban spaces will require innovative approaches to the way we envision, build and manage our cities. Making these new approaches a reality presents a number of challenges for cities. Using examples from across the globe, we have shown that cities already have the tools and capacity to begin working to meet those challenges.

There are 3 key messages we hope you take away from this Primer:

1. **Biodiversity exists within every community. Cities are no exception.**
2. **Municipal decision makers can influence the 'mainstreaming' of urban biodiversity issues. They have a suite of tools and resources available to make urban biodiversity an important component of all city processes.**
3. **Efforts to preserve and restore urban biodiversity can take many forms, and every community approaches an issue in their own way. By sharing experiences, not only are we mainstreaming urban biodiversity, but there is a lot to learn from communities that have had successes in implementing biodiversity initiatives and programs.**

This Primer is intended to furnish policy and decision-makers with arguments and examples that will strengthen the case for taking action on this important issue. It is now it is up to municipalities across Canada to take up this challenge in order to provide the long-term benefits that can be achieved by re-integrating biodiversity into the community and into municipal services. In order to do so, municipalities need champions capable of making the case for urban biodiversity. This Primer empowers those champions.

Annex

Urban Biodiversity Management Guidebook

Moving forward, it is important to take the foundational knowledge built

through this Primer and consider the specific steps needed to develop, implement, and monitor a municipal biodiversity management plan. There is no universal solution to biodiversity planning. However, the *Urban Biodiversity Management Guidebook* presents a practical and action-orientated series of steps—or "milestones"—municipalities can follow as they develop, implement and monitor a biodiversity management plan. These steps follow the traditional planning and management methodology of *plan... do... check... act*. With each step, users are encouraged to reflect upon and reassess past actions, making the process cyclical and continuous. The image below shows each "milestone" and provides a short description of the five steps in the management framework.

Guidebook Methodology:

STEPS TOWARDS DEVELOPING AND IMPLEMENTING A BIODIVERSITY PLAN

Milestone 1—INITIATE: The start-up milestone gets the process of developing a biodiversity plan moving by identifying possible internal and external stakeholders that should be part of the biodiversity planning team. From there, the team will assess their existing knowledge on this issue by identifying current policies and actions.

Milestone 2—RESEARCH: The second milestone further develops a community's understanding of its biodiversity and loss challenges through data collection and biodiversity research. This will help determine what elements should be protected (based on local geography and context), like species, habitat, and natural features, and support informed decision-making on conservation goals.

Milestone 3—PLAN: Based on the biodiversity loss challenges identified, the third milestone guides the development of an overall vision, management goals and objectives, identifies management options, and examines possible drivers and constraints to act. This phase will also mark the drafting of a Biodiversity Conservation Plan, tailored to the needs of the community. Features of the plan may include baseline data, financing actions, implementation schedule, departmental and stakeholder roles and responsibilities, and monitoring indicators.

Milestone 4—IMPLEMENT: The fourth milestone pushes the plan forward through approval processes and the support of council, municipal staff and the community. Implementation of the biodiversity plan will help ensure that this is a living document and implementation tools will be (re)assessed to ensure the plan's success. This will help to mainstream biodiversity and offer the community a chance to participate in the delivery of the plan's goals and objectives.

Milestone 5—MONITOR/REVIEW: The final milestone allows the community and the biodiversity team to assess whether the goals and objectives identified in the plan have been achieved, and provides an opportunity to identify any problems and develop solutions. The plan should be updated as new information becomes available.

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Endnotes

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xx **http://www.peelregion.ca/health/resources/healthbydesign/our-initiatives.htm#sbnav01**

xxi A global Healthy Parks, Healthy People has been established, more information can be found here: **www.hphpcentral.com/global**

xxii Kathryn Campbell, *Working Beyond Park Boundaries to Benefit Public Health in Victoria*, Australia. **http://www.thenatureofcities.com/**, 03/20/2013.

xxiii **http://activeinparks.org/**

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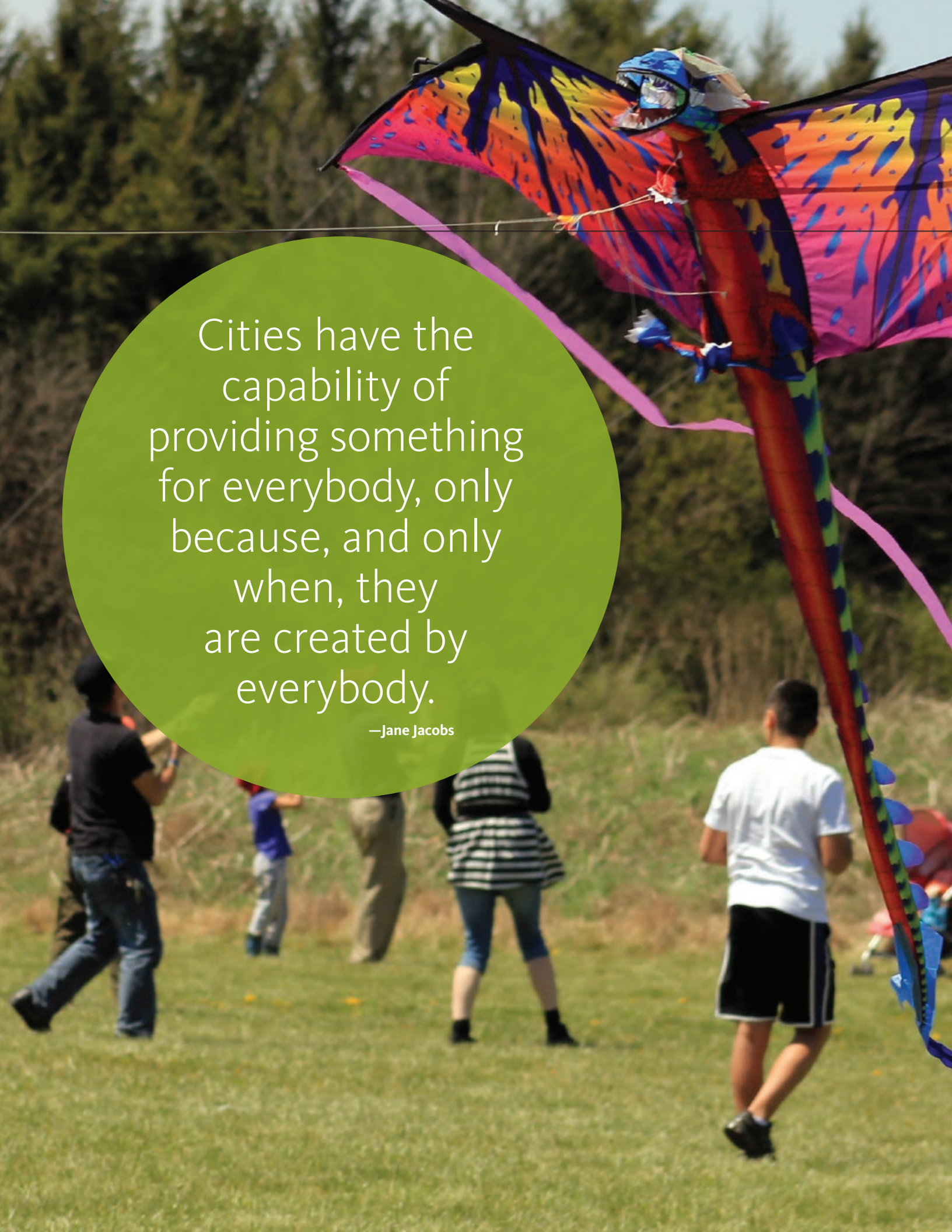

Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.

—Jane Jacobs

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