

Ecological Health Framework



Adopted by the Metro Vancouver Regional District Board on October 26, 2018.

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Photo: Trevor Clark

EXECUTIVE SUMMARY

The concept of ecological health captures the connection among healthy functioning ecosystems, the valuable services they provide, and human well-being. Maintaining and enhancing the integrity of ecosystems and other natural features is essential for ensuring that residents of the region continue to benefit from the ecosystem services that contribute to our collective well-being and prosperity.

As a public entity, Metro Vancouver has a variety of responsibilities related to the ecological health of our region, from protecting lands through its regional parks function to minimizing impacts on the environment through its utility operations.

The *Ecological Health Framework* encapsulates Metro Vancouver's collective efforts around ecological health and provides guiding principles, goals, and strategies to help achieve the vision of a beautiful, healthy, and resilient environment for current and future generations.

Specifically, the *Ecological Health Framework*:

- Identifies Metro Vancouver's role in protecting and enhancing ecological health as it relates to its services and functions;
- Provides a foundation for integrating ecological health into Metro Vancouver's corporate decision making;
- Identifies how Metro Vancouver will report on ecological health-related initiatives across the organization; and
- Supports regional efforts to protect and enhance ecological health.

PART ONE of the *Ecological Health Framework* introduces ecosystem services and green infrastructure, concepts that are key to understanding the benefits that healthy ecosystems provide. Part one also describes some of the foremost physical and technical

AN **ECOSYSTEM** IS A DYNAMIC COMPLEX OF PLANT, ANIMAL AND MICROORGANISM COMMUNITIES AND THEIR NONLIVING ENVIRONMENT INTERACTING AS A FUNCTIONAL UNIT.

ECOSYSTEM SERVICES ARE THE BENEFITS PEOPLE OBTAIN FROM ECOSYSTEMS (SEE FIGURE 1).

challenges to maintaining ecological health in the region: climate change, habitat loss and fragmentation, environmental contamination, invasive species, and data gaps.

PART TWO places the *Ecological Health Framework* in the context of the Metro Vancouver Board Strategic Plan and the set of corporate plans and strategies that reflect Metro Vancouver's commitment to ecological health. Part two also clarifies the key roles that member jurisdictions and other agencies play.

PART THREE sets out the vision, guiding principles, goals and strategies for how Metro Vancouver actively works to advance ecological health through its services and functions. The vision and goals are aspirational and regional in nature, while the strategies focus on Metro Vancouver's role in providing regional utilities, planning for the future, convening and supporting member jurisdictions, and as land managers. 'Current and future directions' are included to provide examples of initiatives that fall under each strategy.

PART FOUR describes how Metro Vancouver will monitor and report out on the state of the region's environment, how corporate initiatives that advance ecological health will be highlighted, and the timelines for reviewing the *Ecological Health Framework*.



Wetlands such as Widgeon Marsh Regional Park Reserve provide important ecosystem services including flood control, water purification, and shoreline protection. They are also critical habitat for birds and other wildlife.

PART ONE: An Introduction to Ecological Health

The Metro Vancouver region is a highly productive and biologically diverse area, with natural areas¹ that in many cases are provincially, nationally, and globally significant. Our coastal location, topography, and climate result in a rich variety of ecosystems, each of which plays a significant role in our region's ecological health, community well-being, and economic prosperity.

Metro Vancouver strives to achieve a livable and sustainable region for current and future generations. This vision is only possible if we ensure a healthy natural environment – one that supports and maintains ecological processes and a diverse community of species and habitats. The concept of ecological health captures the connection among healthy functioning ecosystems², the valuable services they provide, and human well-being. It recognizes that human activity affects the environment and that our well-being depends on the health of the region's ecosystems and the services they provide. Maintaining and enhancing the integrity of ecosystems and other natural features ensures residents of the region continue to benefit from these services, far into the future.



1 Common types of **natural areas** include forests and other areas of native vegetation, vegetated or open wetlands, waterways, springs, rock outcrops, bare ground, caves, coastal dunes, or cliffs. <http://www.metrovancouver.org/services/parks/ParksPublications/RegionalParksPlan.pdf>

2 **Ecosystem:** A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. <https://www.cbd.int/convention/articles/default.shtml?a=cbd-02>

ECOSYSTEM SERVICES

It is commonly understood within the region that nature is important in its own right. For example, natural areas provide habitat for birds, fish, and other wildlife. However, many people may not be aware that our own health and well-being are dependent on the health of our ecosystems. Nature is responsible for the staples of our daily lives – the water we drink, the air we breathe, and the food we eat. Nature provides rich soil and pollinators that sustain local food production, spaces for outdoor recreation, and natural resources upon which our economy relies, like the forests that produce lumber for construction. Even the region’s natural beauty contributes to the economy by generating millions of dollars in annual tourism revenue.



FIGURE 1: ECOSYSTEM SERVICES PROVIDED BY HEALTHY ECOSYSTEMS

Ecosystem services are the benefits people obtain from ecosystems (Figure 1). These services can be grouped into four main types:

- **Provisioning** services include material and energy outputs from ecosystems, including food, fresh water, and raw materials used for construction and energy like wood.
- **Regulating** services refer to the services provided by ecosystems in processing and assimilating pollution, stabilizing water flows and soil erosion, controlling local climates, and storing or sequestering carbon.
- **Cultural** services are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, recreation, and aesthetic enjoyment.
- **Supporting** services underpin all other ecosystem services. Ecosystems provide habitats for all plants and animals while depending on a diversity of species to maintain their own functions.

Methods for assessing and valuing³ these services continue to evolve, and administrators are incorporating ecosystem goods and services into decision-making. The ecosystem services approach is an effective way to illustrate the value of these services to decision makers and people from all walks of life.

GREEN INFRASTRUCTURE

As illustrated in Figure 2, green infrastructure is the natural, enhanced, and engineered assets that collectively provide society with ecosystem services required for healthy living. Natural assets (such as forests, wetlands and soil) and enhanced or engineered systems (such as bioswales and green roofs) improve resilience and mitigate negative environmental impacts from development, benefiting both people and ecosystem function.



FIGURE 2: TYPES OF GREEN INFRASTRUCTURE⁴

3 Valuation: The process of measuring value using monetary and non-monetary assessment of market and non-market values, socio-cultural importance, and/or measures of biophysical integrity and resilience. From: Value of Nature to Canadians Study Taskforce, 2017. "Completing and Using Ecosystem Service Assessment for Decision-Making: An Interdisciplinary Toolkit for Managers and Analysts." Ottawa, ON. http://publications.gc.ca/collections/collection_2017/eccc/En4-295-2016-eng.pdf

4 Municipal Natural Assets Initiative, 2017. "Defining and Scoping Municipal Natural Assets." <http://mnai.ca/media/2018/02/finaldesignedsept18mnai.pdf>



Climate projections for the region include warmer temperatures, reduced snowpack, rising seas and more extreme weather events

CHALLENGES

Metro Vancouver is home to a rich and diverse natural environment, and significant improvements in the quality of our air and water have been realized over the last few decades. However, by 2040 the region's population is projected to grow by 1 million residents, which will require innovation to sustain those improvements. Growth and associated development also put pressures on remaining ecosystems as they become increasingly fragmented and vulnerable to further degradation, especially in a changing climate. Some of the foremost physical and technical challenges to maintaining ecological health are described below.

Climate Change

The changing climate is impacting ecological health. Although the impacts of climate change on ecological health in Metro Vancouver are difficult to isolate and measure, changes to natural systems are already being observed. The latest data suggest that this region will experience hotter and drier summers, wetter winters, and increased risk of flooding in low-lying coastal areas from rising sea levels. Many species and ecosystems in the region will be negatively impacted or displaced entirely due to climate change because they cannot

adapt fast enough. Given the overarching nature of this challenge, the need to respond to climate change is a key theme embedded throughout this Framework.

Habitat Loss and Fragmentation

Globally, habitat loss is the greatest threat to biodiversity because it results in declines in plant and animal species. In this region, many natural areas such as forests or wetlands have been converted to residential, industrial, commercial, or agricultural uses. Declines have been observed in a large number of species across BC, with the most significant declines concentrated in areas of most intense development such as the Lower Mainland.

Loss of natural areas and other green space not only impacts plants and animals, but also people. When people have access to green space, mortality decreases and mental health and well-being increase. Trees and vegetation provide cooling through evapotranspiration and shade from the sun. As cities expand and natural areas are consumed, the heat island effect also increases, leading to an increase in heat-related mortality and morbidity.

In addition to the loss of habitat, the remaining green space is often highly fragmented, particularly in urban areas. Fragmentation is the loss of connectivity between natural areas, which can reduce the ability of the remaining urban green space to provide valuable ecosystem services (Figure 1) because it impairs the movement of organisms and materials across the landscape. Loss of connectivity also impacts animal and plant communities that often need larger, interconnected habitats to complete their lifecycles. Altering natural land cover changes the capacity of the land to intercept rainfall, increases stormwater run-off, and increases pollutant transport. Fragmentation also makes individual species, including those at risk of extinction, less resilient to changes in water, food, shelter availability, or the changing climate.

Environmental Contamination

Houses, vehicles, agriculture, and industry discharge contaminants onto the land and into the water and air. The sediments, metals, pesticides and other contaminants transported in stormwater and agricultural run-off into streams, wetlands, and intertidal areas can reduce species' ability to maintain biological functions (e.g., respiration, reproduction). Some of these contaminants can bioaccumulate in organisms, such as salmon, and eventually can be consumed by humans. Scientific understanding is evolving regarding the potential impacts of 'emerging substances of concern', which include an array of pharmaceuticals, personal care products, brominated flame retardants, and industrial contaminants (such as plasticizers and surfactants).

Air contaminants such as sulphur oxides, nitrogen oxides, and particulate matter can deposit on vegetation, water, and soils, increasing their acidity and potentially impacting the health of local flora and fauna. Although air quality is generally good within this region, hotter and drier summers will increase the risk of poor air quality events due to forest fire smoke and ground-level ozone formation. High levels of ozone can damage plant cell membranes and inhibit key processes required for their growth and development.

Invasive Species

Conservation biologists globally have ranked invasive species as the second most serious threat to biodiversity after habitat loss. Invasive species are non-native flora or fauna that have been introduced to an area without the predators and pathogens that would help keep them in check in their native habitats. Some of these invasive species are highly destructive, difficult to control, and they out-compete native species. They can threaten property and recreational values, infrastructure, agriculture, public health and safety, as well as the ecological health and diversity of the natural environment. In 2016, Metro Vancouver member jurisdictions spent over 1.4 million dollars controlling six invasive species (knotweeds, giant hogweed, Scotch broom, Himalayan blackberry, European chafer beetle and European fire ant). As our climate continues to change, the range of existing invasive species may increase and conditions may become favourable for new invasive species to establish within this region.

Data Gaps

Ecosystems are complex, and our understanding of how they function is incomplete. High-quality, up-to-date data are necessary at an appropriate scale to understand the long-term consequences on ecological health. However, these data can be difficult to collect, access and maintain over time, and gaps limit our ability to see the full-picture of the region's environment.

Progress has been made on developing regional scale datasets. For example, Metro Vancouver has developed and regularly updates the Sensitive Ecosystem Inventory and Land Cover Classification datasets. However, more information is needed on trends over time and ecological processes to better understand the impacts of human activity and climate change on ecological health.



PART TWO: Roles in Advancing Ecological Health

THE METRO VANCOUVER BOARD STRATEGIC PLAN

The Metro Vancouver Board Strategic Plan 2015-2018 showcases commitment to advancing ecological health through the following vision:

Metro Vancouver seeks to achieve what humanity aspires to on a global basis – the highest quality of life embracing cultural vitality, economic prosperity, social justice and compassion, all nurtured in and by a beautiful and healthy natural environment.

The Metro Vancouver Board Strategic Plan confirms the importance of collaboration, education and engagement, informed decision-making based on triple-bottom-line analysis, and the alignment of regional and member objectives. In particular, the Board has committed to “enhance the ecological value of conservation lands through the development of a network of corridors and public and private green spaces”.

METRO VANCOUVER’S ROLE

Metro Vancouver delivers core services (drinking water, wastewater treatment, and solid waste management), regulates air quality, plans for urban growth, manages a regional parks system, provides affordable housing, and acts as a forum for discussion of significant community issues at the regional level. In doing so, Metro Vancouver has established management plans that highlight our commitment to environmental protection.

Metro Vancouver maintains and enhances ecological health in the region by reducing environmental impacts from core services, generating regional datasets to inform long-term planning, and convening our member jurisdictions to address issues of common concern.



Regional Planning

Metro Vancouver supports integrated land use and transportation planning to advance the goals of *Metro Vancouver 2040: Shaping Our Future (Metro 2040)*, the regional growth strategy. Metro Vancouver conducts applied policy research and stewards *Metro 2040* with an aim to: directing growth to Urban Centres and other transit-oriented locations; fostering a strong and diverse economy; and protecting vital industrial, agricultural, and conservation lands. Metro Vancouver generates foundational regional datasets for use in decision-making, analyses data and reports on trends, convenes forums to discuss ecological health-related issues of common concern, and develops internal and regional policies in collaboration with staff, member jurisdictions, and partners. Metro Vancouver also provides local government services for Electoral Area A residents.

The Metro Vancouver Board adopted *Metro 2040* in July 2011. The strategy represents an ongoing commitment to building a compact metropolitan region where approximately two-thirds of the land in the region are designated for agricultural, recreational, and conservation uses. *Metro 2040* establishes land use designations and policies that manage the multiple objectives of accommodating population growth, enhancing economic prosperity, and maintaining the environmental qualities that contribute to the livability and sustainability of the region.

Metro 2040 aims to enhance ecological health by:

- Protecting important areas including conservation and recreation lands, and agricultural lands that provide valuable ecosystem services,
- Protecting and enhancing natural features and their connectivity,
- Encouraging the use of green technologies and infrastructure to maximize ecosystem services,

- Focusing development within the Urban Containment Boundary to avoid sprawl that can consume the natural landscape, and
- Working with member jurisdictions to develop healthy and complete communities with access to a range of services and amenities, including parks and recreational opportunities.

As requested by member jurisdictions, Metro Vancouver also provides important ecological health-related support to inform local decision-making by helping to fill research gaps, generating regional datasets and tools, and hosting regular forums that foster coordination and collaboration.

The Metro Vancouver Board adopted a *Regional Food System Strategy* in February 2011 and a *Regional Food System Action Plan* in April 2016. These policies encourage the collaboration of all levels of government and their agencies, the private sector, public institutions, community groups, and consumers to create a sustainable, resilient, and healthy regional food system.

The *Regional Food System Strategy* and *Regional Food System Action Plan* enhance ecological health by:

- Protecting and enhancing ecosystem goods and services in the regional food system, and
- Facilitating adoption of environmentally sustainable agricultural practices.

Adopted by the Metro Vancouver Board in 2016, the *Regional Affordable Housing Strategy* aims to address some of the critical housing affordability challenges in the region. Although this strategy does not address ecological health directly, it reflects the linkage between housing choices in the region and the broader concept of sustainability.





Burnaby Lake Regional Park

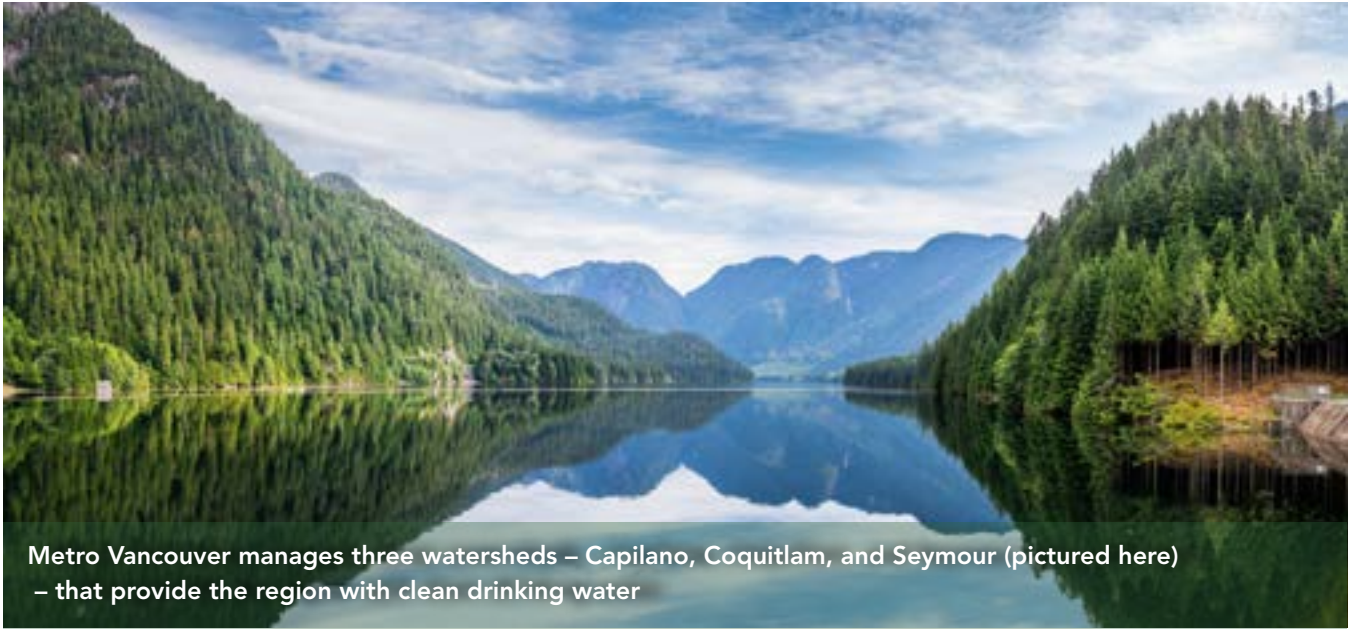
Regional Parks

Metro Vancouver operates and oversees a system of regional parks and greenways throughout the Metro Vancouver region. Through the regional parks system, Metro Vancouver helps to protect important natural areas and provides opportunities for the region's residents to connect with, enjoy, and learn about the environment.

Adopted by the Metro Vancouver Board in 2016, the *Regional Parks Plan* provides strategic direction to the operations of Metro Vancouver's Regional Parks. The commitment to protecting and enhancing natural systems is a strong component of this plan and has shaped how regional parks are managed

and developed, as well as the public education and engagement programs associated with them. Through its Regional Parks function, Metro Vancouver enhances ecological health by:

- Securing land for regional park use centered on protection of the region's important natural areas,
- Managing regional parks to protect and enhance natural assets, and
- Increasing opportunities for people to connect with, enjoy, and be active in nature.



Metro Vancouver manages three watersheds – Capilano, Coquitlam, and Seymour (pictured here) – that provide the region with clean drinking water

Water

Metro Vancouver and its member jurisdictions work together to deliver over 1 billion litres of clean, safe drinking water every day to the Metro Vancouver region. To do so, Metro Vancouver relies on a system of dams, reservoirs, treatment facilities, pump stations and, water mains that are constantly being improved in order to maintain the quality and reliability of the system.

The primary sources of regional water supply are the Capilano, Seymour, and Coquitlam reservoirs. These three reservoirs are surrounded by over 60,000 hectares of closed, protected water supply lands. This protected status not only ensures continued exceptional water quality, it also provides a unique opportunity for the protection of environmental integrity over vast landscapes within the region.

Metro Vancouver is responsible for developing long-range plans for managing our region's drinking water sources. The *Drinking Water Management Plan*, adopted by the Greater Vancouver Water District Board in 2011, provides strategic direction and establishes the priority for drinking water initiatives such as new infrastructure, identifying additional water supplies, and managing watersheds as natural assets. The

plan's primary goal is to provide clean, safe drinking water while ensuring the region's water needs are met affordably and sustainably.

The *Joint Water Use Plan*, which received provincial approval in 2018, ensures sustainable management of the Capilano and Seymour water resources for drinking water, fish habitat, and potentially providing clean energy through hydropower generation.

These integrated plans enhance ecological health by:

- Managing and protecting watershed lands and their biological diversity as natural assets and as part of the region's conservation lands,
- Providing clean, safe drinking water while protecting and conserving fish populations,
- Planning for the future, particularly supplying water to a growing population and anticipating impacts from climate change, and
- Ensuring the sustainable use of water resources so the region can continue to grow and prosper while sustaining our quality of life and environment.

Liquid Waste

The Metro Vancouver region generates over 1 billion litres of wastewater every day and this volume will increase as the population continues to grow. Metro Vancouver receives wastewater (or sewage) from municipal collection systems and carries it to regional wastewater treatment plants. Wastewater is treated before it is discharged to the lower Fraser River, Burrard Inlet or Georgia Strait. Metro Vancouver's priority is to protect public health and the environment by collecting, treating, and safely releasing wastewater from homes, businesses, and industry to waterways, while also recovering resources from wastewater.

In collaboration with member jurisdictions, Metro Vancouver also provides planning and maintenance services for specific drainage facilities in the region. Metro Vancouver is responsible for maintaining stream flows in these areas by making sure that designated culverts, creeks, and grills are kept clear and functioning properly.

The *Integrated Liquid Waste & Resource Management Plan* was adopted by the Greater Vancouver Sewerage & Drainage District Board in 2010 and approved by

the provincial Minister of Environment in 2011. The long-term vision for liquid waste management in Metro Vancouver is to recover all energy, nutrients, water, or other usable materials in the liquid waste stream that can effectively and efficiently be recovered, while the rest is returned to the environment in a manner that protects public health and the environment.

- The *Integrated Liquid Waste and Resource Management Plan* enhances ecological health by:
- Reducing liquid wastes at their source,
- Reducing environmental impacts from liquid waste management to a minimum,
- Monitoring the performance of the liquid waste system and impacts on the receiving environment, and
- Using innovative approaches and technologies to address pollutants of emerging concern, improve wastewater treatment, implement more sustainable stormwater management practices, and reduce long-term financial burdens.



Metro Vancouver manages several urban drainage areas to help prevent flooding



Air Quality & Climate Change

Metro Vancouver develops and implements plans, policies, regulations, and projects that improve air quality and reduce greenhouse gas emissions. These plans and policies are supported by comprehensive monitoring of outdoor air quality and tracking of emissions in the Lower Fraser Valley airshed.

Metro Vancouver was the first regional district in Canada to develop and adopt an Air Quality Management Plan in 1994. In 2011, the *Integrated Air Quality and Greenhouse Gas Management Plan* broadened the scope to include strategies and actions to reduce greenhouse gas emissions, and the 2010 *Corporate Climate Change Action Plan* included actions to meet corporate greenhouse gas emission reduction targets within Metro Vancouver's own operations. Metro Vancouver also adopted internal Energy Management and Carbon Price policies to inform corporate decisions regarding climate-changing greenhouse gas emissions, including decisions related to ecological carbon storage/sequestration.

The *Integrated Air Quality and Greenhouse Gas Management Plan* and *Corporate Climate Change Action Plan* enhance ecological health by:

- Protecting public health and the environment by reducing emissions of common air contaminants,
- Improving visual air quality which enhances enjoyment of natural vistas,
- Minimizing emissions of climate-changing greenhouse gases, and
- Exploring opportunities for carbon sequestration by restoring green spaces and creating new areas with enhanced ecological services.

Metro Vancouver has recently adopted *Climate 2050*, a strategic plan to transition our region to a low carbon future, increasing the health, well-being, and prosperity of Metro Vancouver residents. It applies a 'climate lens' to all of Metro Vancouver's policies and actions to inform climate change mitigation and adaptation measures.

Environmental Regulation and Enforcement

Metro Vancouver protects public health, the environment, utility infrastructure, and worker safety by promoting compliance with bylaws, regulations, and codes of practice related to:

- non-domestic sewerage from industrial, commercial, and institutional sources,
- air emissions from industries, trades, businesses, activities, operations, and residences, and
- privately owned solid waste facilities.

Metro Vancouver is responsible for issuing permits and licences, setting standards, and assessing compliance with Metro Vancouver bylaws.



Solid Waste

Metro Vancouver is responsible for disposing of the waste generated by residents and businesses within this region. Planning for less waste, improving reuse, and recycling systems as well as managing the remaining waste reflects the public's expectations of high environmental stewardship, as well as the desire to keep waste management affordable.

The *Integrated Solid Waste and Resource Management Plan* was adopted by the Greater Vancouver Sewerage & Drainage District Board and accepted by the provincial Minister of Environment in June 2011. The overriding principle of the Plan is the avoidance of waste through an aggressive waste reduction campaign and through the recovery of materials and energy from the waste that remains.

The *Integrated Solid Waste and Resource Management Plan* enhances ecological health by:

- Reducing or eliminating materials entering the solid waste system which may exacerbate environmental impacts of disposed residuals,
- Diverting organic materials from the waste stream to reduce emissions of methane (a potent greenhouse gas), and
- Continuing to improve the environmental performance of waste management facilities.





Housing

Metro Vancouver owns and operates 49 affordable rental housing sites across the region. Providing 3,400 units of low end of market and subsidized housing for more than 9,000 people, Metro Vancouver is committed to providing safe, clean, affordable homes for a diverse range of people.

Metro Vancouver rental housing sites enhance ecological health with community gardens and green spaces that also provide residents with opportunities to connect with nature. As Metro Vancouver expands and upgrades its housing portfolio, there will be more opportunities to enhance ecological health through building design, landscaping, and operating standards.

Corporate and Financial Services

Through its Corporate Services function, Metro Vancouver provides and maintains corporate information technologies and infrastructure, safety management systems as well as building operations for its headquarters on Kingsway, a LEED® Platinum building.

Accounting operations and systems, budgets, business support and analysis, treasury and business processes, purchasing and risk management, fleet services, and real estate services management expertise are provided to the corporation through its Financial Services function. Opportunities to incorporate ecosystem services into corporate planning and investments will continue to be explored.

External Relations

Metro Vancouver supports the achievement of the region's goals, including those related to ecological health, by:

- Building public awareness, understanding and alignment with regional services and policies,
- Enhancing communication and collaboration with member municipalities, and
- Effectively engaging other levels of government in support of regional priorities.

National Zero Waste Council

The National Zero Waste Council was founded by Metro Vancouver in collaboration with the Federation of Canadian Municipalities (FCM) as a leadership initiative bringing together governments, businesses, and non-governmental organizations across Canada to advance a waste prevention agenda and to accelerate the transition to a circular economy in Canada. Through cross-sector collaboration, the Council advances innovations in design and policy as well as behaviour that leads to regenerating natural systems, while creating new economic opportunities.

ROLES OF MEMBER JURISDICTIONS AND OTHER AGENCIES

Multiple jurisdictions are responsible for protecting ecological health in various capacities in the Metro Vancouver region. Because ecosystems do not adhere to local, provincial, or federal administrative boundaries, coordination between agencies in protecting and addressing impacts to ecosystems is vital. In many instances, different orders of government share responsibility and authority for ecological health-related matters, such as protecting fish and bird habitat, species at risk, and environmental contaminants. The descriptions below highlight the key roles different orders of government and others play in protecting ecological health.

Local governments plan and shape their communities through the adoption of local bylaws and policies. Local governments can help protect ecological health in their communities by protecting environmentally sensitive areas through land use planning tools (e.g. zoning bylaws, official community plan policies and designations, and development permits), by implementing parks plans and stormwater management plans, and by adopting broader strategies that address climate change, biodiversity, and sustainability. By working closely with the development community, local governments can help to ensure conservation is considered during the development process, with the aim of maintaining natural areas and ecological processes, providing for habitat connectivity, and managing the environmental impacts of new construction. Local governments can also harness the power of resident volunteers and stewardship groups to help improve natural areas in communities, such as streams and parks, at the same time strengthening the connection local residents have with nature.

The **Provincial Government** is responsible for protecting BC's biodiversity, ecosystems, native species, and natural habitats, and for managing forests, wildlife, water, and other land-based resources in a sustainable manner. The Province administers

provincial parks and protected areas, monitors and enforces compliance with environmental laws and regulations, and manages discharges to the environment from human activities. It also oversees provincial environmental assessments, which includes identifying and managing cumulative effects in BC's natural resource sector.

The **Federal Government** is responsible for protection and management of all marine species, most migratory fish species, migratory birds, nationally significant wildlife areas (e.g., Alaksen and Widgeon Valley), recovery strategies for endangered species, research on wildlife issues of national importance, and international wildlife treaties and issues. Responsibilities for management of wildlife, water resources, and reviewing and conducting environmental assessments for major industrial or infrastructure projects are shared by the federal and provincial governments.

Federal laws apply to all **First Nations** reserve lands, whereas provincial and other legislation are not automatically applicable on reserves. First Nations also have the authority to make environmental laws in relation to reserve land.

The **academic community** helps to fill research gaps and provides sound scientific advice to support evidence-based decision making. A wide array of **non-government organizations** are actively involved in securing and managing conservation lands, lobbying governments for policy and regulatory reform, undertaking environmental litigation, enhancing and restoring habitat, and educating local landowners. **Residents** also play an important role in enhancing the region's ecological health by planting pollinator-friendly gardens, learning about local plants and animals, protecting habitat for species and ecosystems at risk, removing invasive plants, supporting environmental non-profit organizations, or joining stewardship groups.

*A beautiful, healthy
and resilient environment
for current and future generations.*



PART THREE: Metro Vancouver's Ecological Health Framework

Metro Vancouver's *Ecological Health Framework* is organized as follows:



FIGURE 3: METRO VANCOUVER'S ECOLOGICAL HEALTH FRAMEWORK

The Framework's vision and goals are aspirational and regional in nature, while the strategies focus on Metro Vancouver's roles in providing regional utilities, planning for the future, convening and supporting member jurisdictions, and as land managers. 'Current and future directions' are included in this Framework to provide examples of initiatives that fall under each strategy. This Framework will be complemented by an on-line inventory of specific projects and initiatives to feature Metro Vancouver's ongoing efforts to support ecological health in the region.

VISION

Healthy ecosystems provide fresh water, food, shade, jobs, recreational opportunities, and many other benefits. The *Ecological Health Framework* recognizes the inextricable link between the health of the region's ecosystems and that of its 2.5 million residents. The long-term vision for ecological health in Metro Vancouver is:

A beautiful, healthy and resilient environment for current and future generations.

GUIDING PRINCIPLES

While implementing the *Ecological Health Framework*, Metro Vancouver commits to:

Building resilience and adapting to a changing climate

Incorporate mechanisms to bolster ecological resilience⁵ and help ecosystems adapt to climate change.

Mainstreaming ecosystem services

Ensure the goods and services provided by nature are incorporated into decision-making related to regional land use management and core service provision, and assist others to do so.

Promoting space for nature

Work with member jurisdictions to prevent habitat fragmentation and to understand ecosystem connectivity across the region, recognizing that nature needs room to thrive in our rapidly developing region.

Striving for continuous improvement

Continue to enhance environmental management systems to achieve improvements in overall environmental performance in operations, and encourage others to do so.

Metro Vancouver will implement the *Ecological Health Framework* by:

Collaborating with member jurisdictions and other parties

Work with member jurisdictions, other levels of government, and stakeholders to solve problems, maximize mutual benefits and avoid unintended consequences.

Connecting research to practice


Use and share current science and information to assist in the development and implementation of evidence-based policies and practices, and encourage additional research to test effective solutions.

Increasing public awareness

Improve public understanding of the important role nature plays in residents' daily lives by communicating the benefits of green spaces and the ways in which residents can support ecological health in their communities.

Employing an adaptive management approach

Continue to fine-tune programs in response to monitoring and assessment, collaboration with member jurisdictions and other partners, advances in science and technology, changing regulatory regimes and public values, and evaluations of effectiveness with an aim to reduce uncertainty over time.

The strongest connections to these guiding principles are highlighted with colour-coded  beside each strategy.

⁵ Ecological resilience: The capacity of an ecosystem to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks. From: Walker, B., C. S. Holling, S. R. Carpenter, and A. Kinzig. 2004. "Resilience, adaptability and transformability in social-ecological systems". *Ecology and Society* 9(2): 5. <http://www.ecologyandsociety.org/vol9/iss2/art5/>





GOALS AND STRATEGIES

Metro Vancouver has the following high-level regional goals for ecological health to guide corporate actions:

Goal 1: Build ecological resilience and minimize impacts

Goal 2: Protect natural areas and conserve ecosystem services

Goal 3: Nurture nature within communities



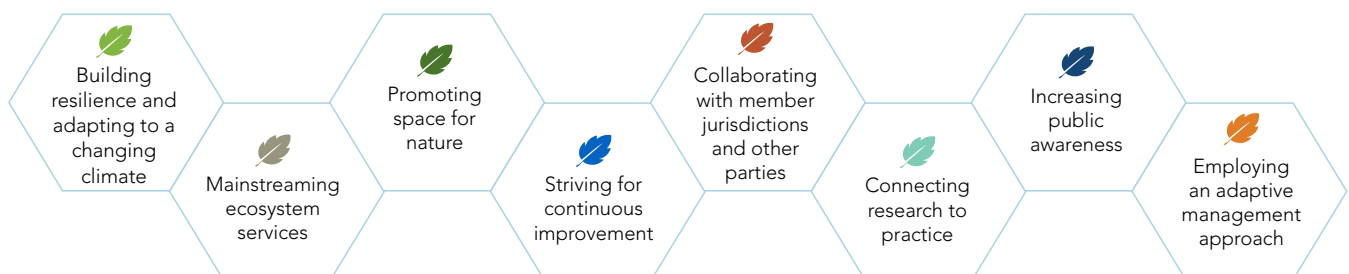
The strategies described on the following pages illustrate how Metro Vancouver will contribute to achieving these goals. These goals and their underlying strategies are not mutually exclusive. In many cases, progress toward one goal or strategy will also advance others. Therefore, it is important to consider the Framework as a whole.



GOAL 1: Build ecological resilience and minimize impacts

Our region is constantly changing – our population is growing, which will require more infrastructure and puts pressure on our remaining green space. The region will also continue to experience the impacts of climate

change. It is essential to build ecological resilience and minimize the impacts of human activity to reduce additional stressors on ecological health.



Strategy 1.1 Enhance Metro Vancouver’s environmental performance

As stewards of the environment, Metro Vancouver aims to enhance the region’s ecological health above and beyond mitigating the potential impacts of corporate actions and complying with regulatory requirements.

Metro Vancouver operates:

- a regional drinking water distribution system with watersheds and reservoirs, drinking water treatment facilities, water mains, and pumps stations;
- a regional liquid waste management system including wastewater treatment plants, a regional network of sewers and pumping stations, and several drainage areas with riparian corridors and fish bearing streams;
- a regional solid waste management system with several transfer stations and a waste-to-energy facility; and
- a regional parks system composed of parks, greenways, ecological conservancy areas, regional park reserves, and associated buildings and infrastructure; and

- affordable housing sites that provide market and subsidized rental apartments and townhomes for more than 9,000 people in the region.

During construction and operation, facilities may discharge to the environment as authorized by other government agencies. Metro Vancouver minimizes discharges and impacts to the environment by monitoring, periodically upgrading, and enhancing the performance of these facilities. As the region grows and demand for services increases, infrastructure improvements will become even more important.

Current and new directions:

- Manage regional utilities to minimize impacts associated with discharges to the environment, monitor performance to ensure compliance as a minimum, and strive for continuous improvement.
- Explore innovative approaches and technologies to reduce impacts from emissions and effluents.
- Explore opportunities to consider ecosystem services in the design and construction of new facilities.



Strategy 1.2 Promote knowledge and consideration of cumulative effects in collaboration with other agencies 🍁🍃

Cumulative effects are changes to environmental, social, and economic values caused by the combined effect of past, present, and potential future human activities and natural processes. If not proactively managed, these changes can compound and eventually harm the environment. Managing the cumulative effects of human activities is important because the ability to derive long-term benefits from the land requires an underlying natural resource system that is healthy and sustainable.⁶

Metro Vancouver is one of dozens of entities collecting environmental data that can be used to assess cumulative effects in this region to support member jurisdictions and others. Metro Vancouver works with these organizations to increase awareness about cumulative effects and the need to fill data gaps.

Current and new directions:

- Participate in provincially- and federally-led environmental assessments and reviews of major projects in the region.
- Where appropriate, collect, manage, analyze, and update data that can be used to support cumulative effects assessment.
- Advocate for additional data collection and coordination by other governments to assist with cumulative effects assessments and reporting.
- Support research and data collection on emerging substances of concern.

⁶ Auditor General's Report, 2015. "Managing the Cumulative Effects of Natural Resource Development in B.C.". <https://www.bcauditor.com/sites/default/files/publications/reports/OAGBC%20Cumulative%20Effects%20FINAL.pdf>





Credit: Yoland Leung, Township of Langley

Strategy 1.3 Increase use of natural and built green infrastructure 

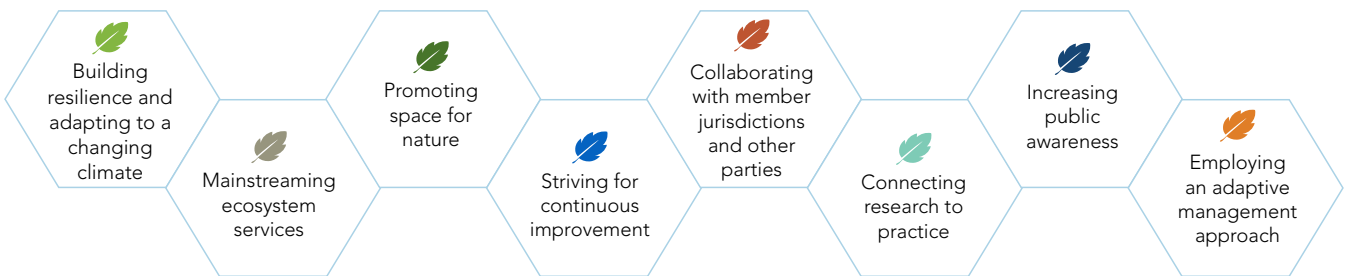
Green infrastructure is the natural, enhanced, and engineered assets that collectively provide society with ecosystem services required for healthy living. Natural assets (such as forests, wetlands and soil) and enhanced or engineered systems (such as bioswales and green roofs) conserve natural resources and mitigate negative environmental effects, benefiting both people and wildlife. Green infrastructure will play an expanding role in managing the anticipated impacts of climate change in our region, such as capturing stormwater from higher intensity rainstorms.

Metro Vancouver develops educational products to increase awareness about the benefits of green infrastructure and the range of options in various situations, and continues to explore opportunities to

incorporate green infrastructure into corporate facilities when opportunities arise.

Current and new directions:

- Improve understanding about the different forms of green infrastructure and how it provides integrated benefits across the regional landscape.
- Incorporate the assessment of ecosystem services provided by green infrastructure into option analysis for project evaluation and planning.
- Foster the exchange of information and experience regarding funding, design and maintenance techniques for green infrastructure.





Credit: Suzanne Rushton

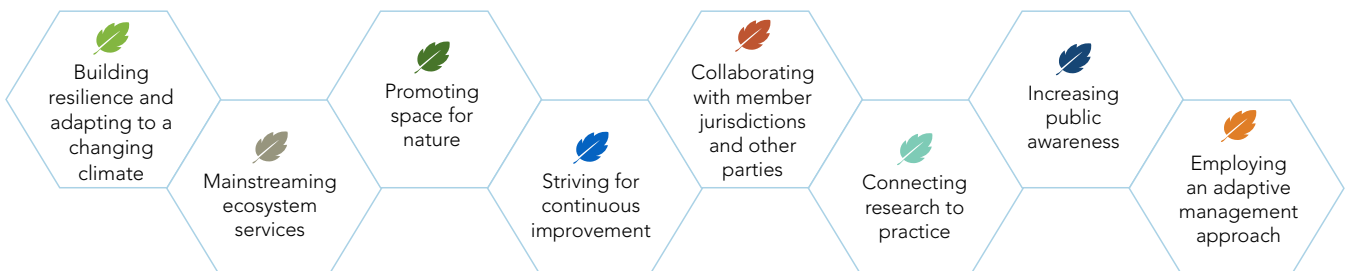
Strategy 1.4 Manage invasive species 🍁🌿

Invasive species are non-native flora or fauna that can be highly destructive, competitive, and difficult to control. Climate change will likely support climatic conditions that allow existing invasive species to flourish and new invasive species to establish within the region.

Metro Vancouver manages and prevents the spread of invasive species on Metro Vancouver lands (e.g., regional parks, watersheds, and other utility-related facilities) through the implementation of integrated pest management plans. Regional cooperation and corporate action are key to mitigating negative impacts of invasive species on our natural and built environments.

Current and new directions:

- Continue to provide a forum for coordination and collaboration with member jurisdictions and other parties to develop best practices, ensure appropriate disposal options, and increase awareness of invasive species.
- Develop and employ best practices in the management of invasive species on Metro Vancouver lands and promote their use region-wide.





Credit: City of Surrey

Strategy 1.5 Support natural and urban ecosystems to adapt to climate change

Many species and ecosystems in the region are at risk of being negatively impacted or displaced entirely due to climate change because they cannot adapt fast enough. Impacts are already being observed in some of the region's ecosystems.

Although the repercussions of climate change on the region's overall biodiversity are largely unknown, Metro Vancouver has developed guidelines for urban foresters to improve resilience and continues to work with others to better understand the implications for natural areas.

Current and new directions:

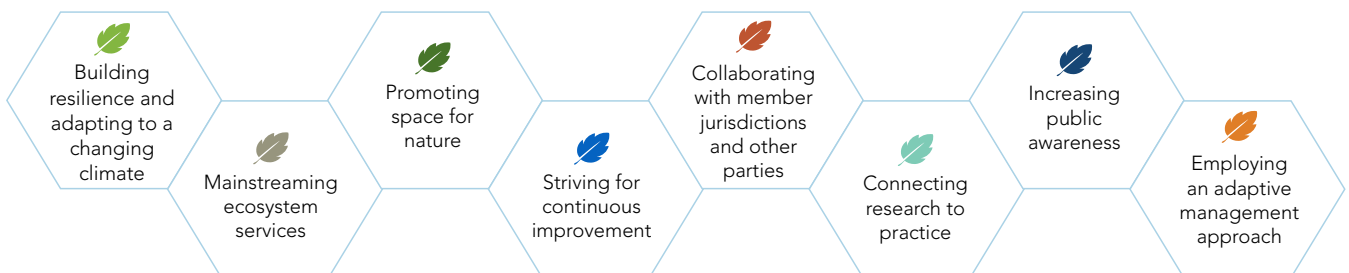
- Restore or enhance habitat on Metro Vancouver lands to improve ecological resiliency.
- Support further research to improve understanding of the impacts of climate change on species and ecosystems and what can be done to help non-invasive species adapt.
- Explore opportunities to support native species and ecosystems in adapting to climate change.



Surrey Bend Regional Park

GOAL 2: Protect natural areas and conserve ecosystem services

With its varied topography and moderate climate, Metro Vancouver is home to a rich array of species, and is one of the most biologically-diverse regions of the Province. Collecting, analysing, and using environmental data to make evidence-based decisions will assist efforts to conserve, restore, and connect these diverse natural areas and the ecosystem services they provide.



Strategy 2.1 Provide data and analysis to inform planning 🌿🍂

Local government decisions on land use, the location and operation of utilities, and designating protected areas can impact ecological health. To understand these potential impacts, local governments need high quality, up-to-date data and analysis at an appropriate scale.

Metro Vancouver collates environmental data, creates regional inventories, and conducts applied policy research and studies to inform corporate activities and support member jurisdictions and other agencies in their planning and decision making.

Current and new directions:

- Collect and maintain environmental data (e.g., biophysical data, ecosystem mapping, species surveys, ambient water and air quality, emission inventories, effluent monitoring).
- Report on trends in key ecological health indicators, where data are available, and work towards filling data gaps.
- Conduct applied policy research that supports evidence-based decision making related to ecological health.



Strategy 2.2 Incorporate ecosystem services into decision making

As illustrated in Figure 1, ecosystem services are the benefits people obtain from ecosystems. Forests, rivers, soil, and other natural assets must be maintained to safeguard the continuing flow of these benefits, particularly in the face of climate change.

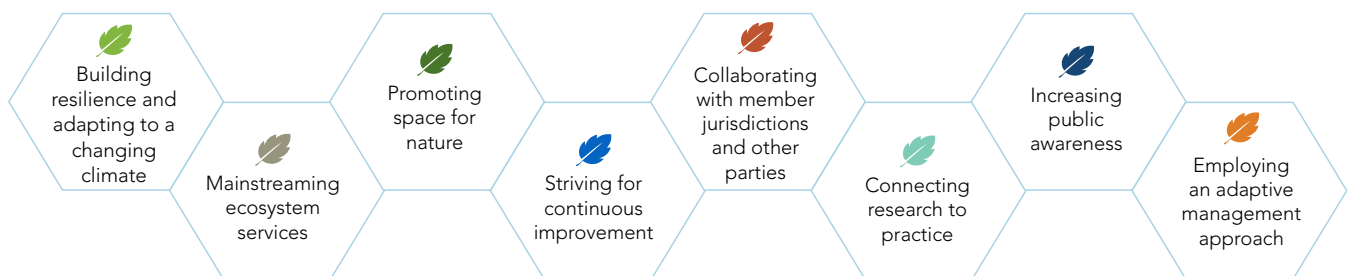
By ensuring ecosystem services are embedded into corporate decision making and encouraging member jurisdictions and other partners to do so, Metro Vancouver can foster a healthy and resilient environment while also supporting sustainable economic prosperity.

Current and new directions:

- Provide regionally-appropriate guidance on ecosystem services valuation methodologies, tools and decision making frameworks, and internal training.
- Enhance understanding of the ecosystem services provided by agricultural land (e.g., nutrient and organic matter recycling, habitat for wildlife, food for pollinators, carbon sequestration, and flood management) and promote the use of beneficial management practices.
- Incorporate ecosystem services into corporate planning and investments (e.g., financial feasibility assessments for projects, park land acquisition, regional plans, inventory of corporate natural assets, and carbon price policy).

Example: An assessment of ecosystem services can inform decisions on specific projects such as:

- Routing options for an underground pipe
- Purchase of land for conservation and/or recreation
- Siting of a trail or building within a park
- New green infrastructure projects
- Maintenance of existing drainage infrastructure versus daylighting streams
- Proposed *Metro 2040* land use designation amendments
- Protection of agricultural land



Strategy 2.3 Enhance ecosystem connectivity



Ecosystem connectivity is the physical and functional links between ecosystems that support biodiversity by allowing movement of species across the region. Ecosystem connectivity is achieved by conserving and maintaining a connected network of natural areas. Connections support ecosystem functions and the movement of species. Connectivity of habitat is critical for conservation, particularly in urban areas where green spaces are often highly fragmented. Maintaining ecosystem connectivity can also help moderate impacts of climate change on biodiversity by allowing movement as conditions change.

Metro Vancouver works with researchers to comprehend the ecosystem service benefits of connections between natural areas, and seeks collaborative opportunities to protect and enhance connectivity.

Current and new directions:

- Provide data and analysis to support the work of multiple agencies across the region to advance connectivity objectives.
- Continue to explore opportunities to enhance connectivity through the Regional Parks network, watersheds, drainage areas, and other sites across the region.
- Promote pollinator-friendly gardening and landscaping to provide connected habitat across the region.



Credit: City of Burnaby

Strategy 2.4 Conserve habitat for species and ecosystems



The Metro Vancouver region has a highly diverse range of habitat types – from alpine meadows to tidal flat – and species due to the variety of geographic conditions throughout the region. To ensure protection of biodiversity, proactive steps are needed to prevent the loss of key habitat. Maintaining these key habitats and the connections between them is even more important with climate change, which can alter the traditional range of species over time.

Metro Vancouver protects and enhances habitat in regional parks and watersheds, and works with member jurisdictions, other levels of government, and partners to promote conservation of natural areas across the region.

Current and new directions:

- Secure land for regional parks centered on protection of the region's important natural areas in collaboration with partners.
- Restore and enhance terrestrial and aquatic habitat to support biodiversity.
- Conduct a review of *Metro 2040* environmental and climate change policies to inform the next iteration of the regional growth strategy.



Credit: City of Delta

GOAL 3: Nurture nature within communities

Residents in urbanized regions can often become disconnected from nature. They may not be aware of the streams that have been paved over, and may see nature as a place to travel to and enjoy only on weekends. By providing opportunities for people to get outdoors and connect with nature, communities will benefit from social, mental, and physical health improvements and may become more engaged in and passionate about protecting, enhancing, and restoring the environment in which they live, work, and play.



Credit: City of New Westminster

Strategy 3.1 Promote sustainable green spaces within communities 🍃🌿🍁

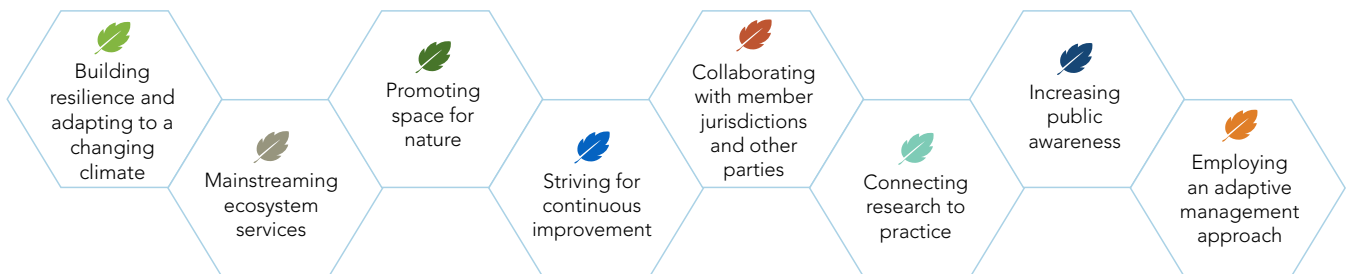
Metro Vancouver is a diverse region with both urban and rural land uses. In highly fragmented urban environments, it is essential that residents have opportunities to connect with nature. Green spaces are an important component of healthy and complete communities. Access and proximity to green spaces provide physical and mental health benefits to people. In addition, green spaces provide wildlife with habitat and opportunities for movement across the region.

By continuing to promote sustainable practices on public and private green spaces within communities, Metro Vancouver can support regional sustainability objectives such as water conservation and rain water capture, invasive species management, support for



biodiversity and better ecological connectivity, waste reduction, and composting.

Current and new directions:

- Provide data, conduct research, and convene forums to support member jurisdictions in planning communities with sufficient green spaces such as parks, nature trails, and urban forests.
- Promote sustainable best practice in gardening and landscaping for residents and professionals.
- Employ sustainable best practice in landscaping on Metro Vancouver lands.





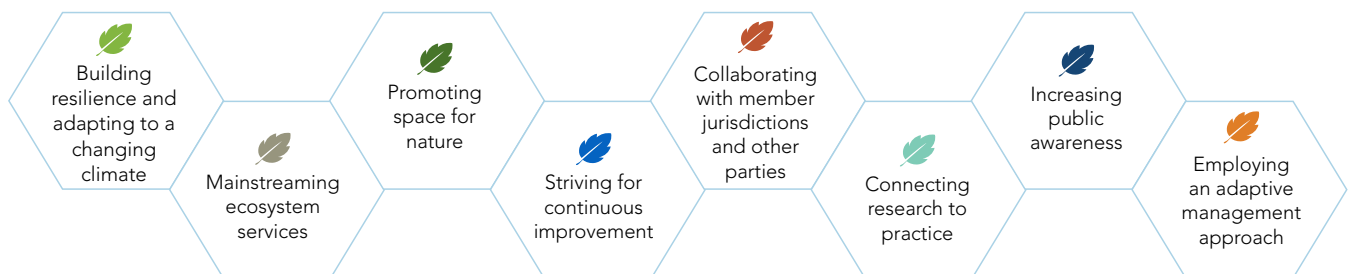
Strategy 3.2 Build a broad base of understanding and support for ecological health  

A key principle of the *Ecological Health Framework* is to increase awareness about the importance of ecological health and the connection to human health and well-being. It is also important to ensure residents understand the importance of nature and the ecosystem services it provides to their neighbourhoods.

Metro Vancouver provides opportunities for people from all walks of life to connect with, enjoy, be active, and learn about the environment by visiting regional parks, watersheds, and facilities, and through broader public education and outreach programs.

Current and new directions:

- Increase public awareness about the value of healthy ecosystems and ways residents can enhance ecological health.
- Develop a common lexicon, training modules, and materials to increase staff and member support for environmental protection and enhancement projects.
- Continue to provide interpretive, educational, and stewardship programs, teacher workshops, forums, and youth leadership opportunities to enhance public understanding and enjoyment of the natural environment within our regional parks, conservation reserves, greenways, and watersheds.







Credit: Jason Puddfoot

PART FOUR: Monitoring, Reporting and Review

To detect changes in ecological health over time, monitoring is essential. Ecological indicators can assist in this process. Early detection of change can uncover potential trends and provide time to implement adaptive management strategies. Monitoring is also important to assess performance and progress toward the *Ecological Health Framework's* vision of a “beautiful, healthy and resilient natural environment for current and future generations”.

STATE OF THE REGION'S ENVIRONMENT

A set of 'Regional Ecological Health Indicators' will help measure and track aspects of the region's ecological health. These indicators will form the basis for a regional 'state of the environment' assessment every six years to align with timelines for the update of key datasets such as the Sensitive Ecosystem Inventory and Land Cover Classification. The following indicators will be summarized regionally, sub-regionally, and at the watershed level, as appropriate:

- % Tree canopy cover
- % Impervious surfaces
- Hectares of land inventoried as a Sensitive or Modified Ecosystem
- % Inventoried Sensitive and Modified Ecosystems rated high quality
- Hectares of protected lands and waters
- Hectares of unprotected Sensitive or Modified Ecosystems
- Green space connectivity index
- Watershed and stream health index
- Water quality index
- Number of new invasive non-native species recorded and/or considered established

This list represents indicators that can currently be measured and as more data becomes available, additional indicators may be added. Several of Metro Vancouver's plans contain ecological health-related indicators that may be included in state of the environment reporting as appropriate.





ECOLOGICAL HEALTH FRAMEWORK REPORTING AND REVIEW

Metro Vancouver will play a variety of roles in implementing the *Ecological Health Framework* – from corporate leadership, to participation and collaboration, to supporting other agency initiatives.

A list of corporate projects and initiatives will be placed on a dynamic webpage to illustrate the steps Metro Vancouver is taking to support ecological health. This webpage will be updated when new projects arise and significant milestones have been achieved.

Metro Vancouver will compile progress reports summarizing how the strategies in the plan are being implemented. In keeping with the adaptive management principle and aligning with regional data collection schedules, the Metro Vancouver Board will consider whether the *Ecological Health Framework* should be updated or amended every six years, based on Board priorities and the best science and information available at that time.

