

The Future of Natural Systems

Approaches for Canada's Capital Region

A Discussion Paper for
Choosing our Future





Choosing our Future Discussion Paper

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City of Ottawa

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Choosing our Future is an initiative led by the City of Ottawa, in partnership with the City of Gatineau and the National Capital Commission, to prepare Canada's Capital Region to meet the challenges of the 21st century. It will result in long-term strategic directions that integrate the concepts of sustainability, resiliency and liveability into all aspects of our communities.

Purpose

This series of Discussion Papers presents a range of ideas for how we can succeed in facing challenges such as demographic change; resource scarcity; globalization and economic uncertainty; a changing climate, rising energy and food prices; and sudden shocks such as extreme weather conditions and emergencies. The papers are intended to stimulate dialogue about the best ideas for the future of the region and provide the basis for our future plans.

Discussion Papers in this series include:

- The Future of Culture
- Greening the Economy
- The Future of Social Development
- The Future of Food and Farming
- The Future of Natural Systems
- The Future of Buildings and Energy Supply
- The Future of Water, Stormwater, and Wastewater Infrastructure
- The Future of Materials and Solid Waste Management
- The Future of Land Use, Growth Management and Urban Form
- The Future of Mobility

The ideas discussed in this series include many that were suggested by participants at public and stakeholder events during the process to date.

The papers, as well as other information about the initiative, can be found online at:

www.choosingourfuture.ca

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1 Introduction

1.1. The Future of Biodiversity and Natural Systems

Biological diversity or “biodiversity” refers to the variety of life and ecological processes within all types of environments—terrestrial, marine and other aquatic ecosystems. It includes diversity within species, between species, and among ecological communities and the natural processes that link them. There are many stresses and pressures on wildlife and their habitats including rural development and expansion of the urban area resulting in habitat loss and fragmentation, threats from moving vehicles (roadkill), direct harvesting of species for hunting and food, disturbance of sensitive habitats, and pollution of air, water, and soil. According to the 2005 Millennium Ecosystem Assessment, more than half of the earth’s grasslands, forests, rivers and lakes have been degraded along with their ability to perform essential ecosystem functions and support life.

Biodiversity and ecosystem health go hand-in-hand. Robust ecosystems rely on broad genetic variability and a wide range of ecological processes to sustain them through all types of disturbances. It is not just the number of different species that is important, but the representation of each of those species. While only a few species in North America have actually gone extinct, many species populations have significantly declined compared to their historical numbers.

Healthy ecosystems are essential for sustaining environmental and human well-being, supporting vital ecological processes and providing essential human resources. Many people also believe that biodiversity has intrinsic value regardless of its usefulness to humankind, and that we have an ethical responsibility to look after it. Preserving and restoring healthy ecosystems can also play an increasingly important role in buffering the effects of a changing climate.

1.2. Summary

A range of high-level strategic directions to creating vibrant, resilient natural systems is explored in this paper. Each strategic approach is a response to the question: “What and how much should we do to achieve a more sustainable, liveable and resilient region?” Based on public and stakeholder feedback, this paper is designed to help forge a preferred path for the long-term plans developed through Choosing our Future. The strategic directions described here are not meant to be exclusive. Rather, they are framed as questions to stimulate discussion, responses and additional ideas. These discussion areas include:

- **Continue to conserve large natural areas and strengthen connections between them** — Major natural areas provide the core refuge areas and reservoirs for biodiversity. How can they be conserved? How can private land stewardship be encouraged and supported to supplement these areas and to improve the connectivity of core natural areas?
- **Encourage the creation and protection of small-scale habitats in urban and suburban areas** —How can our backyards be managed to contribute to ecosystem function? What about natural landscaping techniques? What can be done to encourage the planting of certain species of trees and shrubs that can provide habitat for songbirds?
- **Restore degraded and damaged habitats** — What can be done to restore and enhance ecosystems that have been lost or damaged? Along with restoring the natural channel of urban creeks or creating artificial wetlands on marginal farmland, what other actions can be explored?
- **Control the spread of invasive species** — How can we manage invasive species - public education, removal programs, and regulation to restrict their introduction or spread? What might be the role of property standards bylaws play?
- **Reduce the impacts of consumption** — Many ecosystems throughout the world are in decline and in some cases this is the result of the consumption of resources and generation of wastes from people living elsewhere. How can education and information be used as strategies to guide the consumption choices of residents and businesses?



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2 Background

2.1. Biodiversity and Natural Systems Defined

Ecosystem services provided by natural systems and biodiversity are the beneficial processes and resources that support life and a healthy environment. Ecosystem services in the region include:

- *Supporting services* — nutrient cycling, soil formation, primary production
- *Provisioning services* — food (plant crops, livestock, aquaculture, fisheries), fresh water, timber, fibre, fuel
- *Regulating services* — flood regulation, disease regulation, waste treatment, air and water purification, erosion control, natural hazard protection, and carbon sequestration. (Carbon sequestration refers to the removal, capture or storage of carbon dioxide from the atmosphere. The carbon dioxide that is captured by trees through photosynthesis is an example of carbon sequestration which occurs in natural systems.)
- *Cultural services* — aesthetic, spiritual, recreational, and educational spaces and opportunities

2.2. Context

Our region is rich with a variety of high-quality natural habitats and landscapes. These include the Mer Bleue Wetland, identified under the Ramsar Convention as a wetland of International Importance. Other notable features include Stony Swamp, extensive river systems (Ottawa, Gatineau, Mississippi, Rideau) and large forests.

A number of studies of this region's parks and natural features have been completed that help to describe the region's ecosystems.

- **Gatineau Park** — The park is 363 square kilometres in size, of which the National Capital Commission owns or manages 97%. Studies to date show that Gatineau Park shelters almost 100 species of plants and 49 species of animals that are considered at risk.

- **Valued ecosystems** — In 2007, the NCC identified and evaluated the condition of high-value ecosystems and natural habitats found in the Greenbelt, Gatineau Park, and on NCC urban lands.¹ A total of 28 sites or “valued ecosystem components” representing 33% of the NCC’s lands were determined to have high ecological value based on the presence of species at risk, riparian areas, ecological corridors, and rare ecosystems (rare from a regional perspective). Some of the components considered exceptional include Mer Bleue and the Eardley Escarpment and Plateau in Gatineau Park (see Figure 1).
- **Natural Environment Systems Strategy (Region of Ottawa-Carleton, 1997)** — Approximately 88,000 hectares of natural areas in Ottawa were surveyed in the mid-1990s to assess their relative significance for maintaining biodiversity and ecological functions. While the study confirmed the high value of well-known features such as the Marlborough Forest and Richmond Fen, it also provided the first detailed information on many of the areas surveyed.² This and subsequent studies formed the basis for the Natural Heritage System identified in Ottawa’s 2003 Official Plan.
- **Watershed and subwatershed studies** — Many of the most detailed studies of biodiversity and ecological health on the Ottawa side of Canada’s Capital Region are done as part of watershed and subwatershed studies conducted by the City of Ottawa and the conservation authorities. Examples include the Carp River Watershed/Subwatershed Study completed in 2005 by the City and the Mississippi Valley Conservation Authority, and the Jock River Reach 2 and Mud Creek Subwatershed Study being conducted by the City in partnership with the Rideau Valley Conservation Authority.

By all accounts, the ecology of Canada’s Capital Region is rich and diverse in terms of both landscapes and species. However, this ecological richness is under stress from various forces.

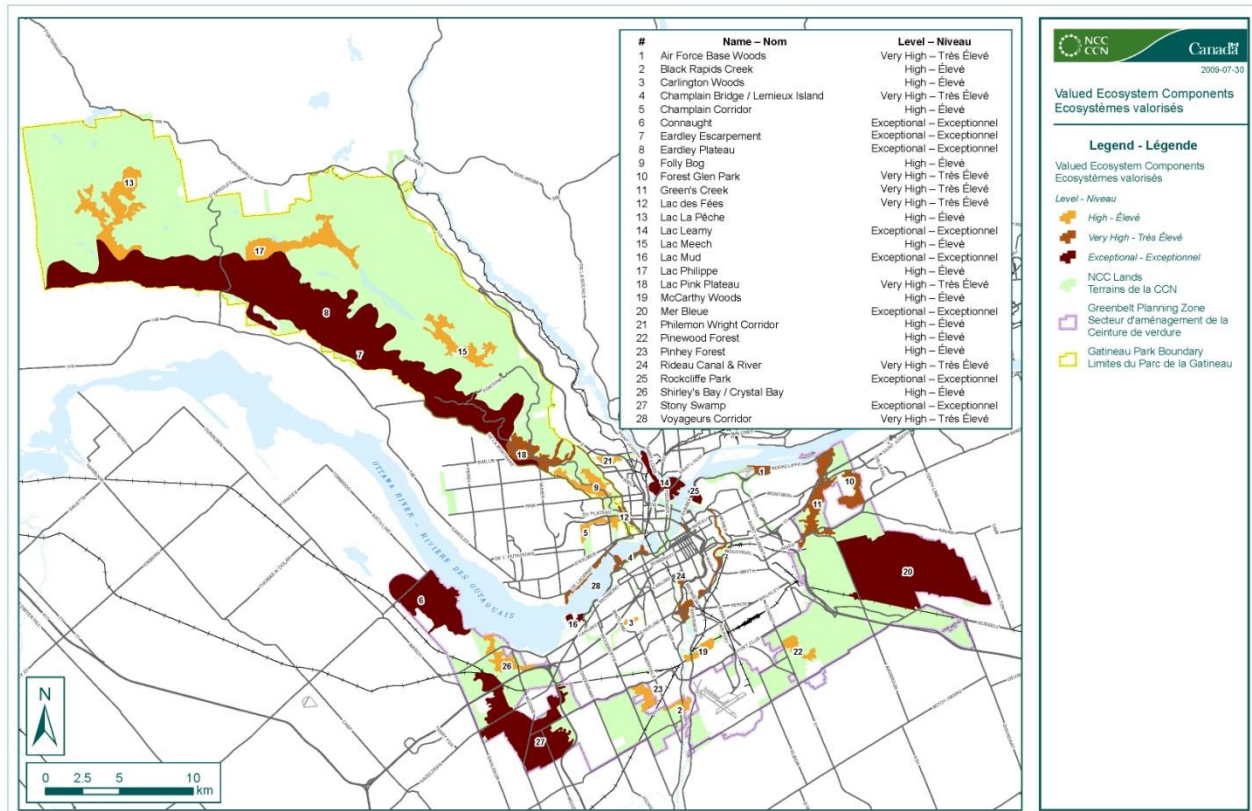


Figure 1: Valued Ecosystem Components in NCC lands. Source: Degan, 2007

2.3. Challenges and Trends

Looking forward, Canada's Capital Region will need to deal with several existing and emerging challenges in order to maintain the high quality of natural systems currently enjoyed, and advance overall sustainability and resilience in the region. These challenges include:

Growth

In the Ottawa-Gatineau area, the major impacts on the environment originate from urban sprawl and rural development (displacing habitats); air pollution from a growing number of vehicles; increasing road and service networks that disrupt wildlife corridors; chemical and physical alteration of water bodies, particularly wetlands, and the subsequent loss of aquatic habitat; and agricultural practices that may degrade habitats in rural areas.

Most of the original habitat areas such as fertile river valleys and flat lands have long been taken over by agriculture and human habitation. Natural habitats now tend to occur on higher lands of rocky, thin soils (such as Gatineau Park and the Carp Hills) and headwater wetland areas that are too large and flat to drain (such as Mer Bleue, Richmond Fen, and Long Swamp). These are being separated from one another by ongoing development and competing land uses, including aggregate resource extraction, agriculture, informal recreational use, and other human activities. Habitat fragmentation limits the ability for wildlife to find food and cover and it also restricts the gene pool, which threatens the ability of populations to respond to environmental changes. The habitats remaining in cities, suburbs and active farmland are often small or narrow corridors that support a limited number of plants and animals.

Declining biodiversity

The World Conservation Union has ranked 38% of the 44,838 species it has evaluated as being threatened with extinction.³ In Canada, as of November 2010 there are 617 Species at Risk (“extirpated, endangered, threatened or of special concern”) according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). As of September 2010, there are 207 species on the Species at Risk in Ontario list maintained under the *Endangered Species Act*; of these species, 46 inhabit the Ottawa area.⁴

Further, a number of invasive species threaten the health of natural systems by killing native species or outcompeting native species for habitat and resources. For example, the emerald ash borer is now spreading across Ottawa, threatening to devastate the city’s ash trees. Other problematic species include reed canary grass, swallow-wort (dog-strangling vine) and zebra mussel.

A changing climate

Changes in climate may manifest as shifts in average night-time temperatures, warmer winters, and changes in the variance and frequency of climatic extremes. These changes may impact biodiversity directly and indirectly through a variety of mechanisms. The changing climate may also stimulate species-level changes in range and abundance, life cycle, physiology, behaviour, and in genetic evolutionary responses. At the ecosystem level, changes in structure, function, patterns of disturbance, and the increased dominance of invasive species is a noted concern.⁵

Recreational use

With a population of almost 1.2 million nearby, Gatineau Park receives over 1.7 million visits per year, placing significant pressure on its natural processes. User numbers are also high in the Greenbelt and NCC’s urban lands—areas surrounded by all types of land uses (residential, commercial, recreational and institutional).

2.4. Goals

Recognizing the need to address these issues and challenges, and to envision a better future, through community outreach, Choosing our Future has developed a set of high-level aspirational goals to define success over the long term. This discussion paper and the strategic directions identified respond to the *Biodiversity and Ecosystem Health* goal as follows:

Ecosystems are healthy, protected and support biodiversity

The region continues to fulfill its traditional ecological functions, supporting connected habitats, regulating water and nutrient cycles, and providing food and shelter to all species living in the region. Residents value biodiversity and ecosystem health and understand the interconnectedness between humans, other species, and the ecosystems in which we all live.

Other goals can be found on the project website: www.choosingourfuture.ca.

2.5. Current Plans and Programs

The City of Ottawa and the National Capital Commission both own substantial areas of ecologically significant land in the Ottawa area; the Province of Ontario and other public organizations own smaller amounts. The NCC owns the Greenbelt, and the City's holdings extend through the Carp Hills, South March Highlands, Cumberland Forest, Marlborough Forest and Richmond Fen. The City of Ottawa and the NCC together own almost 50% of the significant wetlands identified to date.

The region includes portions of several watersheds including those of the South Nation, Mississippi, Rideau and Gatineau rivers. In Ontario, local governments take a lead role to prepare watershed and subwatershed management plans, supported by the NCC and the conservation authorities. These plans support the natural heritage system through direction about land use planning, infrastructure, and ecosystem management. The Province of Ontario has undertaken groundwater characterization throughout the province and is working with municipalities to protect the sources of municipal drinking water.

Ottawa's Official Plan (2009) provides the policy basis for protecting a natural heritage system that consists of significant wetlands. They are identified as "areas of natural and scientific interest" by the Province because of their unique qualities, and significant habitat of endangered and threatened species. The Official Plan prohibits lot creation and site alteration within these areas, on the basis of provincial direction, as well as within other features that have been identified locally. The Plan permits development in other components of the natural heritage system, but it requires an environmental impact statement demonstrating no negative impact on those features or their ecological functions. Similarly, Gatineau's Urban Plan (*Plan d'Urbanisme*) describes and maps valuable ecosystem components within Gatineau and lays out the framework for protecting these from development.

With its 2009 Environmental Strategy, the National Capital Commission is intensifying efforts to understand biodiversity within the region and to implement plans to preserve, protect, and ensure the sustainable use of natural resources. The NCC intends to designate all 28 of the high-value ecosystems defined in its 2007 Valued Ecosystems and Habitats study as "conservation lands" by 2012. Besides contributing to the long-term conservation of the region's biodiversity, these

sites will offer an opportunity for education and interpretation about the region's ecology. The NCC has also initiated a program to acquire privately held lands within Gatineau Park, monitor biodiversity, and protect animal and plant species at risk in the park.

Private land stewardship

Ottawa, the Province of Ontario, and the conservation authorities help support property owners as stewards of their own properties. The City of Ottawa partners with the conservation authorities to administer the Rural Clean Water program aimed at protecting surface and groundwater in rural areas.. For example, grants are given for agricultural best management practices such as well decommissioning and erosion control measures. Tree-planting programs are available to rural and urban residents.

The Ministry of Natural Resources administers two tax incentive programs that act to reduce municipal taxes on privately-owned forests and conservation lands if the landowners have an approved Forest Management Plan (in the case of managed forests) or sign a conservation agreement (in the case of conservation lands).

There are also a number of other programs offered by federal and provincial governments as well as environmental non-profit organizations (such as Ducks Unlimited, Nature Conservancy of Canada, TD Friends of the Environment Foundation) to assist landowners and community groups with planting trees, preserving natural areas, restoring habitat and controlling invasive species.



3 New Directions

3.1. Strengthening Natural Systems

Existing plans and strategies in the region address many of the current challenges and lay the groundwork to better ensure continued health of the region's natural systems. However, looking towards the long term, addressing the challenges associated with maintaining our natural heritage system in a context of a changing less stable climate, population growth and pressures from development and other human activity remain significant. The following presents a range of potential approaches and practices, most of which build upon existing directions.

Continue to conserve large natural areas and strengthen connections between them

Many of the region's most precious natural areas are already protected through public ownership and municipal land use policies and plans. However, urban and village expansion in the past or the potential for such expansion in the future have led to the loss of large woodlands and wetlands. Apart from topsoil removal bylaws, there are few municipal controls in place such as tree-cutting bylaws or site-alteration bylaws to restrict such losses in the rural area.

Encouragement and support for private land stewardship can be vital for maintaining the landscape matrix within which these natural areas are embedded. The region is unlikely to have a fully connected, publically owned system of natural heritage areas given the large extent of the rural area and natural heritage system in Ottawa and the cost and disruption of land acquisition. Other options that could be explored include preserving and increasing connectivity across private lands through stewardship activities.

Maintaining a compact region and further restricting or eliminating country lot subdivisions is an additional option to explore that could also reduce the development pressure on these natural areas. In many locations, country lot subdivisions have developed on adjacent parcels, thus suburbanizing extensive areas and occupying as much land as small villages. While many significant areas are protected by planning policies, development in rural areas continues to challenge the protection of woodlands, and minor connecting elements like small tributaries and hedgerows that serve to help sustain diversity within these habitats.

However, a compact urban form can also add to development pressures on green spaces remaining in the urban area. Given the rising cost of urban land, it is increasingly difficult for the municipality to protect remaining woodlots in the urban area through acquisition. As densities increase, so will pressures to ensure that land is well-used for a variety of purposes. While planning for open space networks can help make connections among larger recreation and natural lands in the city, these smaller connections and opportunities may be more difficult to secure.

Regardless of how we manage urban growth, the projected increase in the region's population over the next 50 years is likely to increase the recreation pressure on the Greenbelt and all natural areas close to the urban area. As part of their ongoing planning activities, the City of Ottawa, City of Gatineau and the National Capital Commission have the opportunity to ensure that plans are in place to protect the features and functions of natural areas while accommodating public access.

Encourage the creation and protection of small-scale habitats in urban and suburban areas

It is not only large natural spaces that contribute to the region's biodiversity. Smaller spaces are also valuable; urban parks, landscaping, street trees, stream corridors and stormwater ponds provide ecosystem functions. Even backyards can contribute to ecosystem function if managed using natural landscaping techniques. The quantitative and economic values of many of these ecosystem functions can be estimated using existing tools and methods, and this could enable them to receive explicit consideration in planning decisions.

The type and quality of the landscapes surrounding buildings can contribute to biodiversity in the region. Landscape management practices including pest control methods, structural and species diversity, weed management, and aesthetics all influence the quality of habitat. Property owners, developers, community groups, individuals, can be encouraged to plant certain native species of trees, shrubs and flowers that can provide habitat for songbirds and bees. For example, the developer of a large brownfield site in Vancouver developed an "urban songbird strategy" for the site designed to guide landscaping activities to establish the types of habitat preferred by songbirds.⁶

The NCC's role in federal land development and the role of municipalities to review land development applications positions them well to encourage small-scale habitats in the heart of the cities.

Restore degraded and damaged habitats

In some cases where ecosystems have already been lost or damaged there may be the potential for restoration and enhancement. This can take the form of restoring the natural channel of urban creeks or creating artificial wetlands on marginal farmland.

Ottawa, Gatineau, and the NCC could focus on identifying habitat restoration opportunities within their respective land holdings. As part of the review of development applications, they can also look for preservation and restoration opportunities on privately owned lands that support the natural heritage system. New and redeveloped areas could incorporate small-scale natural habitat features and corridors linking surrounding habitats in order to support biodiversity features and values throughout Canada's Capital Region. Within developed portions of the region, these sites could also focus on the experiential and cultural values associated with

biodiversity, enhancing not only connectivity within an ecological network but also the connections between residents and their environment.

Control the spread of invasive species

Managing invasive species requires public education, removal programs, and sometimes regulation to restrict the introduction or spread of invasives, or in some cases to require ongoing management. Regulation of invasive species is done at the national or provincial level (Canadian Food Inspection Agency regulations, *Ontario Weed Control Act*, etc.); municipalities can additionally regulate management of invasive species through property standards bylaws. Both the NCC and the City of Ottawa have already started to address this issue in their plans.

Reduce the impacts of consumption

Many ecosystems throughout the world are in decline, and in some cases, this is the result of the consumption of resources and waste produced by people living elsewhere in the region, the country, or the world. “Ecological footprint” analysis has shown that, on average, the annual consumption of each person in the Capital Region requires 8 hectares⁷ of ecologically productive land somewhere on the planet. At a broader level, it is this imbalance between consumption and resources that is, in part, driving the global focus on sustainability and the anticipated loss of 40% of the world’s biodiversity this century⁸. While addressing this imbalance is both difficult and beyond the jurisdiction of the Partners in Choosing our Future, no local sustainability plan would be complete without acknowledging that our natural resources are being outstripped by demand along with a discussion as to how best to provide education and valuable information to guide the choices of residents and businesses.

3.2. Conclusion

Natural and green spaces are a critical component of the ecological and community health of the region. They can be considered the “green infrastructure” which, like roads and water systems, are an essential part of a community. These spaces provide valuable habitat and connections for wildlife, and provide ecosystem services such as rainwater infiltration and transpiration, water and air purification. Access and the enjoyment of green space strengthen our connections to the landscape through both passive and active recreation. Biodiversity and habitat also have an intrinsic value, and help maintain the quality of life that residents demand.

Endnotes

¹ D. Degan, Massé et Assoc. Inc. 2007. The NCC's Valued Natural Ecosystems and Habitats. National Capital Commission.

² City of Ottawa - www.ottawa.ca/residents/planning/master_plans/gmp/lands/inventory_en.html

³ IUCN. 2009. Numbers of threatened species by major groups of organisms (1996-2008). Red List of Threatened Species <http://www.iucnredlist.org/static/stats>

⁴ Species at Risk in Ottawa as of September 29, 2010. Amy MacPherson, Natural Systems Program, Policy Development and Urban Design City of Ottawa

⁵ Compass Resource Management. 2007. Major Impacts: Climate Change. Biodiversity BC.

⁶ http://vancouver.ca/commsvcs/currentplanning/current_projects/east_fraserlands/open2/7_Songbird%20strategy.pdf

⁷ IUCN. 2009. Numbers of threatened species by major groups of organisms (1996-2008). Red List of Threatened Species <http://www.iucnredlist.org/static/stats>

⁸ Anielski.2005. "Ecological Footprints of Canadian Municipalities and Regions," prepared for the Canadian Federation of Municipalities.