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Cost of Living

With ecology-focused planning tools, communities will reap millions of dollars in returns.





COURTESY OF ALIUS.

IN THE MID 20TH CENTURY, a continuous ring of forests, wetlands and farmlands surrounded the city of Montreal. The south side of the St. Lawrence River was mainly dedicated to farms of hay, oats and grazing cows, while plenty of forests were left to grow in the north.

Today, the landscape has changed considerably. Practically the only land use in Montreal and Laval is urban development, and the protective ring of natural space that once surrounded the island has been largely interrupted and paved over.

I was born and raised in the Montreal region. I worked in agriculture when I was a kid, and used to play in the forests near my home. As I grew up, I saw these natural and agricultural ecosystems disappear and be replaced by monster houses and shopping centers. In 20 years, my village, only 10 km outside the island of Montreal, changed from an agricultural area to a commuter town. I decided to study that phenomenon in my graduate studies, and preserve the urban biodiversity in my activism. Now, all my work and social engagement is motivated by my one and three-year-old children. What kind of Montreal will exist for them, and for their children?

My research has led me to the concept of ecosystem services, a new frontier in environmental research. The concept refers to the tangible and intangible benefits that nature provides to people at different scales. Forested areas within urban centres, for example, improve air quality by sequestering pollutants, wetlands mitigate flooding damage, and forest canopy cover reduces urban heat island effects.

The importance of ecosystem services produced by urban ecosystems have been integrated into transnational initiatives, such as the *Millennium Ecosystem Assessment* and *The Economics of Ecosystems and Biodiversity* since the early 2000s, with the concept also being applied through local initiatives. These include initiatives emerging out of New York, Berlin, Cape Town, Quito, Seattle, London or Canberra that explicitly recognize ecosystem services in their development plans.

In Canada, seven out of 10 people live in metropolitan areas, and one in three Canadians live in either Toronto, Montreal or Vancouver. These urban centres have the fastest growing populations, suggesting the proportion of Canadians living in cities will increase in the coming decades. This creates challenges for the management of natural environments within cities and on their outskirts.

Since the 1950s, growth of the urban population in Canada has been based on the urban sprawl model, characteristic of the post-war years in North America. This carving out of land for human use impacts ecological connectivity. Ecological connectivity includes the ability of living species and matter to move freely across the landscape, and is critical to ensure the survival of species and important ecosystems.

For example, urban sprawl since the 1960s in the Greater Montreal area has resulted in the loss of over 25 percent of woodlands and wetlands and has thus reduced ecological connectivity by 80 percent. This qualitative and quantitative decrease in the environment has significant public health impacts and generates significant economic costs, resulting in \$235 million in ecosystem losses each year in Montreal (in terms of recreational value, pollination, and waste treatment for example).

Justification for the environment

Unfortunately, the main problem encountered in the consideration of environmental objectives in urban areas is that the protection of natural environments is still often perceived as an economic constraint. The general lack of planning tools available to land managers, in terms of laws, rules, policies and programs, do not accommodate conservation, restoration and enhancement of the natural heritage as objectives that can also be viewed as economically viable.

Saskatchewan ALUS staff and assistants demonstrate the installation of a waterfowl "henhouse" in a large wetland that has been beautifully restored and enhanced through ALUS.

Consequently, with the combination of the high property values of available urban space where natural ecosystems may exist combined with the municipal tax structure of urban areas, it becomes increasingly challenging to justify the implementation of environmental initiatives.

The typical urban sprawl model of the later 20th century remains a dominant urban development model in Canada because services provided by nature are not traditionally quantified in economic terms. Natural processes are not translated into economic terms for use in decision-making. At the same time, the conservation of natural environments is generally perceived as an economic cost, and a barrier to economically competitive urban development. This leaves the environment out of economic decisions, resulting in distorted land-use and urban planning.

In order to limit the erosion of natural areas in cities and suburbs, it is increasingly common, in the language of public authorities and environmental NGOs, to talk about natural environments in terms of infrastructure. This is called the Green Infrastructure Approach. This approach argues biodiversity and ecosystems produce, like human-built infrastructure, a number of "ecosystem services" that guarantee quality of life and security for communities.

It is vital to attribute economic values to the real contribution of nature in terms of public services. Doing so can have two effects. First, the economic consideration of natural capital can not only assure that quality of life of urban residents is prioritized, but also that it can be economically viable with other competing land-uses and hence the production of public services. Second, the conceptual attractiveness of this perspective offers a language that resonates with the demands placed on decision-makers, practitioners and other land-use planning stakeholders. This can also help ensure that urban planning tools better incorporate the values of biodiversity and ecosystem services that land-users and managers hold dearly.

In Canada, many studies have been

carried out to determine different ways to place value on biodiversity and ecosystems. Environmental features, or "natural infrastructure" can be evaluated differently depending on the scale at which they are considered. For example the monetized benefits of a single tree will be different than when it is grouped into a larger forest. This is why looking at valuing the environment through the lens of many scales in urban areas is critical.

On a micro scale, an urban green infrastructure can simply take the form of a tree. In 2014, the TD bank issued two reports on the value of trees in large Canadian cities. By assessing the effect of trees on water runoff control, air quality, carbon sequestration and energy savings, these studies have indicated a value of approximately \$330 million per year for the urban forests of Montreal, Halifax, Vancouver and Toronto, with an average of about \$700 per tree. The return on investment is very advantageous since for every dollar invested in tree maintenance, a return of \$2 to \$13, depending on the city, is expected to be recovered in avoided costs for households and utilities.

At a medium-scale, a green infrastructure approach might include a wetland, a creek or a woodlot. In Quebec, researchers measured that households would be prepared to disburse an average of approximately \$500 per year through their municipal tax bill to ensure that wetlands are protected and restored. This would effectively double the area of wetlands protection in southern Quebec. Water filtration, flood protection, habitat for biodiversity and carbon sequestration services have motivated this significant willingness to pay of more than 2,000 respondents, which would result in the economic valuation of approximately \$4,000 per hectare of wetland.

Finally, on a regional scale, a green infrastructure approach represents a green network or green belt, which enables the interconnection of natural environments for improved ecological connectivity across the landscape. This principle of ecological connectivity is increasingly present in land use planning and urban planning.

Numerous studies have examined the economic value of ecological corridors in many of Canada's major cities. For instance, the aquatic and terrestrial ecosystems of the Montreal Greenbelt produce many non-market ecosystem services that represent a shadow market contribution valued at almost \$3 billion per year. Similarly, significant values have been measured for the Ottawa Greenbelt (\$5 billion) and Toronto (\$2.6 billion annually).

Ways to measure value

However, we run into two problems: complexity of measuring services and ethics.

Converting ecosystem processes into measurable services with economic value is complex. An estimate of the value of certain services or natural environments can be made through the use of various instruments.

For example, techniques based upon how existing markets function, such as the replacement costs of substituting natural capital for built alternatives can provide an indication of the value of losing natural environments. For instance, it may be possible to examine the cost of built infrastructure that could replace a natural wetland, which filters thousands of cubic meters of water and protects surrounding areas against flooding while also harbouring rare and endemic species.

Other techniques refer to secondary markets that indirectly convey the value of elements of natural capital. As such, it is possible to evaluate the aesthetic and recreational value of a lake through its effects on the real estate market.

Finally, other approaches exist which simulate markets for certain goods and services that do not have a market of reference. One can thus estimate the "willingness to pay" of residents to increase the area of green space in their neighborhood. On the other hand, it may be recognized that values for natural ecosystems may be incompatible with market mechanisms or economic means of valuation and therefore possess a value that can't be measured with any built or substitutable alternative (e.g., the customary values local communities might hold to natural environments may not be replaceable

by built environment alternatives).

While these studies reveal important economic values, the monetization of ecosystem services is not in itself a goal. The objective of a green infrastructure approach aims to provide new indicators that can highlight the real contribution of natural ecosystems to the health and well-being of communities; values that the traditional municipal tax and planning tools are unable to recognize. Indeed, the existing model of municipal taxation largely explains the historical and continued threat to natural and agricultural environments in urban and peri-urban areas. The high dependence of municipalities on property taxes serves to fuel a model of urban sprawl that proves to be economically inefficient, socially unfair and destructive to the environment.

Going forward

Several ecological economists emphasize the importance of setting up new programs and policies that internalize the economic and non-economic values of ecosystem services. Such tools can take various forms, like land tax credits for the protection of private natural environments, royalties related to soil regeneration, and compensation for the restoration of green areas.

Even if Canadian cities are not generally prepared to promote and use such tools, a major contemporary challenge in land-use planning is to transition to a model that recognizes the real value of ecological heritage and that is able to internalize the full social, environmental, and economic costs of unsustainable urban sprawl. In this regard, the concepts of ecosystem services and green infrastructure offer promising avenues for improving the development model of our cities.

One possibility for change is "payments for ecosystem services" initiative, in which monetary incentives are offered to landowners in exchange for land management that can increase the production of one or more ecosystem services, including the conservation of natural draining basins to allay runoff during storm events.

The great news is that some

Canadian cities have begun to recognize and internalize the negative economic externalities of urban sprawl.

Since 2015, for instance, the city of Mississauga, Ontario, charges home owners and businesses alike for storm water costs based on the size of their property. The revenue obtained from storm water management provides an interesting potential to explore alternative green infrastructural approaches to absorb storm water while maintaining and enhancing natural environments.

In 2016, the city of Trois-Rivières in Quebec offered real estate tax reductions of up to 50 percent to urban woodlot owners of five hectares and over who are committed to preserving them. In the same way, the town of Gibson in British Columbia is managing and financing urban natural ecosystems as part of its infrastructure development planning.

It's time for other Canadian cities to follow suit – to recognize the public services provided by ecosystem services, from farmers, to bees, to trees and waterways. Enhancing the resiliency of a city means searching out elegant solutions to problems, and there is nothing more elegant than using nature to provide solutions for complex social problems. Nature should no longer be viewed as a constraint, but instead a part of each of us individually, and a part of our communities. 

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There's lot's on the go about sustainable development in Montreal. Find out more at Maison de Développement Durable/The Centre for Sustainable Development: lamdd.org.

ALUS is a leading organization dedicated to helping Canadian farmers and land owners take care of their land to share the ecosystem benefits with all Canadians. Find out more at alus.ca.