



Green Spaces: Forgotten Areas with High Potential

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Introduction: why is this issue significant to mid-sized cities?

With the growth of cities and urbanization, many people have become detached from their natural environment. While this issue is recognized in the context of fast-paced growth in large cities, mid-sized cities (MSCs) have received less attention, despite experiencing similar challenges. The planning and development of healthy communities must make green spaces and planting vegetation a priority. Investing in green spaces and tree planting is often overlooked in MSCs due to a lack of funding and demands of ongoing maintenance. The pressure for MSCs to develop greater suburban areas in order to increase their municipal tax base poses an additional obstacle to investment in green spaces. Dupras and Alam (2015) argue that urban sprawl and the resulting development of subdivisions have led to a significant decrease in forests, croplands, and other green spaces, leading to a reduction of ecosystem services – benefits obtained from natural environment (TEEB 2010) – in different communities. Such services include water purification, food provision, climate regulation, and reduction of air pollution.

In large cities such as Toronto and Vancouver, developments are often designed using an intensification approach where houses, particularly condominiums or townhouses, are built in high density. However, in small and mid-sized cities, such intensification presents different challenges. For example, subdivisions are located at city margins, next to rural areas and mainly include low-density housing developments (Brewer and Grant 2015). While this may appeal to urbanites, especially families in search of larger yards for lower prices, this close contact between suburban and rural areas has led to some unexpected results and conflicts. In general, urbanites expect that the closer they are to rural areas, the more peaceful and pristine the surroundings (Walker 2000). They also

believe that green spaces are readily accessible. They are generally unaware that farms can be noisy because of tractors and bird cannons, or may smell during manure spreading. Most MSCs that are in close proximity to rural areas have to deal with these issues and expectations for more access to nice parks, in contrast to rural agricultural spaces.

Urbanites expect that the closer they are to rural areas, the more peaceful and pristine the surroundings

Land use changes and brownfield sites can be common in most MSCs since they are located at the edge of larger centres or close to natural resource extraction activities (e.g. mining in Greater Sudbury). In many cases, likely due to a perceived abundance of space, they are often abandoned due to lack of planning, funding or knowledge of what to do with them (Seasons 2003). MSC decision makers tend to invest less in restoring these brownfield sites and maintaining green spaces because they believe they have easy access to natural rural areas (Baycan-Levent et al. 2002). Under these conditions, they do not develop long term plans to increase or maintain green spaces or parks, instead focusing on new roads and services. When they finally examine the need for green spaces it is often too late as spaces are already developed.

This paper examines the various contributions that green spaces add to communities and proposes options that can be used in the mid-sized city context to restore subdivisions or integrate green elements in the planning of future residential or commercial developments. It looks at how green spaces can be better integrated into the planning of subdivisions and enhancing the downtown core of MSCs to ensure greater benefits for the ecosystem services required for human wellbeing, such as climate regulation,

water and air purification and food provision. With the implementation of the 2030 Sustainable Development Goals, and notably “Goal 11: Make cities inclusive, safe, resilient and sustainable” (United Nations 2015), understanding how green spaces can be enhanced in MSCs should be seriously considered.

Making the case: benefits to MSCs

Green spaces and their contributions to sustainable development

Green spaces refer to any type of space found in urban areas that is covered by vegetation and serves as a link to nature (Baycan-Levent et al. 2002). These spaces are usually directly or indirectly accessible to people. They can include edges with trees on the roadside, community gardens, water retention ponds, parks, and even planters on the streets. Green spaces are not only a question of aesthetics. They usually improve the liveability of a city and depending on their planning and management, they can fulfill many roles. For example, green spaces provide areas for cultural events and children’s education and play. Green spaces can also help children with physical, mental and social development.

Green spaces provide many ecosystem services that are critical for community sustainability such as food provision, climate regulation, and reduction of air pollution. Green spaces also provide cultural ecosystem services such as aesthetic beauty and spaces for reflection, meditation, relaxation, etc. Regulating services offered by green spaces include ecosystem-based adaptation to climate change, reduction of the heat island effect (while enhancing carbon sequestration), reduction of wind intensity during storms, and buffers on water ways. Green spaces can

also contribute to disaster risk reduction, such as water retention ponds that absorb greater volumes of water during heavy rainfall.

Green space planning in MSCs can be coupled with sustainable development plans to increase their combined impact. Well-planned green spaces can become linkages between the residential, commercial and leisure components of a community (Baycan-Levent et al. 2002). They can also encourage a more active lifestyle and improve safety for cyclists and pedestrians. This is the case for the City of Markham, where ecosystem integrity is highlighted in various ways. Markham outlines the benefits of ecosystem services as follows:

When a positive action is taken in one area of the system, such as protecting biodiversity through habitat conservation, the action ripples through the rest of the system to help conserve cultural landscapes, protect water resources, sequester carbon, clean the air and provide recreational amenities. (Markham ICSP, p. 16)

Researchers have argued that easy access and proximity to green spaces (<0.5 km) lead to an increase in number of visits by local residents and healthier communities, as most residents practice outdoors activities such as hiking, biking or jogging (Haq 2011). The size of green spaces is another aspect to consider. If planned well, MSCs could have an advantage over large cities as they can more easily create multifunctional networks of green spaces, connecting with the rural ecosystem and enhancing the role of active transportation (Niemelä et al. 2010). In addition to the aesthetic appeal, there are many benefits to having such networks such as improving adaptation to climate change and better water management (Coombs et al. 2011). In order to create these networks, planning and decision-making can benefit greatly from involving local communities and neighbourhoods. Local knowledge can inform what is appropriate for a specific location (Coombs et al. 2011).

Green space options for mid-sized cities

There are many types of green spaces that can enhance connectivity, ecosystem services, active transportation and other benefits in MSCs. Bell et al. (2007) count parks and gardens, natural and semi-natural spaces, green corridors, allotments, community gardens and urban farms, outdoor sport facilities, informal recreation and green spaces around housing, playgrounds, cemeteries, disused churchyards and other burial grounds and other public spaces as green spaces. Even sidewalks can serve as areas to add vegetation and enhance the aesthetic value of core urban or suburban areas. Green space in a core urban area can be as small as a flower box. In Moncton, New Brunswick, flower boxes are located on the sidewalk along Main Street, containing flowers, as well as crops such as bok choy, kale, etc. These vegetables are freely accessible to residents who can come and harvest according to their needs. In urban centres where space is more limited, planter boxes suspended from windowsills and street light poles have been used to add greenery for a long time.



Roadside green areas

MSCs tend to have limited resources for public transportation, which leads to car-centered lifestyles. This translates into increased development and road maintenance to accommodate traffic. A higher number of cars per household leads to increased pollutants and noise intensity along main roads (StojanoviĎ et al. 2016). One solution that has been used, mainly in Europe, is to establish roadside green areas with trees to reduce the negative impacts of roads and car traffic. Some suburban developments in MSCs like St. Catharines have used a similar strategy by planting trees along roads. This also has a cooling effect in the summer by reducing the heat coming from the pavement by shading a portion of the streets. In addition, it contributes to carbon sequestration by the municipality.

Road in St Catharines, ON. *Photo by Flickr user Andy Nystrom*



Urban landscape

There are many ways that green spaces can be added to the urban landscape, whether through the protection of existing green spaces, restoration of open spaces or the creation of new spaces (Bilgili and Gokyer 2012). It has been argued that decisions should be based on the needs of a neighbourhood and the risk of environmental damage such as flooding, heat waves or windstorm (Bilgili and Gokyer 2012). Elements that can be added to green spaces include grasses, trees, shrubs, herbaceous plants, and crops. Generally, native species are preferable as they are adapted to the climate conditions of the area. Assisted migration is a potential solution to adding new species in a green space. This allows species to be moved to a location where they are more likely to be found several decades from now. This is especially true for tree species that take over 50 to 100 years to grow. Such an approach should be carefully considered. Using species-based distribution models with climate change scenarios may help understand which species can be more appropriate and will not turn into a weed. Such an approach remains debated in the scientific community but is an option in regions where regeneration of some species is already being affected by climate change and the introduction of invasive pests (e.g. Emerald ash borer currently killing most ash trees in southern Ontario).

In all cases, increased biodiversity is favoured over monoculture as it tends to lead to a higher number of ecosystem services due to more functional groups and thus improved resilience (Bengtsson et al. 2002, Soliveres et al. 2016). Usually areas with high biodiversity tend to be less susceptible to invasions from exotic species than manicured grass yards (Loreau et al. 2002). Vegetated green spaces play various roles. Not only can trees reduce noise pollution, they help filter air pollutants and buffer against the urban heat island effect, and therefore can reduce respiratory infections or heat-related illnesses (Bolund and Hunhammar, 1999)

Photo: Gore Park, Hamilton. *Photo by Tom Flemming via Flickr*



Green spaces in core areas

Green spaces in core areas are considered important in MSCs as they bring a sense of belonging to the community and reflect its health and economic stability (Seasons 2003). It has been suggested that despite their high density of development, green spaces in core areas should also have a pleasing and pedestrian-friendly environment and the amount of accessible green space can be used as an indicator of the environmental quality of MSCs (Seasons 2003). Urbanisation tends to lead to an increased number of concrete structures and pavement, which are less permeable than green space. Under heavy rainfall, which is projected to increase with climate change (Canadian Climate Scenarios Network 2011), surface run-off will increase, leading to flooding (Weng 2001). Surface run-off from vegetated areas is typically as low as 5-15% of rainfall, while in urban areas, it is estimated at 60% of rainfall (Bernatzky 1983). With the American recession and decline of housing in some cities like Cleveland, Ohio, restoration of empty lots into rain gardens has helped increase a sense of belonging in addition to improve ecosystems services such as stormwater management, thus increasing the resilience of communities (Chaffin et al. 2016).

A large component of the southern Ontario ecosystem was originally tall grass prairies. Such an ecosystem is currently being restored with conservation agriculture in some small communities in Ontario. In addition to enhanced carbon sequestration and reduced flood risks through greater absorption of rainwater, such an ecosystem could also be restored in vacant lots in MSCs and serve as a link between the suburban and rural component of a community. In other communities, empty lots have been replaced by community gardens. Some MSCs, such as Greater Sudbury and Moncton, have initiated swap programs in the spring and fall to give citizens a chance to exchange plants or produce. In some cases, this has encouraged people to garden at home or in community gardens. In St. Catharines, local organizations, such as Greening Niagara, have found a way to inventory fruit trees located on public lands and refurbish them so they can be reused through a harvest program in the fruit season. This has encouraged some participants to trim the trees to improve production and produce preserves for the benefit of the community.

Photo: A vacant lot transformed into a community garden and mural in Cleveland, Ohio. *Photo by Brad Masi via Flickr*

Densification of new developments and innovations

Ontario MSCs, especially those located near or in the GTA, are experiencing pressure to increase residential development. The Ontario Growth Plan encourages densification of new developments to help reduce the footprint of cities, and give developers the opportunity to plan for green spaces in new residential subdivisions where multifunctional areas can be created to satisfy the needs of residents and the broader community. High-density housing has proven to be more sustainable than low-density housing because it helps preserve large areas of intact green spaces, which can serve as a buffer against extreme weather events and provide a place for emotional and community stability (Caryl et al. 2016; Gagné and Fahrig 2010; Sushinsky et al. 2013).

With intensification of the urban core and the need to reduce the footprint of buildings (as well as reducing other impacts such as water run-off, heat island, etc.) rooftops represent an interesting option. The Accordia Development in the United Kingdom is an interesting example of different housing types that share green spaces, but where every house has its own private green space in the form of an inner courtyard or a rooftop garden (Bradley et al. 2011). In Canada, the Delta Beausejour in Moncton not only grows vegetation on its roof but also beehives. The honey it produces is then used by its restaurant.

Photo: Green roof, Robertson Building, Toronto. Photo by Viv Lynch via Flickr



Green infrastructure and housing

Houses can be built of materials other than concrete, bricks, and inert materials. The design of new housing developments can reduce energy and water usage by integrating green infrastructure. Aagaard (2012) suggests that 50% of energy usage depends on the building design. With summer temperatures projected to rise in Ontario (Canadian Climate Scenarios Network 2011) and the resulting growing reliance on air conditioning, it is increasingly important to find ways to reduce these costs through natural ventilation. Green spaces can greatly contribute to cooling and heat regulation. For example, vegetated areas around houses have been found to reduce the heat island effect and radiation from the building, decreasing the need for air conditioning (McPherson 1994). Living walls have been used for centuries in Europe and can help reduce heat radiation from buildings. Green roofs are another effective option to reduce heat and improve water run-off (Del Barrio 1998). Saiz (2006) reports that adding a green roof to a typical Toronto house has led to a 25% reduction of air conditioning use by the entire building and a 60% reduction of use for the floor immediately below the green roof. While this approach has mainly been promoted in large cities, MSCs should be proactive and innovative, especially with new housing developments.

Photo: Living wall in Paris, France. Photo by Gary Craig via Flickr

Policy implications

MSCs face challenges when making planning decisions regarding new subdivisions or the renewal of core areas. Challenges are multifaceted, encompassing budget limitations and the lack of a clear long-term

vision on how to balance development with green spaces. In MSCs, there is a perceived proximity to nature. This reduces the pressure to develop green spaces or increase their connectivity within the urban area. A heavy reliance on cars exacerbates these challenges.

People are more likely to visit green spaces that are close to their homes, which has implications on the planning and design approach to maximizing health and other social and environmental benefits (Sturm and Cohen 2014). Green spaces have been shown to have several benefits such as improved general health (de Vries et al. 2003), prevention of mental fatigue (Kuo 2001), and provision of places for meditation (Herzog et al. 1997). To increase the impact of these benefits, MSCs should develop policies and long-term development plans that are conducive to the sustainable establishment of green space networks. Such policies can put pressure on developers to ensure that any new subdivision must find a way to invest in green spaces through housing intensification and by promoting accessible green spaces that can also be used for active transportation.

Ontario's Places to Grow Act: The Growth Plan for the Greater Golden Horseshoe (GGH) (Ministry of Municipal Affairs 2013) states in its vision for 2041:

A healthy natural environment with clean air, land and water will characterize the GGH. The Greenbelt, including significant natural features, such as the Oak Ridges Moraine and the Niagara Escarpment, has been enhanced and protected in perpetuity. These will form the key building blocks of the GGH's natural systems. The GGH's rivers and streams, forests and natural areas will be protected and accessible for residents to enjoy their beauty. Open spaces in our cities, towns and countryside will provide people with a sense of place.

In addition, it acknowledges the importance of "unique and high-quality agricultural lands [being] protected for future generations". For MSCs, these elements need to be balanced because pressure from developers will continue to be strong under the current economy.

MSCs must consider the principles put forward in the Ontario Growth Plan, especially as it relates to compact communities and protection and conservation of natural resources including land, air, and water.

With the current trend towards a low carbon energy economy, with less and less of a reliance on fossil fuels, and provincial policies in favour of "building compact, transit-supportive communities in designated greenfield areas, and reducing dependence on the automobile through the development of mixed-use, transit-supportive, pedestrian-friendly urban environments" (Ministry of Municipal Affairs 2013, Policies 2.2.2), MSCs must plan for green spaces in new developments and existing areas. Indeed, policies of the plan support some of the major points that have been described in this document such as the need for a new development to plan for open spaces. These policies could have gone further in underlining the importance of green spaces not only for more active transportation but for adding additional benefits to mental and physical health.

While some MSCs, such as Markham, have been proactive at integrating ecosystems services and ecosystem health and green spaces into their plans others still have work to do to avoid being trapped in developer and tax grab pressures. A review of some of the strategic plans (e.g. St. Catharines) reveals that environmental sustainability is often related to green infrastructure or to maintaining existing green spaces. In other cases (e.g. Kingston), strategic plans include guidelines on residential development that "encourage" the protection or creation of natural landscape. It is often unclear how green spaces are practically promoted in these circumstances. For some MSCs (e.g. Windsor), the way residential and industrial developments are designed can help promote the increase of green spaces. However, land supply pressure remains for the City of Windsor (2017):

The City of Windsor had approximately 2,058 hectares of undeveloped land in 1996. Of this total, 1,214 hectares were designated for future residential use, 606 hectares for industrial use, and the remaining 238 hectares for open space use. As a result of the projected positive population, housing and employment growth, Windsor's land supply is expected to decrease over the next twenty years.

Under those circumstances, it is easy for decision-makers to forget about the 238 ha of open spaces. Developers could be interested in developing these spaces as soon as possible. It would then be too late then for the city to plan green spaces and protect areas.

Tools for practitioners

The design of green spaces should be included in any city planning due to its environmental and human health benefits (Stigsdotter 2014). Some municipalities throughout the world, such as London in the UK, have been very engaged in defining and promoting green spaces. Tools for green spaces are becoming abundant and are freely available to practitioners, planners, and decision-makers. For example, Parks of London developed a quality manual for green

spaces so authorities did not have to “reinvent the wheel”. This tool aims to help authorities and decision makers understand the importance of quality green spaces. The Green City Guideline is “an internationally targeted initiative that aims to provide practitioners and decision-makers with the essential information they need to understand and communicate the benefits of urban green space or more accurately green infrastructure” (de Roo and Roozen 2011, p. 4). The Canadian Institute of Planners (2012) has also developed the “Healthy Communities practice guide”, which recognizes the importance of green spaces for healthy communities.

Planners must work in collaboration with other municipal divisions to ensure that any new activities planned or actions taken by the municipality can be viewed from an environmental sustainability lens where green spaces are taken into consideration. Some municipalities, mainly in Europe, establish committees



St. Paul Street, St. Catharines. Photo by Eric Sehr via Flickr

of decision makers, planners, landscape architects, and municipal employees to examine these issues and outline recommendations, especially for new developments, before they are built. Public consultation is a great way to involve citizens and look at developments as more long term sustainable projects. This is the case for the Prudhomme development in the Town of Lincoln, where the public was consulted and developers designed a long-term vision that embraces intensification in order to protect green spaces. City staff, decision makers and even developers should be educated about the long term importance of green spaces for human health. Despite the pressure to guarantee tax-based funding for municipalities, intensification with the addition of green spaces can make a significant difference in attracting families in the long term (Stigsdotter 2014).

Conclusions

Green spaces should not be omitted in mid-sized cities because of their proximity to the rural environment. As shown in the literature, people tend to be busy and more sedentary, with few excursions to the rural environment. Increasing the amount of green spaces in MSCs can help enhance resilience, attractiveness, and the value of infrastructure. Municipalities, including small and mid-sized cities in the European Union are far more advanced in creating these types of infrastructures. Promoting these green spaces is valuable for several reasons, including human health benefits as well as sustainability of communities. As shown, there are many available options to improve, protect and create green spaces. While it is clear that MSCs often have limited budgets for such spaces, partnerships with community organizations and local committees can help support these actions.

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