



Mississauga's Natural Capital:

The Foundation of Our Health and Well Being



Prepared by Hamza Ali
Design Artist: Grace Yang

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A photograph of a small stream flowing over rocks in a forest. The water is clear and white with foam as it flows over the rocks. The surrounding vegetation is dense and green, with some autumn-colored leaves visible. The photo is framed with a soft green border.

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

– Aldo Leopold

What is Natural Capital?

Natural Capital refers to stock of natural resources and environmental assets and how they contribute to building healthy communities. The *Natural Capital* perspective tries to quantify the wide range of benefits that are provided by these natural resources and environmental assets for FREE.



Natural capital includes:

- Minerals
- Trees/plants
- Forests
- Land
- Air
- Animals
- Living organisms
- Lakes and rivers

Natural Capital provides a range of benefits, also known as *Ecological Goods and Services*, to local residents and visitors of natural areas.

Ecological Goods and Services

Ecological Goods and Services	
<p>SUPPORTING: Services or functions of healthy natural areas needed for the production of all other services</p> <ul style="list-style-type: none"> • Primary production • Provision of habitat • Nutrient cycling • Soil formation • Production of oxygen • Water cycling 	<p>PROVISIONING: goods provided by ecosystems</p> <ul style="list-style-type: none"> • Fresh water • Food and fuel • Genetic resources
	<p>CULTURAL: non-material benefits provided by eco-systems</p> <ul style="list-style-type: none"> • Spiritual and religious experience • Education and inspiration • Recreation and aesthetic values
	<p>REGULATING: benefits obtained from regulation of ecosystem processes</p> <ul style="list-style-type: none"> • Pollination • Climate regulation • Disease regulation • Natural hazard protection • Erosion regulation • Water purification



HUMAN WELL-BEING

- Basic Materials
- Health
- Security
- Good social relations
- Freedom of choice and action



Credit River Watershed



Natural capital tends to be underestimated in terms of the benefits it provides, undervalued in its dollar value and often neglected when healthy green space is replaced by grey infrastructure, such as bridges, roads and sewers. It is essential to protect and preserve our natural areas and green spaces (or green infrastructure) because their benefits far exceed the costs to maintain these areas.

A significant portion of Mississauga's *Natural Capital* lies within the Credit River Watershed. A **Watershed** is a basin-like landform. It carries water that is "shed" from the land after rain falls and snow melts to rivers or streams.

- The watershed covers an area of almost 1,000 square kilometres and has a population of over 750,000.
- Watershed is located in one of the most rapidly urbanizing parts of Canada, within the Greater Toronto Area.
- The Watershed receives about 21,000 new immigrants per year (mostly in Mississauga and Brampton).
- The lower portion of the Watershed is an urban dominant landscape (Mississauga and Brampton), whereas middle and upper portions are traditionally dominated by agricultural use and natural areas.
- Mississauga contains the majority of the watershed's population at about 68%.
- Although the Mississauga-portion of the watershed is highly urbanized and has just a few natural spaces, these spaces are most valued by local communities and visitors because of their scarcity.
- Most notable natural capital resources in the Watershed include wetlands, upland forests and water.
- The natural capital of the Credit River Watershed delivers a flow of services to society on the order of at least \$371 million per year.¹

Value of Natural Capital in the Credit River Watershed

LAND COVER	UPLAND FOREST	RIPARIAN FOREST	WETLAND	WATER	URBAN FOREST	MEADOWS	AGRICULTURE	TOTAL
Ecological Services	Atmospheric Regulation Climate Regulation Disturbance Avoidance Water Regulation Water Supply Pollination Habitat Recreation	Atmospheric Regulation Climate Regulation Water Supply Waste Treatment Pollination Biological Control Habitat Biodiversity Recreation Culture	Climate Regulation Water Regulation Water Supply Soil Formation Nutrient Cycling Waste Treatment	Water Regulation Water Supply Soil Formation Waste Treatment Habitat Biodiversity Recreation	Atmospheric Regulation Climate Regulation Water Regulation Water Supply Recreation Culture	Climate Regulation Pollination Habitat Recreation	Climate Regulation Pollination Habitat	
Estimated value (\$) per capita per year	94	67	247	19	25	10	28	490
Estimated annual value (\$ millions)	70.9	51.0	186.8	14.5	18.7	7.8	21.4	371.1



"Natural Credit: Estimating the Value of Natural Capital in the Credit River Watershed" (2009) <http://www.creditvalleyca.ca/bulletin/downloads/CVC-NaturalCreditReport.pdf>
Picture: Rob Weidemann, Über Communications

Ecosystem Goods and Services provided to residents and visitors by Natural Areas in Mississauga

Wetlands provide important benefits to local communities and visitors, including maintaining water quality, flood and erosion control, recreational fishing and hunting, and others. CVC's Natural Capital study found that the natural benefits from wetlands were the most valuable to the community.²

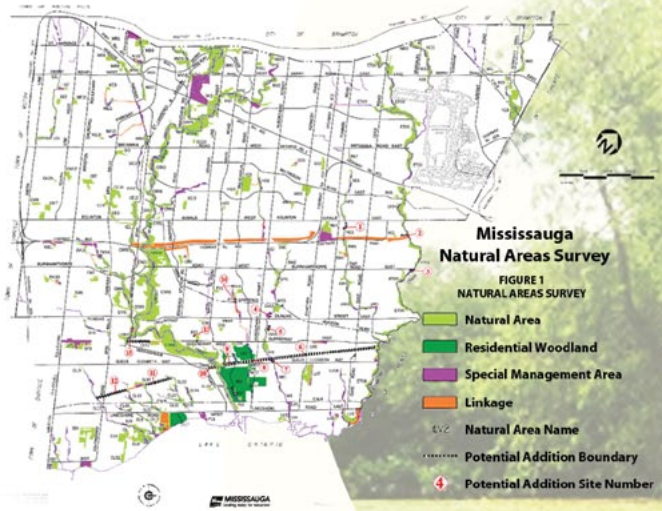


Mississauga's Wetlands:

Rattray Marsh Conservation Area

- As the last remaining lakefront marsh between Toronto and Burlington, this environmentally sensitive wetland is a definite must see for avid bird watchers, photographers and nature lovers.
- Officially opened in 1975, Rattray has a historical significance to many of its visitors. Some remember how it was saved from the developer who planned to fill it in and build homes, while others remember it as a living classroom

- where they came for guided tours to learn about nature.
- Plant life is abundant and beautiful at the marsh. Rattray is home to a large variety of wildflowers.
- Rattray Marsh also provides habitat for numerous bird species, including wood warblers, eastern kingbirds, tree swallows, and herons. Wildlife within the marsh includes rabbits, beaver, deer and occasionally foxes. Other creatures include the vocal spring peeper, American toad, turtles, snakes and more.
- Credit Valley Conservation in partnership with the Rattray Marsh Protection Association help protect the Marsh through education, stewardship and trail upgrades in order to preserve the area's many sensitive features.



Creditview Wetland

- The Creditview wetland is Mississauga's most unique natural heritage feature (created some 12,000 years ago) dating from the period just after glacial retreat.
- Provides a rare natural habitat for vegetation and wildlife within the urban boundaries.
- City of Mississauga acquired this wetland in 1998.



Trees and Urban Forests:

- Climate Change attributed to the concentration of carbon dioxide and other greenhouse gases in the atmosphere is a global problem that threatens both humans and nature.
- Trees and shrubs capture carbon from the atmosphere and store it the wood and leaves helping us to reduce greenhouse gases that are affecting our climate. Trees in Mississauga store 203,000 tonnes of carbon, with an associated value of \$5.8 million.³

Carbon storage by trees in Mississauga is equivalent to:

- The amount of carbon emitted in the City in 20 days
- Annual carbon emissions from 134,000 automobiles or
- Annual carbon emissions from 67,400 single family houses

- Trees protect our health by removing pollutants, from the air, while producing life-supporting oxygen. Trees and shrubs in Mississauga remove 429 tonnes of air pollution annually with an associated removal

value of \$4.8 million.⁴

- Trees help to save energy and reduce energy costs by providing shade and protection from wind. Trees in Mississauga are estimated to reduce energy costs from residential buildings by \$1.2 million annually.⁵
- In addition to regulating climate, forests are also valued for their role in supplying clean water, providing home for variety of plants and animals in the area, offering great recreational, spiritual and cultural opportunities (hiking, walking, biking, bird watching, etc).



The major threat to clean air is posed by emissions from traffic as well as industrial sources that emit a wide variety of pollutants, including carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO₂), volatile organic compounds (VOCs) and particulate matter (PM₁₀), which have an increasing impact on urban air quality.

Nitrogen dioxide removal by trees in Mississauga is equivalent to:

- Annual nitrogen dioxide emissions from 6,100 automobiles or
- Annual nitrogen dioxide emissions from 4,000 single family houses

Sulfur dioxide removal by trees in Mississauga is equivalent to:

- Annual sulfur dioxide emissions from 19,100 automobiles or
- Annual sulfur dioxide emissions from 300 single family houses

PM₁₀ removal by trees in Mississauga is equivalent to:

- Annual PM₁₀ emissions from 259,000 automobiles or
- Annual PM₁₀ emissions from 25,000 single family houses

Carbon monoxide removal by trees in Mississauga is equivalent to:

- Annual carbon monoxide emissions from 30 automobiles or
- Annual carbon monoxide emissions from 100 single family houses



Mississauga's Forests:



Riverwood Conservancy

- A 60-hectare site characterized by its natural beauty and cultural heritage.
- Home to more than 475 species of animals and plants.
- Major contributor to the reduction of carbon emissions in Mississauga.
- Riverwood has a rich heritage with a geological history of ancient seas and a bountiful agricultural history.

Urban Green Spaces:

- Many studies demonstrate that having access to nature benefits our physical, social and mental health. For example:
 - Children with Attention-Deficit Disorder who participate in outdoor activities, such as camping and fishing, have less symptoms and better ability to focus.⁶
 - People who exercise in natural green spaces have more energy and feel more relaxed than people who exercise indoors.⁷
 - People living in close proximity to green spaces have better health than those without such access.⁸
- Proximity to natural spaces increase property values and increased tax revenues associated with that. In Mississauga, proximity to green spaces adds more than a quarter of a billion dollars to real estate values in just two areas of the city.⁹
- Other ways communities benefit from natural features include healthy recreation, clean water, and protection from floods.

Mississauga's Green Spaces:



Jack Darling Park

- Prairie landscape situated on the north shore of Lake Ontario in the south west section of the City of Mississauga.
- Dominated by grasses and made up of a unique collection of plants adapted to drought and frequent wildfires.
- The prairie grassland not only enhances the region's natural significance but also helps to provide a refuge for species on a decline in the southern Peel Region.

Healthier and Happier Mississauga – naturally!

Natural areas bring enjoyment to people and enhance the overall quality of life. There is a direct correlation between quality of life, a healthy environment and a prosperous economy.



- An essential part of human well-being includes a healthy and sustainable ecological system.
- Scientific studies show that people who live in Cities with abundant natural areas have lower stress levels and are happier overall.
- Natural areas help to purify and detoxify our air, resulting in cleaner air that translates into huge savings in health premiums and a more sustainable economy.
- It pays to protect our groundwater, wetlands, forests and other natural resources from threats like over consumption, urban development and pollution so they continue provide their benefits for the current and future generations in Mississauga.

How You Can Protect and Increase Your Natural Capital

- Educate yourself on native species, local wildlife and ecological landscaping.
- Plant native trees and other vegetation to protect soil, improve air quality and provide natural habitats for wildlife. Become an example for your family by planting together.
- Get to know what green infrastructure opportunities, such as green roofs or living walls, exist for your home or building.
- Establish a rain barrel system to conserve water and prevent runoff.
- Use gravel or interlocking brick on your driveway to allow water to soak into the ground, filtering storm water, reducing runoff and replenishing groundwater.
- Become more informed about the value of preserving and restoring Natural Areas and biodiversity, both locally and globally.
- Practice low impact recreational and educational activities to avoid trampling delicate plants and soils. Follow existing trails when possible.
- Join a conservation/environmental organization or start a green team at work that looks at increasing biodiversity on their grounds and be part of the solution.
- Let our elected leaders know that our Natural Capital is a top priority. Ask them to enact protective policies and to support public acquisition programs for natural areas.

References:

- ¹ "Natural Credit: Estimating the Value of Natural Capital in the Credit River Watershed" (2009) <http://www.creditvalleyca.ca/bulletin/downloads/CVC-NaturalCreditReport.pdf>
- ² "Natural Credit: Estimating the Value of Natural Capital in the Credit River Watershed" (2009) <http://www.creditvalleyca.ca/bulletin/downloads/CVC-NaturalCreditReport.pdf>
- ³ "Peel Partnership Urban Forest Study: Part 2 City of Mississauga Urban Forest Study" (draft), TRCA, October 2010
- ⁴ Ibid.
- ⁵ Ibid.
- ⁶ Kuo F.E., Faber Taylor A. A potential natural treatment for Attention Deficit/Hyperactivity Disorder. *Am J Public Health* 2004; 94 (9): 1580-86
- ⁷ Pretty J. et al The mental and physical health outcomes of green exercise. *Int J Environ Health Research* 2005; 15(5):319-37
- ⁸ Maas j. et al. Green space, urbanity, and health: How strong is the relation? *J Epidemiol Community Health* 2006; 60:587-92
- ⁹ "The Credit River Watershed - Property Value Appreciation: Impacts of Natural Features" (2009) <http://www.creditvalleycons.com/bulletin/resources.htm>

Images:

- Credit River*. N.d. Desktopplace Albums, Mississauga . Desktopplace. Web. 12 Feb. 2011.
- Down the Lane to Chappell House ~ Riverwood*. N.d. Riverwood Wood Carvings Chappell House ~ Mississauga Ontario Park, Mississauga. Snapshot Travel Blog: Rhododen. Web. 12 Feb. 2011.
- Leung, Michelle . "Sparrow ." 2011. JPG file.
- Miles, Richard. *Credit River*. 2009. N/A, Mississauga. flickr. Web. 1 May 2011.
- Nichole Jiang, Nichole . "Fall." 2011. JPG file.
- Park*. 2010. Jack Darling, Mississauga. *Jack Darling Park, Mississauga*. Web. 12 Apr. 2011.
- Pond and Marsh - Riverwood Conservancy Park*. N.d. Riverwood Wood Carvings Chappell House ~ Mississauga Ontario Park, Mississauga. Snapshot Travel Blog: Rhododen. Web. 12 Feb. 2011.
- Rattary Marsh*. N.d. About Rattary Marsh , Mississauga. Credit Valley Conservation. Web. 12 Feb. 2011.
- Waterfall*. 2010. Flickr, N/A. *Economist Pavan Sukhdev on 'natural capital' and the green economy*. Web. 22 Apr. 2011.
- Wetland*. 2011. Creditview Wetland, Mississauga. Flickr. Web. 12 Jan. 2011.

**"Conservation is a state of harmony between
men and land."
-- Aldo Leopold**



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