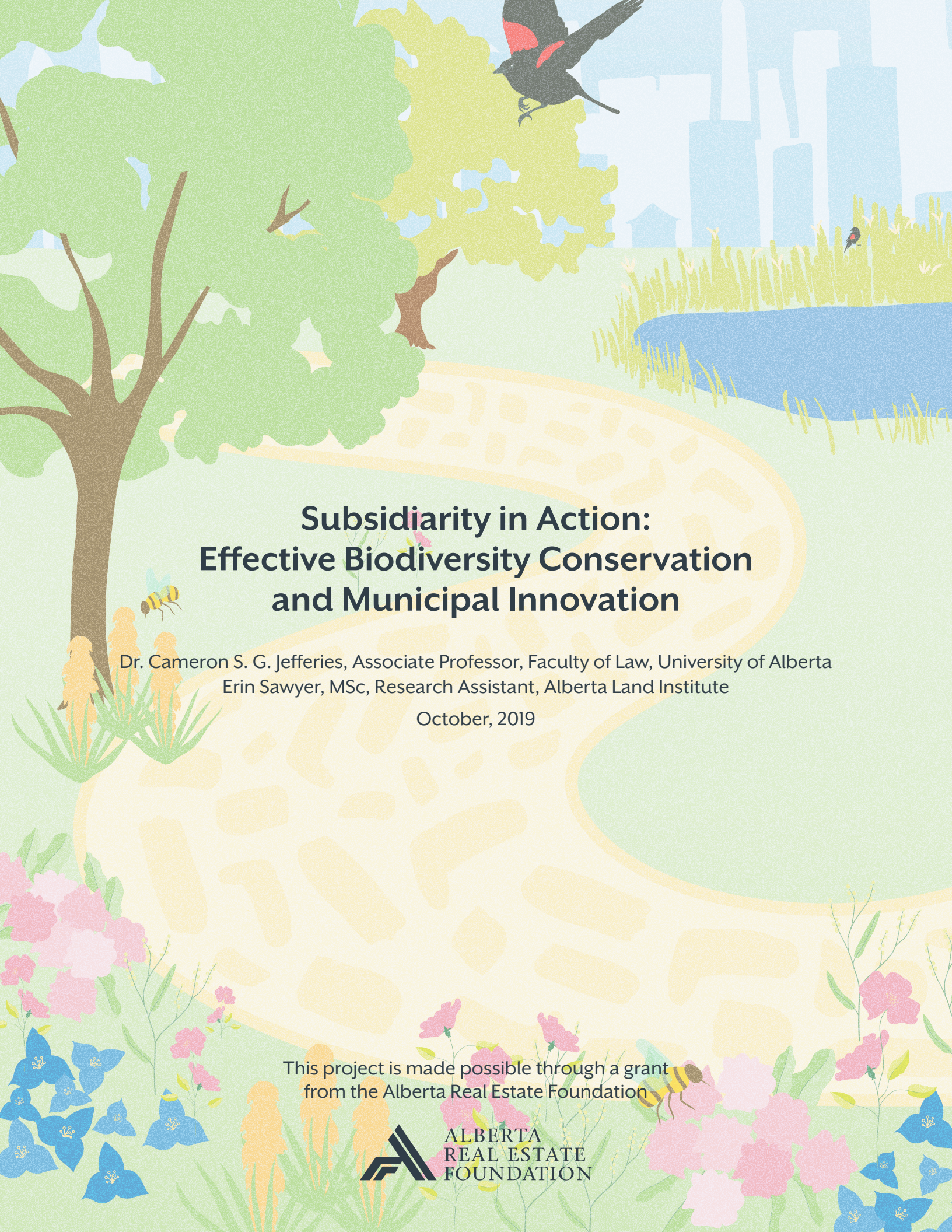

Subsidiarity in Action: Effective Biodiversity Conservation and Municipal Innovation

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EXECUTIVE SUMMARY

Humankind's current impact on Earth, and its life-supporting systems, is globally significant and unprecedented. Biodiversity — the variety of life that is found on Earth, the assemblages that this life forms, and the interactions that occur between living and non-living components of our world — provides essential services (e.g., climate regulation, pollination, flood buffering, water filtration, etc.) and influences our communities, culturally and socially. Globally, biodiversity is in crisis. Environmental pollution, climate change, habitat loss, and many other anthropogenic threats jeopardize both species and ecologically significant spaces. Rising to the challenges of contemporary biodiversity conservation requires action at all levels of regulatory authority: international, national, and sub-national.

This report examines the important contribution that municipalities can make to biodiversity conservation in Alberta where amendments to the *Municipal Government Act* empower, and indeed require, Alberta's municipalities to enhance their environmental protection efforts. An examination of these changes, assessed using the principles of subsidiarity, environmental governance, and biocultural diversity, reveals that municipalities, both large and small, urban and rural, can innovate with novel legal initiatives to improve their biodiversity-related conservation actions. Concurrently, while municipal innovation is possible, improving local biodiversity conservation action also requires innovations in funding, citizen engagement, and regional environmental governance. Municipalities are already recognized contributors to biodiversity conservation and great strides have been made at the municipal level to increase habitat connectivity. Current municipal conservation efforts need to be augmented to harness new statutory powers, capitalize on local knowledge and initiative, and enhance citizen education and engagement.

INTRODUCTION

WHAT IS BIODIVERSITY AND WHY DOES IT MATTER?

Humankind is the dominant species on Earth. Our resource extraction and development practices, production and consumption habits, and pollution and waste patterns now threaten our planet's life-supporting systems on a truly global scale.[1] Moreover, the pace and intensity of global change continues to accelerate such that we have now entered the geological age commonly referred to as the Anthropocene ("the human era").

One feature of the contemporary "New Earth"[2] is that there is no area of the planet—from the deepest ocean to the upper atmosphere—that has not been impacted, directly or indirectly, by human activity.[3] In other words, humanity may have lost "nature," in the purest sense of the word.

Our conceptualization of "nature" and the "natural world" is, of course, subjective and formed across blurred cultural, religious, and scientific lines.[4] Thus, nature, is difficult to define. To some, nature is synonymous with "Mother Earth"; to others, nature is a description of Earth's features and attributes and a wilderness untouched, or at least untamed, by human progress. One view is that the natural world and its systems should be conquered and ordered by socio-political intervention; a competing view is that nature is deserving of our respect and protection because it is intrinsically important. Situated somewhere between these beliefs is a compromise—a balance point—where humanity is able to benefit from nature but also respect the limits inherent to nature's systems and processes. Regardless of the view of nature one subscribes to, working to find this balance is incredibly important, given how dependent humanity is on the vast range of goods and services provided by nature: food, energy, building material, fresh water, clean air, medicine, biotechnology, flood mitigation, waste assimilation, and the list continues.

One term that is often associated with nature is biodiversity. Simply put, biological diversity is the variety of life that is found on Earth, the assemblages they form, and the interactions that occur between living and non-living components of our world. Legally, the seminal United Nations *Convention on Biological Diversity* (*CBD*) defines "biological diversity" as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."[5]

Biodiversity exists, and can be measured, at various scales.[6] For example, if you were to visit your favourite urban park, you might imagine the various species of fauna (animals) and flora (plants) that are found within the park's boundaries. The park itself might serve to protect or conserve one or more unique ecosystems[7] such as a pond, a wetland, a tree stand, or a field of native grass species. Each of these ecosystems is both influenced and characterized by the interactions between the biotic (living or once-living components) and abiotic (physical and chemical components) of that particular environment. Describing the park's biodiversity is a scientific exercise that will account for the number of genetically-related individuals found in a defined region (called species richness), the relative proportion of species in the region (called species abundance), or the genetic diversity within and between species. Beyond the boundaries of the municipal park introduced above, we can also conceive of the biodiversity scaled as larger units, which may be defined along human habitancy and political lines (i.e., cities, provinces, or countries) or biogeographical lines (i.e., ecosystems, bioregions, or ecozones).

Putting aside the technicalities of how biodiversity is defined and measured, it is clear that we are experiencing a biodiversity crisis. The *Global Assessment Report on Biodiversity and Ecosystem Services*, published in May 2019 by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), offers a sobering account of the state of the Earth's biosphere. According to the authors, the rate of global change to nature over the last 50 years is "unprecedented in human history" and is having a devastating impact on biodiversity; "an average of 25 per cent of species in assessed animal and plant groups are threatened," which corresponds to 1 million species facing extinction in the coming decades.[8] The extinction rate, the report notes, is already "tens to hundreds of times higher than it has averaged over the past 10 million years" and poised to accelerate further without action addressing the drivers of biodiversity loss.[9] The most significant direct drivers of biodiversity loss include "changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species."[10] These direct drivers "result from an array of underlying causes—the indirect drivers of change—which are in turn underpinned by societal values and behaviours that include production and consumption patterns, human population dynamics and trends, trade, technological innovations, and local through global governance."[11]

Canada is not immune to the biodiversity crisis. The last comprehensive review of the state of Canadian biodiversity, conducted by the World Wildlife Fund-Canada (WWF-Canada) and published in 2017, concluded that of the 903 monitored vertebrate species, 451 had declined during the review period (1970–2014) by an average of 83%.[12] The drivers of Canada's biodiversity loss are the same as those responsible for global declines; however, WWF-Canada observes that:

> Habitat loss is the greatest threat to species in Canada, including listed at-risk species, from forestry, agriculture, urbanization and industrial development. City growth has doubled in Canada over the last century, sprawling into and over habitat.[13]

Although bleak in their diagnosis and prognosis, both the IPBES and WWF-Canada reports provide a prescription for the sort of transformation to the status quo that is required to confront the biodiversity crisis. The IPBES authors emphasize the need for "concerted efforts fostering transformative change" that incents environmental responsibility, encourages integrated and cross-sector decision-making, preemptively avoids the destruction of nature, works to manage human and natural systems for resilience and adaptability, and strengthens environmental law and policy and its implementation.[14] The WWF-Canada report emphasizes the need to encourage broad public support for the "difficult resource allocation and land-use decisions that have a goal of benefiting nature at their core."[15] Importantly, it is critical to empower individuals and encourage individual contributions to collective and concerted action aimed at the next generation and to implement measures designed to protect biodiversity.[16]

Biodiversity loss is an environmental problem that transcends jurisdictional and political boundaries. At one level, it is an international dilemma that requires state to state cooperative action to curb the climate emergency and destructive resource extraction practices. At the next level, it is an issue of national concern that requires a strong federal response. Biodiversity loss is also a local issue that requires robust provincial and municipal effort. Canada continues to urbanize at a rapid pace; presently, 26.5 million Canadians live in a census metropolitan area, which is defined as an area with a population of at least 100,000 aggregated around a core of 50,000 or more.[17] In Alberta, 81% of the population lives in an urban environment, concentrated along the Edmonton-Calgary Corridor.[18] To many Albertans, nature is most commonly experienced as a combination of the green and blue spaces that form part of the urban landscape and the plants and animals that utilize these spaces as habitat.

Recognizing the local context in which many Canadians experience the natural world, the concept of subsidiarity, in which those closest to the issue at hand exercise regulatory authority over it, is explored more deeply in this study as a principle that should be embraced in Canadian biodiversity conservation efforts. In addition to formal regulatory authority exercised at the municipal level (i.e., bylaws), this study grapples with the principle of environmental governance, which looks beyond formal rule-making institutions to consider the importance of other actors (including citizens, corporations, and non-governmental agencies) and social structures (including politics, public education, and citizen engagement) and their respective roles in environmental management. Taken together, local biodiversity conservation that recognizes the importance of environmental governance may help foster a more sustainable relationship with the natural world in a manner that recognizes socio-ecological connectivity, invites nature into our built environment rather than excluding it, and encourages us to consider the diversity of life in accordance with the principle of biocultural diversity.

This report focuses on the important role that municipalities play in biodiversity conservation and highlights key transformations that are required at the level of local governance to foster resilient and biologically diverse landscapes—both human and ecological—in Alberta. This study builds upon recent contributions to the literature that have assessed Alberta's legislative framework in regards to the effects of urbanization on provincial biodiversity[19] and examined amendments to the *Municipal Government Act*[20] in the context of air quality and surface water management.[21] The critical *MGA* amendments that are central to this study were made between 2015 and 2017 and, in theory, grant Alberta's municipalities — both large and small, urban and rural — additional powers and responsibilities to safeguard and steward the environment. Even if the principle of subsidiarity does not take root, these amendments clearly create new environmental obligations that are severed from human-centered municipal authority. In reality, many municipalities struggle to find the financial and human resources as well as the political will or capital to make land-use decisions that conserve biodiversity within their borders. This study explores contemporary changes in local biodiversity conservation and encourages consideration of how municipalities, communities, and even individuals can better support and protect the nature and biodiversity found in our cities. It is clear that there is no panacea, no single bylaw or municipal policy, that can achieve the desired outcome of improved biodiversity conservation. Rather, this analysis concludes that subtle improvements in funding, governance, and citizen engagement are critical to realizing the transformative outcomes that are urgently needed.

Part I introduces the principles of biocultural diversity, environmental governance, and subsidiarity. These concepts are key to understanding how new thinking is guiding biodiversity conservation in urban settings and serve to lay the foundation for the exploration of Alberta's urban biodiversity conservation and inform the remainder of the analysis. Part II examines the scope and legal interpretation of the subsidiarity principle, how it has been operationalized in the EU, and the ways in which it can help justify municipal biodiversity conservation efforts. The remainder of the section introduces the land management, economic, and other tools presently available in Alberta to aid in conservation. Part III then examines the current state of municipal biodiversity conservation and opportunities for greater collaboration within Alberta. Part IV examines the relevant provisions in the revised *MGA* and *City Charter Regulations*[22] to provide guidance in their interpretation and implementation; examples of environmental bylaws are used to introduce innovative means by which municipalities can exercise their statutory power. Finally, Part V considers opportunities and challenges for growth in municipal biodiversity conservation and four key areas are identified for further exploration: environmental governance; measuring biodiversity; the value and costs of biodiversity; and citizen engagement. Case studies provide inspiration by outlining ways municipalities can expand their biodiversity programs through engagement with a broad array of actors, a thorough understanding of biodiversity indicators, and creative financing mechanisms. Concluding

findings and future questions outline next steps and study limitations. Appendix I aggregates and reproduces important legislative provisions that are discussed throughout this study. The research for this study was conducted between June, 2018 and September, 2019.

Endnotes

[1] J Rockström et al, "Planetary Boundaries: Exploring the Safe Operating Space for Humanity" (2009) 14:2 Ecology & Society 32; J Rockström et al, "A Safe Operating Space for Humanity" (2009) 461 Nature 472; Will Steffen et al, "Planetary Boundaries: Guiding Human Development on a Changing Planet" (2015) 347:6223 Science 736.

[2] See S Nicholson & S Jinnah, eds, *New Earth Politics: Essays from the Anthropocene* (Cambridge, MA: The MIT Press, 2016).

[3] Jedediah Purdy, *After Nature: A Politics for the Anthropocene* (Cambridge, MA: Harvard University Press, 2015) at 2-3.

[4] See Sandra Díaz et al, "Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services" (2019) at 2, online (pdf): *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* <www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf > [IPBES].

[5] *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, 31 ILM 818 (entered into force 29 December 1993) [*CBD*]. Other important definitions in the *CBD* include:
Ecosystem: "dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit."
Habitat: "the place or type of site where an organism or population naturally occurs."
Protected area: "geographically defined area which is designated or regulated and managed to achieve specific conservation objectives."

[6] See e.g. Richard M Gunton et al, "The meaning of 'scale'" in K Henle et al, eds, *Scaling in Ecology and Biodiversity Conservation* (Sofia, Bulgaria: Pensoft Publishers, 2014) 19; David Storch, Petr Keil & William E Kunin, "Scaling communities and biodiversity" in K Henle et al, *ibid*, 66.

[7] See *CBD*, *supra* note 5 at the definition of "ecosystem".

[8] IPBES, *supra* note 4 at 3.

[9] *Ibid* at 12-13.

[10] *Ibid* at 3. These factors are listed in order from most global impact to least.

[11] *Ibid* at 3-4.

[12] World Wildlife Fund Canada, "Living Planet Report Canada: A national look at wildlife loss" (2017) at iv, online (pdf): *World Wildlife Fund Canada* <assets.wwf.ca/downloads/WEB_WWF_REPORT.pdf> [WWF-Canada].

[13] *Ibid* at 6.

[14] IPBES, *supra* note 4.

[15] WWF-Canada, *supra* note 12 at 51.

[16] *Ibid*.

[17] Statistics Canada, *Canada's population estimates: Subprovincial areas, July 1, 2018*, Catalogue No 11-001-X (Ottawa: Statistics Canada, 28 March 2019).

[18] "Population Projections: Alberta and Census Divisions, 2019-2046" (3 July 2019) at 1, online (pdf): *Government of Alberta* <open.alberta.ca/dataset/90a09f08-c52c-43bd-b48a-fda5187273b9/resource/2ba84ee4-c953-457c-a8c7-351f6dd68abf/download/2019-2046-alberta-population-projections.pdf>; also see "Biodiversity Risk", online: *Government of Alberta* <www.alberta.ca/biodiversity-risk.aspx>.

[19] Sara Jaremko, "Legislative Frameworks for Urban Biodiversity, Ecosystems, and Wildlife in Alberta" (2018) Canadian Institute of Resources Law Occasional Paper 65.

[20] *Municipal Government Act*, RSA 2000, c M-26 [*MGA*].

[21] Judy Stewart, "Do Recent Amendments to Alberta's *Municipal Government Act* Enable Management of Surface Water Resources and Air Quality?" (2018) 55:4 Alta L Rev 1009.

[22] *City of Calgary Charter, 2018 Regulation*, Alta 40/2018; *City of Edmonton, 2018 Regulation*, Alta 39/2018 [together *City Charter Regulations*].

PART I: GUIDING PRINCIPLES

BIOCULTURAL DIVERSITY, ENVIRONMENTAL GOVERNANCE, AND SUBSIDIARITY

i. Biocultural Diversity

The Emergence of Biocultural Diversity

"Nature" is a subjective construct, informed by personal and socio-cultural experience. The principle of biocultural diversity (BCD) helps unpack our complex relationship with nature and biodiversity. BCD comprises the diversity of life in all its manifestations—biological, cultural, and social—and posits that all are interrelated within socio-ecological systems.[1] The concept was first put forth in 1998 by the International Society of Ethnobiology in the *Declaration of Belém*, which observed an inextricable link between cultural and biological diversity.[2] Originally framed as a crisis narrative in response to global concerns regarding the disappearance of tropical forests and fragile ecosystems, extinction of many plant and animal species, and the disruption of Indigenous cultures, studies of BCD emphasized the dual loss of local cultures and wilderness.[3] Out of these concerns, a global coalition for BCD was established which emphasized the historical continuity of Indigenous peoples' culture in relation to sustainable practices of living in the natural environment.[4] In 1992, the *CBD* identified the need to maintain biodiversity at the genetic, species and landscape scale, and formally acknowledged the importance of Indigenous peoples' biodiversity-related knowledge.[5] More recently, BCD has emerged at the intersection of different disciplines and knowledge systems, built upon the notion that humans are an intrinsic part of the natural environment and that human relationships with the environment are complex, diverse, and need to be understood on the basis of a range of social, cultural, economic, political, and ecological variables.[6]

BCD has been extensively explored in a European context, most notably in the recently concluded Green Surge project from the University of Copenhagen, which aimed to "identify, develop and test ways of linking green spaces, biodiversity, people and the green economy in order to meet major urban challenges."[7] Early BCD research acknowledged that the pace and scale of human activity was having a profound impact on the natural world, and focused on identifying and describing ecological hotspots and the negative impacts that human activity was having on the biodiversity and ecosystems found there.[8] This research influenced approaches to conservation that seek to reconstruct an idealized state of ecosystems where humans are seen as a threat to the remaining vestiges of a "pristine" environment.[9] This approach attracted criticism because it ignores the fact that people have been interacting with and shaping the natural environment in response to their material and non-material needs since time immemorial. Decades of work by ethnobiologists and ethnoecologists indicated that there are a variety of ways in which humans have maintained, enhanced, and created biodiversity through their practices of managing "wild" resources.[10]

In the 1990s, researchers began to acknowledge that the way we think, feel, and act regarding nature is fundamentally culturally determined.[11] Diversity of life is made up not only of plants and animal species, habitats and ecosystems, but also of human cultures and languages.[12] What matters most from the BCD perspective is the very diversity of adaptive tools deployed by human societies in relation to the environment, and the sustained intergenerational development and transmission of values, beliefs, knowledge, languages, and practices relevant to human-environment interactions.[13] In this form, BCD research aims to understand and support ongoing adaptations.

Geographically, BCD has been largely restricted to studying traditional ecological knowledge of Indigenous peoples and their role in the conservation of nature in developing countries.[14] More recently, however, BCD has been explored in the context of urban environments. Recognizing the importance of green space, nature, and biodiversity in fostering the overall health and wellbeing of people and communities, the focus shifted to the concern that in urbanized societies the opportunities to interact with nature are decreasing.[15]

Ecological consultant Ellen Woodley suggests that BCD can be supported implicitly (i.e., spontaneously) and explicitly (i.e., consciously pursued).[16] She proposes that the following conditions are required to successfully foster and implement BCD planning: strong local institutions; secure land and resource tenure; robust cultural identity; intergenerational connections; and an emphasis on the sustainable use and management of biodiversity for sustainable livelihoods, using traditional environmental knowledge in conservation planning, and collaborative partnerships that are focused on capacity building and have government support.[17]

Biocultural Diversity and Urban Environments

Urbanization contributes to the biodiversity crisis, but cities may also be part of the solution as urban environments can harbor surprisingly high biological richness.[18] The United Nations projects that by the year 2050, 66% of the world's population will be living in cities.[19] The *Florence Declaration on Heritage and Landscape as Human Values* (2014) recognizes that urban green areas can be considered a cultural landscape embodying a specific type of co-evolution between nature and culture.[20]

Human interactions with nature are dynamic and constantly evolving. People create a sense of place when they develop a relationship to a specific location that they live, work, or recreate in.[21] Many people in urban environments live without having close contact with nature. Environmental scientists Elands et al. warn of the "extinction of experience," arguing that with decreasing cultural interaction with biodiversity, attitudes towards nature-protection and pro-environmental behavior also decline.[22] This can create significant obstacles when attempting to implement laws and policies aimed at promoting biodiversity because such actions often require substantial support from urban societies.[23] Addressing the extinction of experience not only involves maintaining historical or traditional interactions but also the development of new and novel BCD interactions.[24] To this end, recent research has investigated how different people in urban environments value and interact with the natural environment.

Studying attitudes towards biodiversity in urban environments, ecology scholars Fischer et al. surveyed residents in five European cities.[25] Respondents were asked to rank photographs of four different types of urban greenspaces (park, wasteland, streetscape, and forest)[26] with varying degrees of biodiversity depicted (measured as low, medium, and high). The results indicate that people generally prefer more biodiverse greenspaces in urban environments. This study also revealed how various groups within the urban environment experience and value greenspace differently, and identified sociocultural groups that had previously been overlooked, such as dog walkers. Overall, individuals valued green space positively regardless of the city they lived in or their cultural background; however, between cities, park valuation differs greatly. Thus, the authors suggest that biodiverse urban development need to account for geographic differences that inform citizen preferences.

The Green Surge initiative produced a series of projects that explored different ways to link green spaces, biodiversity, people, and the green economy. In one study, researchers identified potential BCD indicators within urban environments. The following table summarizes examples of BCD indicators.

Table 1: Examples of the indicators of Biocultural Diversity (BCD), Adapted from Green Surge MS22

BCD Type	Indicator	Description/Rationale	Measurement	Methods/Data
Lived	Space usage–duration of visit	Presence of people increases the perception of safety and attractiveness of a greenspace	Time spent in urban green space	Survey; direct observation
Materialized	Biodiversity	Biodiversity in urban green spaces support a wide range of ecosystem services and represent a tangible opportunity for direct interaction with the natural environment	Biodiversity measures (e.g., number of species, presence of ecological key species, proportion of exotic species, etc.)	Field inventories, databases, citizen observations
Stewardship	Civic ecologic practices	Taking care of a greenspace creates a connection with place; sense of belonging and ownership, while also stewarding nature	Users gardening, watering, repairing, volunteering, foraging, weeding etc.	Observations; survey; interviews; participatory methods

The vitality of ecosystems and human communities are linked.[27] BCD research indicates that, generally speaking, people positively value green places and that the value and understanding of biodiversity varies across cultural and social experience. It is through the interaction with greenspace that people develop a bond with it, creating a meaningful place. Places that have meaning are more likely to be defended by members of the public.[28] Alberta is a large province with a diverse landscape that includes boreal forest, prairie grasslands, parkland, foothills, and mountains.[29] The municipalities that exist in all of these landscape-types are socially and culturally diverse, influenced by the dominant economic sector of their region and their own community's social and cultural traditions. It stands to reason then, that while biodiverse greenspaces and biodiversity-friendly management actions can help counteract our current biodiversity crisis, there is no one-size-fits-all approach and that each innovation presented in this study must be tailored to local conditions to maximize the chances of its success.

Canadian Cultural Perspectives of Landscape and Biodiversity Conservation

Urban and rural peoples' cultural perceptions of the environment are influenced by the physical features of their respective environments. For example, geography researchers Lutz et al. studied urban understandings of "wilderness" in urban and rural British Columbia.[30] They found that urbanites refer to landscapes as wilderness despite evidence of human activity (e.g., roads and hydroelectric dams). Rural residents generally label the same landscapes as non-wilderness.[31] Landscapes also encourage or discourage different types of conservation activity. While urban environments are more likely to

support infrastructure such as public transit, rural environments facilitate land stewardship activities like planting trees and restoring habitat.[32] How residents understand which activities constitute conservation—and the meaning they attach to that characterization—is culturally influenced.

The traditional land practices of Canada's Indigenous peoples also provide evidence of the influence of culture in environmental conservation. The Anishnaabe near Shoal Lake, Ontario are one of many Indigenous groups who use fire for forest succession management. Fires are "disturbance events," which release nutrients into an ecosystem and restart cycles of ecological growth. Frequent, small disturbances promote ecosystem functioning, while their prevention makes a forest vulnerable to "larger and potentially disastrous disturbances."[33]

The Anishnaabe's spiritual beliefs guide their landscape management practices.[34] They believe that the Creator provides every plant and animal on Earth for a reason, which are revealed through the generational transfer of knowledge or presented in visions. Because it cannot be foreseen which plants or animals will become useful, the natural abundance of the environment must be conserved. Burning is not seen as a permanent disturbance to the landscape but rather a way to reveal and maintain the diverse combination of plants naturally present. The Anishnaabe's burning practices deliberately follow natural processes like forest succession to avoid permanent change to the forest and encourage biodiversity at both the landscape and site level.[35]

Most of the provincial government's law and policy makers work in urban landscapes, and their cultural perceptions influence the way that high level conservation strategies are created, implemented, and enforced. When applied to different landscapes, these strategies may not have the effectiveness that was predicted. Furthermore, place-based cultural views, such as those expressed above, will affect the support that these strategies receive in any given community. Local governments have insight when creating conservation plans, as the actions they choose are more likely to be aligned with the cultural understandings of their residents.

ii. Environmental Governance

Governance is one of the most critical factors in enabling or undermining the effectiveness of environmental management.[36] In the broadest sense, governance is a social function centered on efforts to steer or guide the actions of human groups toward some desired end.[37] Governance is comprised of the "institutions, structures, and processes that determine who makes decisions, how and for whom decisions are made, whether, how and what actions are taken and by whom and to what effect."[38]

"Environmental governance" is a subset of the larger governance domain and is specifically engaged in steering human actions that involve natural resource use or ecosystem impacts.[39]

Global sustainability governance scholar Frank Biermann defines "environmental governance" as:

> The interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies toward preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development.[40]

As an inherently theoretical field of inquiry, environmental governance can sometimes be inaccessible to policymakers, managers, practitioners, and scientists.[41] To further complicate matters, concepts of "governance" and "management" are often mistakenly conflated.[42] The latter involves operational decisions about specific outcomes, whereas the former refers to the broader processes and institutions through which decisions that affect the environment are made.[43] In other words, "management" refers to resources, plans, and actions that result from the functioning of governance.[44] Environmental governance must also be distinguished from environmental regulation.[45] Environmental regulation, in a traditional sense, is primarily understood as command and control models and permissive regulation.[46] This type of environmental regulation encompasses the bulk of institutionalized environmental action to date, but its appropriateness in a modern context may be diminishing. Donald Ludwig, Professor of Mathematics and Zoology, suggests that "the era of management is over"[47] and that traditional systems and management approaches are "inappropriate for the complex problems that are most important today," including biodiversity conservation.[48]

Governance systems that are specialized to the treatment of environmental or resource concerns are generally known as "environmental regimes" or "resource regimes."[49] Some environmental regimes are constitutive in nature; they provide broad frameworks covering a range of human activities (e.g., legislation governing national parks), but they can also be issue specific, addressing matters like land-use at the local level, air pollution at the national level, or the depletion of the ozone at the international level.[50]

Governance questions are often expressed or represented as models that reflect the underlying assumptions of who should make decisions and how decisions should be made.[51] Environmental specialists Plummer et al. identify four key models of environmental governance: State, Market, Civil Society, and Hybridized forms.[52] Within the State model, the government is the main entity involved in governance. Decisions are made through formal political processes with emphasis on the legal/regulatory aspect. In the Market model, the state (government) facilitates market processes to varying degrees which mediate the interactions of corporations, private businesses, and citizens. Within this model, consumers and industries make choices with the environmental costs of production incorporated. The Civil Society model of governance sees citizens, non-governmental organizations, community, and stakeholders as the entities primarily involved in governance. Decisions are made, democratically with emphasis placed on broad participation, deliberation, consensus, public debate, and civil opposition. In the Hybridized Forms model, governance is a shared endeavour. Here, decisions are made in a multitude of ways, but some degree of power sharing is present. Modern environmental management includes the state sharing some power and allowing non-state actors to take on new roles and decision-making positions.[53]

Environmental governance generally, and the Hybridized form especially, recognizes that no single agent possesses the capacity to address the pressing, multidimensional, interdependent, and large-scale contemporary environmental challenges. Like ecosystems, environmental governance is characterized as a complex network of interconnected components, which when utilized effectively can support biodiversity conservation. Relevant actors include formal governments (at all levels), corporations, non-governmental organizations (NGOs), and individuals. The partnerships and linkages that are created can include co-management initiatives, public-private partnerships, and social-private partnerships.

This study explores environmental management at the local level. Importantly, and as identified in the Introduction, there is no single formal regulatory action that any level of government can take to resolve the current biodiversity crisis. Instead, a myriad of approaches is required. This study reviews the state of environmental governance in more detail through an in-depth examination of Canada's commitment to

the *CBD*. It remains unclear if sufficient effort has been made to engage all levels of government, industry, non-governmental organizations, and citizens in order to achieve Canada's commitment.

iii. The Principle of Subsidiarity

Subsidiarity is defined as "the principle that a central authority should have a subsidiary function, performing only those tasks that cannot be performed effectively at a more immediate or local level."[54] At its root is the idea that the state (i.e., the centralized authority) *should not* intervene unless and until it is necessary. In the governance context, subsidiarity reflects the notion that "the smallest possible social or political entities should have all the rights and powers they need to regulate their own affairs freely and effectively."[55] The concept was originally developed as part of the social thinking of the Catholic Church, introduced by Pope Leo XIII at the end of the 19th century and expanded by Pope Pius XI in the 1930s. In a contemporary context, the concept served as an organizing principle during the formation of the European Union (EU) through international agreement (i.e., the development of the *Maastricht Treaty*[56] and the *Treaty of Lisbon*[57]). Functionally, subsidiarity encourages and guarantees a certain level of independence by sovereign states within the EU while still permitting a reallocation of certain powers, including a law-making function, to a centralized authority when objectives cannot be achieved by states acting independently. Importantly, subsidiarity does allow for the centralized authority to exercise its legislative function when it is the lowest form of government with the competence and authority to address a matter.

As a federalist state, Canada features a constitutionally determined distribution of legislative powers between the federal and provincial governments. Municipalities lack constitutional status and, accordingly, are delegated authority by provincial governments. While less developed in Canada than the EU, subsidiarity offers useful guidance regarding the role of municipal action in Canadian biodiversity conservation efforts. The principle of subsidiarity was described by Justice L'Heureux-Dubé in *114957 Canada Lteé (Spraytech, Société d'arrosage) v Hudson (Town)* in the following terms:

> The case arises in an era in which matters of governance are often examined through the lens of the principle of subsidiarity. This is the proposition that law-making and implementation are often best achieved at a level of government that is not only effective, but also closest to the citizens affected and thus most responsive to their needs, to local distinctiveness, and to population diversity.[58]

Justice L'Heureux-Dubé's characterization of subsidiarity was informed by Justice La Forest's majority opinion in the earlier Supreme Court of Canada (SCC) decisions of *R v Hydro-Quebéc*, where he opined that "the protection of the environment is a major challenge of our time. It is an international problem, one that requires action by governments at all levels."[59] Justice La Forest's opinion also referenced a passage from the United Nation's *Our Common Future* report, emphasizing that environmental protection "should normally be done at the national level, with local governments being empowered to exceed, but not to lower, national norms."[60]

In view of the principles of BCD and environmental governance, municipalities in Canada are well-situated to operationalize the subsidiarity principle. Municipalities are positioned to both assess the biodiversity needs of local ecosystems and human communities, and to encourage the necessary conservation response. In accordance with Justice La Forest's reasoning, local measures can complement and improve, rather than supplant or undermine provincial and federal actions. Ultimately, this study endorses the role

that subsidiarity occupies in Canadian environmental governance and works to reveal how it can be operationalized in the biodiversity conservation context.

CONCLUSION

The principles of biocultural diversity, environmental governance, and subsidiarity, collectively and independently, inform the remainder of this study. The theme of biocultural diversity underlies many of the practical examples provided in this study. Biocultural diversity captures the idea that humans and nature, both of which are complex and diverse, are intricately interwoven and need to be examined from a range of economic, political, and ecological perspectives; thus, the varying methods put forth by municipalities in response to different biodiversity issues are also a study in biocultural diversity. From the governance perspective to implementing international biodiversity targets and the values that humans assign to nature, biocultural diversity plays a role in understanding how municipalities are able to address environmental issues.

Part II of this study examines the influence of the subsidiarity principle in Canada before examining how environmental governance and the principle have impacted European environmental policy. Furthermore, the subsidiarity principle occupies a key role in understanding the unique justifications for municipal intervention in biodiversity and environmental issues. Subsidiarity is also employed as a lens through which recent *MGA* amendments are analyzed, as discussed in Part IV, and the impact of the new grants of authority to municipalities for biodiversity and environmental conservation.

Environmental governance becomes a primary focus in Part V of this study where the challenges and opportunities for municipal biodiversity conservation are set out. Within the context of the *CBD* and the Aichi Biodiversity Targets, the principle of environmental governance is key to understanding how today's transboundary environmental issues cannot be addressed entirely through traditional centralized government action. Municipal action is a critical component of environmental governance, is in keeping with the subsidiarity principle, and will play a significant role in addressing the opportunities and challenges of biodiversity conservation.

The proceeding section of this study begins with an examination of the legal development of the subsidiarity principle in Canada and analyzes how it has been invoked in environmental governance in other jurisdictions. That analysis is then used as justification for local biodiversity conservation measures being taken in Canada. Part II concludes with a discussion of the legislative tools available to Alberta's municipalities within the environmental governance context.

Endnotes

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PART II: SUBSIDIARITY AND ENVIRONMENTAL GOVERNANCE IN ALBERTA

SUBSIDIARITY IN THEORY AND IN PRACTICE

i. The Emergence of Subsidiarity in Canadian Jurisprudence

As discussed in Part I, the principle of subsidiarity was broadly introduced to Canadian jurisprudence in the Supreme Court of Canada's 2001 decision in *Spraytech.*[1] While the SCC had previously alluded to key elements of the principle in describing Canada's federalist structure in the *Reference Re Secession of Quebec*, subsidiarity was never explicitly mentioned.[2] The definition ultimately provided by the SCC in the *Spraytech* decision, which was reproduced in Part I, has since been widely adopted and has resulted in calls for the creation and implementation of laws at the level of government that is closest to the people affected while still being effective.[3]

Although the subsidiarity principle was introduced in the opening paragraphs of the *Spraytech* decision, it was never referred to in the remainder of the judgment. However, Justice L'Heureux-Dubé, writing for the majority, did note that multiple levels of government will need to take action in order to deal with environmental issues and further recognized that the United Nations' *Our Common Future* report called for municipal governments to impose higher standards of environmental protection as compared to national baselines.[4] Furthermore, the SCC endorsed a previous decision that acknowledged municipal governments' decisions should be respected by courts when made within the boundaries of the authority conferred to them. Cumulatively, then, the impact of the *Spraytech* decision could reasonably have been construed as the SCC taking the first steps in creating a strong legal precedent for decentralized, municipal decision-making as a preferred response to local environmental issues, as endorsed by the subsidiarity principle. Ultimately, however, this approach failed to gain momentum and for almost ten years, the subsidiarity principle received limited judicial attention from the SCC when considering jurisdictional issues.[5]

In 2010, the SCC renewed its interest in the role subsidiarity plays in Canada's federalist structure in *Reference Re Assisted Human Reproduction Act*.[6] Unfortunately, as was the case with *Spraytech*, the *Human Reproduction Reference* was not a watershed moment for the subsidiarity principle. The SCC was divided four to four to one, both in its decision and in its preference for how the principle should be interpreted. Chief Justice McLachlin, writing for a group of four justices, advanced a narrow interpretation of the principle, which constrained the application of the subsidiarity principle to the instances where there was already overlapping jurisdiction. In such situations, Chief Justice McLachlin reasoned that "the level of government that is closest to the matter will often introduce complementary legislation to accommodate local circumstances."[7] The application of the subsidiarity principle with respect to the facts of *Spraytech* was justified in that the town had implemented stricter environmental standards that "complemented, rather than frustrated" federal standards.[8] In interpreting Justice L'Heureux-Dubé's decision, Chief Justice McLachlin came to the conclusion that "subsidiarity does not override the division of powers in the Constitution."[9]

The other group of four justices, with Justices LeBel and Deschamps providing the reasons, held a view that the principle could be more prescriptive:

> Canadian federalism sometimes requires the application of a principle of subsidiarity in the arrangement of relationships between the legislative powers of the two levels of government. According to this principle, legislative action is to be taken by the government that is closest to the citizen and is thus considered to be in the best position to respond to the citizen's concerns.[10]

In this way, the subsidiarity principle would "serve as a basis for connecting provisions with an exclusive head of power."[11] This approach does not, however, go so far as to give the principle the standing as a determinative factor in assigning power to a particular head of authority; rather, it is to function as an interpretive tool. The salient difference between the two interpretations is that Chief Justice McLachlin's approach would consider the subsidiarity principle only after a matter had been assigned to a particular constitutional head of power, at which point if there was overlapping jurisdiction the principle could seemingly be used as justification for stricter local standards whereas Justices LeBel and Deschamps endorse an approach that allows the principle to actively play a role in determining which head of power a particular matter is assigned to.

Since 2010's *Human Reproduction Reference*, the SCC has only returned to subsidiarity on one occasion—Justice Gascon's dissent in *Rogers*.[12] In *Rogers*, the SCC was considering whether a municipality could prevent a radiocommunications tower from being constructed on municipal lands. Given that the regulation of radiocommunications is under the exclusive jurisdiction of the federal government, a majority of the SCC held that the municipality's actions were unlawful, with Justice Gascon writing the lone dissent. Referring to subsidiarity as a "key principle underlying the division of powers,"[13] Justice Gascon framed the issue at hand as requiring consideration of whether the subject being legislated is something that should be dealt with federally or provincially in light of the principle. Ultimately, it remains uncertain which view from the *Human Reproduction Reference* Justice Gascon prefers, but the limited discussion of the subsidiarity principle in *Rogers* arguably favours the LeBel and Deschamps approach.

While the SCC has yet to take a definitive stance on the scope and role of the subsidiarity principle, recent Appellate Court decisions have considered the principle and added useful gloss. The Ontario Court of Appeal in *Canada Post* endorses the view that the principle of subsidiarity cannot change the Constitutional division of powers, however, it can be used as an interpretive aid.[14] The Court of Appeal did suggest that local authority should not be readily cast aside given the acceptance by the legal community that local decisions are "inherently valuable," a view which underlies the subsidiarity principle.[15] More recently, in the 2019 *Environmental Management Reference*, the British Columbia Court of Appeal took a position that echoes Chief Justice McLachlin's reasoning in the *Human Reproduction Reference*.[16] The BC Court of Appeal held the principle has no impact on the division of powers and that the principle had no application given the national interests at stake.[17]

Legal academics have also attempted to define the scope and standing of the principle in Canada. Prior to the *Human Reproduction Reference,* the principle's role may have been seen as limited to a close reading of *Spraytech* such that subsidiarity should be used to encourage local government to enact higher environmental standards where dual compliance is possible.[18] Following the *Human Reproduction Reference*, Professor Eugénie Brouillet argued that the principle could be used to better balance the distribution of powers.[19] The McLachlin approach, according to Brouillet, would only serve to reinforce Federal powers, whereas the broader interpretation of subsidiarity could be utilized to examine and answer issues of jurisdictional validity.[20] The broader approach to subsidiarity would be more in line with the approach taken by the EU, where the principle plays a key role in determining which level of

government has jurisdiction.[21] This approach has been advocated for elsewhere given the strong role the principle of subsidiarity has in determining preference for the distribution of power in other jurisdictions.[22]

In one form or another, the subsidiarity principle may represent a justification for enhanced complementary or independent municipal intervention in environmental issues, yet its application is not without criticism. In a general sense, a lingering concern with the subsidiarity principle centres around the fact that it is not well understood. This is especially true in North America, where neither politicians nor the legal community have to grapple with it regularly.[23] This is exacerbated in the Canadian context where the principle has received limited and somewhat divergent interpretations by the SCC. This lack of understanding also exists in jurisdictions where subsidiarity is more widely cited, including the EU where it is a long-standing governance principle that is regarded as part of the Union's fabric. Even here there is debate as to the proper interpretation of the principle that extends to consideration of whether or not subsidiarity is a legal principle at all.[24]

ii. Subsidiarity and Environmental Governance Operationalized

Subsidiarity is a broad and fluid concept. While it may seem, in theory, that subsidiarity suggests a definable allocation of responsibility, its practical implementation has proved far more challenging.[25] In the environmental context, there have been few Canadian examples of how the principle can be operationalized in environmental management or conservation efforts. Accordingly, it is helpful to examine other jurisdictions, particularly the EU, to gain a better understanding of how the subsidiarity principle has influenced the implementation of environmental management measures.

The EU provides an interesting case study for subsidiarity in action for two key reasons. First, the EU has a considerably longer history of interpreting and applying the subsidiarity principle to governance issues than Canada. Second, the EU and Canada both exhibit multi-layer governance structures. In any system where there is a division of power with areas of both exclusive and shared jurisdiction, there is likely to be some difficulty in maintaining a balance; the subsidiarity principle is one of the ways in which the EU and its member states maintain that balance.[26] Particularly in areas of shared competence, subsidiarity has been useful in answering the question of which government should exercise authority, not simply whether they are able to.[27]

In the environmental context, the balancing of power and the implementation of policy that has occurred within the EU loosely resembles the experience in Canada. In both the EU and Canada, the environment is an area of shared jurisdiction.[28] Despite this shared competence, environmental governance in the EU has become increasingly centralized since the 1990s, despite the existence of the principle of subsidiarity, which, to some, carries with it a presumption of decentralization.[29] Justifications put forward for the centralization of regulation over local environmental issues include the transboundary nature of the environment, the possibility for differing local responses to create trade barriers,[30] economies of scale that accompany centralized decision making, and the prevention of standard slashing by member states in an effort to better compete for industrial activity.[31] The goal, however, for centralized EU environmental governance is not unlike the articulation of the subsidiarity principle put forth by Chief Justice McLachlin in the *Human Reproduction Reference*; that is, the EU should create environmental policy as a means of "minimum harmonization," and individual member states should be left to create "more stringent environmental regulations."[32] In practice, this may take the shape of a minimum standard set by a centralized authority, whereas local governments take on a larger implementation and enforcement role.[33] This arrangement works to operationalize subsidiarity because it creates a uniform standard while

still allowing for local implementation measures that will better respond to local preferences and conditions.[34]

The European framework provides an example of how subsidiarity could guide the implementation of environmental regulation in Canada. Following SCC case law from *Oldman River,* where the environment was declared an area of overlapping competence,[35] to *Spraytech*, which first invoked the subsidiarity principle and established a role for municipalities in protecting the environment, it is evident that collective action will be required to address the "major challenge of our time."[36] As discussed throughout this study, the measures provided in the recently amended *MGA* are a key step towards the operationalization of the subsidiarity principle within Canadian environmental management. In addition, there are a number of practical justifications for why municipal governments should have a substantial role in environmental and biodiversity conservation, particularly in the age of climate change where the impacts will be unique to individual areas and local responses will be required to adapt to a particular set of circumstances.[37] These justifications are discussed in detail below.

iii. Justification for Municipal Biodiversity Conservation

At the core of the subsidiarity principle exists the idea that local governments, given their proximity to people and their community, should have a substantial role in creating laws and regulations that address issues unique to the local area or that can be addressed, at least in part, via a local response. The principle provides justification for the development of municipal action targeting biodiversity conservation. This justification is strengthened when considered in view of the impacts of urbanization on biodiversity.

Urbanization often occurs in areas that are considered rich in biodiversity. As municipalities in Canada continue to grow, urbanization's negative impacts on biodiversity, including habitat destruction, degradation, and fragmentation, worsen.[38] Expanding municipal footprints are and will continue to be a challenge facing biodiversity in Alberta, given the growth of the province's two major cities:

> Calgary grew 156% to 700km^2 between 1971 and 2011, with population increasing by 190%, losing "214 km^2 of arable land and 154 km^2 of natural and semi-natural land [to] settled area." In the same time period, Edmonton grew 220% to 1,094 km^2, with population increasing by 118%, losing "402 km^2 of arable land and 169 km^2 of natural and semi-natural land [to] settled area."[39]

In addition, as the assets and services associated with biodiversity degrade, municipalities and their citizens will be directly impacted as a result. However, the reasons justifying municipal action in biodiversity conservation are not limited to the mitigation of negative outcomes; there are also benefits to be gained from a municipal perspective in taking steps to preserve biodiversity assets.

Multiple academic studies have examined the benefits that should encourage local government to actively pursue biodiversity conservation. Biology scholars Donald Dearborn and Salit Kark discuss and summarize seven major motivations for urban biodiversity conservation:

1. To preserve local biodiversity in an urbanizing environment and protect important populations or rare species;
2. To create stepping stones or corridors for natural populations;
3. To understand and facilitate species' responses to environmental change;

4. To connect people with nature and provide environmental education;
5. To provide ecosystem services;[40]
6. To fulfill ethical responsibilities; and
7. To improve human well-being.[41]

These motivations fall along a spectrum, from conservation focused on nature's intrinsic value, such as the protection of rare species for the sake of the species, towards more anthropocentric rationales, such as the maintenance of ecosystem services.

The second motivation cited by Dearborn and Kark emphasizes connectivity of spaces, both outside and within a municipality to foster the creation of wildlife corridors. This outcome is particularly important in combatting the effects of land fragmentation caused by urbanization. The seventh motivation, which focuses on improving human well-being, emphasizes the role local biodiversity conservation plays in improving air and water quality, while also contributing to local character, pride, and stewardship.[42] Framed in this way, local biodiversity conservation initiatives that reflect social and cultural goals are essential to foster and sustain biocultural diversity.

There may also be a compounding effect associated with municipal efforts to conserve biodiversity related to citizen education and engagement. Some commentators suggest that integrating biodiversity with urban planning can generate additional support for conservation efforts because increasing the level of daily interaction with or exposure to nature will encourage citizen engagement.[43] Achieving a certain level of consistent interaction may also result in people feeling increasingly connected to the local environment,[44] which in turn increases support for biodiversity conservation amongst the general public. If environmental and biodiversity stewardship is an important aspect of our biocultural identity, then a variety of local actions tailored to community conditions are necessary for its maintenance and growth. Dearborn and Kark capture this justification in a manner that is in keeping with the subsidiarity principle:

> Different groups of people have different cultures and values and, hence, different legitimate motivations to conserve urban biodiversity [...]. Some cities may focus primarily on ecosystem services or human health, whereas cities in countries with a strong scientific tradition and resources may be the only ones to prioritize the research opportunities in urban ecosystems. Within any country, cultural traditions, financial resources, religious beliefs, and local environmental issues all will influence the goals of urban biodiversity conservation.[45]

Because of the different motivations and goals for conserving biodiversity, having measures prescribed at the local level, even if they are taken as a complement to provincial or federal legislation, will better ensure that the variety in values, issues, outcomes sought, and resources available will be accounted for. Ultimately, this is at the core of the subsidiarity principle: the ability of local government to respond to "the citizens affected and ... their needs, to local distinctiveness, and to population diversity."[46]

iv. Jurisdiction over the Environment in Canada

Environmental law encompasses the areas of law—including common law, constitutional law, and statutory law and regulations—considered by the courts or developed by the different levels of government to regulate activities relating to the use and management of the natural environment, its various components, and its ecosystem services.[47] Legislated environmental law is derived from and must

accord with each government's areas of authority. The federal and provincial government have generally responded to environmental issues by addressing the "points of pollution and major projects"—such as waste from pulp and paper mills impacting water quality and emissions from industrial plants impacting air quality–and have indirectly left municipalities to address "non-point issues" through land-use planning, such as aquifer conservation, land modification and urban sprawl, and the air pollution associated with vehicle congestion.[48]

Canada's provincial and federal governments are understood to concurrently possess the authority and responsibility to produce substantive environmental laws. The SCC has confirmed that legislative jurisdiction over the "environment" has not been expressly assigned to either the provincial or federal government,[49] and is instead "a diffuse subject that runs across many different areas of constitutional responsibility."[50] In response, environmental regulation often operates according to the principle of "cooperative federalism," whereby provincial legislatures and federal Parliament communicate, consult, and work together collaboratively—at least in theory.[51]

One weakness of cooperative federalism is that both levels of government may be reluctant to impose stringent environmental regulations due to the significant political costs associated with doing so.[52] For example, imposing additional restrictions on industry may run contrary to the economic interests of voting citizens in a particular region.[53] Consequently, each level of government may try to off-load its responsibility on the other. Viewed in this light, a cynical interpretation of the recent *MGA* amendments that authorize and perhaps demand municipalities to shoulder an enhanced responsibility to address environmental issues, are actually an attempt by the province to further download their environmental stewardship responsibilities.

Conversely, enhanced municipal authority within the cooperative federalism matrix may also enable local government to create more effective environmental initiatives that complement or enhance provincial and federal action.[54] Local knowledge is a fundamentally important determinant of a government's ability to innovate[55] because "[l]ocal regulation offers certain advantages over regulation by senior levels of government. Council can pass local legislation relatively quickly and are less likely to be beholden to special interests that may unduly influence provincial or national governments."[56] Within the context of the subsidiarity discussion above, the Government of Alberta is not only justified but perhaps should also be lauded for empowering municipal environmental stewardship through the amendments to the *MGA,* which are discussed in the following section.[57]

ALBERTA'S MUNICIPAL FRAMEWORK

In Alberta, the term "municipality" includes cities, towns, villages, summer villages, hamlets, municipal districts, and specialized districts.[58] Municipalities are governed by a council of elected officials, led by a chief elected official (mayor) or reeve. Municipalities perform a variety of functions at the local level and are responsible to the local community. They administer various services and programs, including the management of parks and recreation, overseeing police, fire, and emergency services, and directing the management of local transit systems. Municipal officials guide the growth of a municipality through planning and development policies and regulate local business activity within the municipality.

The *MGA* is the provincial statute that confers powers to Alberta municipalities. Enacted in 1994, the *MGA* establishes the legal framework within which municipalities are required to operate. Municipalities, unlike the federal or provincial governments, are not empowered by way of the *Constitution Act, 1867.* Instead,

the provinces, acting in accordance with their constitutionally designated powers, create municipalities and delegate authority to them.[59] Given the constitutionally defined division of powers between the federal government and the provinces, municipalities as creatures of provincial statute can only be delegated powers that the provinces themselves possess.

Part 1 of the *MGA* sets out the purposes, powers, and capacities of municipalities. Part 2 contains the bylaw making provisions under which municipal councils can enact laws to serve municipal purposes. Generally speaking, council is able to pass bylaws concerning a wide range of areas that affect the municipality including nuisances, transportation systems, business activity, public utilities, municipal services, animals, the safety, health and welfare of people, and the protection of people and property. These powers also allow municipalities to pass bylaws that can require a license, permit, or approval, and fees for these processes. The legislation also includes a mechanism for bylaw enforcement.[60]

i. Municipal Purpose

Sections 7 and 8 of the *MGA* authorize municipalities to pass bylaws; however, a bylaw passed under those sections must be passed for a "municipal purpose." These purposes are set out in section 3 of the *MGA*:

(a) to provide good government,
(a.1) to foster the well-being of the environment,
(b) to provide services, facilities or other things that, in the opinion of council, are necessary or desirable for all or a part of the municipality,
(c) to develop and maintain safe and viable communities, and
(d) to work collaboratively with neighbouring municipalities to plan, deliver and fund intermunicipal services.[61]

With one of those municipal purposes as the goal, bylaws, according to section 7, must concern one of the listed matters, which include:

(a) the safety, health and welfare of people and the protection of people and property;
(b) people, activities and things in, on or near a public place or place that is open to the public;
(c) nuisances, including unsightly property;
(d) transport and transportation systems;
(e) businesses, business activities and persons engaged in business;
(f) services provided by or on behalf of the municipality;
(g) public utilities;
(h) wild and domestic animals and activities in relation to them.[62]

Section 8 of the *MGA* subsequently sets out what form of action a bylaw may take as a municipal exercise of authority:

(a) regulate or prohibit
(b) deal with any development, activity, industry, business or thing in different ways, divide each of them into classes and deal with each class in different ways;
(c) provide for a system of licences, permits or approvals, […][63]

The bylaw provisions detailed above set out, in broad terms, a scheme for the exercise of municipal power where council can take a section 8 action in regulating a section 7 matter for a section 3 municipal purpose. Additionally, for the purposes of this study, it should also be noted that municipalities possess substantial land-use planning and development powers according to the provisions provided in Part 17 of the *MGA*.[64] Part 17 sets out the authority of municipalities to pass land-use bylaws that "prohibit, or regulate and control impacts of land-use and development on certain components of the local environment."[65]

ii. The MGA Amendments

Beginning in 2015, a series of bills were passed with the goal of modernizing the *MGA*. The amendments were developed in collaboration with municipalities and involved extensive public consultation. One of the key objectives of the modernization process was to provide municipalities with "the additional tools they need to maintain and build strong and sustainable communities."[66] While the Government of Alberta ultimately passed three bills, two are of particular note for this discussion. The first is the *Municipal Government Amendment Act*,[67] passed in 2015, which introduced Conservation Reserves as a mechanism by which municipalities can protect environmentally valuable land while providing market value compensation to developers and land owners.

The 2015 amendments also enabled municipalities to develop and pass a city charter with the consent of the Legislature. The creation of a city charter takes the form of legislative regulations passed by the Government of Alberta. In the case of the Edmonton and Calgary city charters, additional municipal purposes have effectively been added to the *MGA* for the purposes of those municipalities.

The second act, *An Act to Strengthen Municipal Government* [Bill 8], passed in 2017, resulted in the additional municipal purpose being included for all municipalities in Alberta. That amendment adds "(a.1) to foster the well-being of the environment" as a municipal purpose under section 3.[68]

The section that follows takes a more in-depth look at the tools available to municipalities in the biodiversity and environmental conservation context, including the recently implemented Conservation Reserve mechanism. In addition, Part IV of this paper undertakes a statutory interpretation exercise of two of the most important amendments to the *MGA*: the newly added municipal purpose in section 3(a.1) and the addition of the *City Charter* provisions included in Part 4.1. The goal of the statutory interpretation exercise is to further explore the basis from which municipalities can act in achieving biodiversity conservation. That is, what effect does the municipal purpose of fostering the well-being of the environment and the additional municipal purposes related to environmental protection for charter cities, in *MGA* sections 3(a.1) and Part 4.1, respectively, have on municipal biodiversity authority?

LEGISLATIVE POWERS: WHAT CAN MUNICIPALITIES DO?

There are a number of statutory mechanisms available to local governments for environmental conservation and stewardship. They can be conceptualized in two ways: 1) general land-use powers that can be used to encourage sustainable growth; and 2) specific powers that municipalities can use to take positive action to promote or preserve local biodiversity. Most of these tools are provided by the *Alberta Land Stewardship Act* (*ALSA*)[69] and the *MGA*. The *ALSA* is unique in Alberta in its regional approach to land-use planning for the seven watershed regions of the province. The *MGA* enables and empowers municipalities by delegating authority from the provincial government. It also supplies an operational

framework to guide municipal governments as they fulfill their purpose to "provide responsible and accountable local governance in order to create and sustain safe and viable communities."[70] This section will examine the statutory tools provided by the *ALSA* and *MGA*, and other pertinent legislation, in relation to the level of government authorized to use them.

i. Provincial Powers

Public Lands Act *Mechanisms*

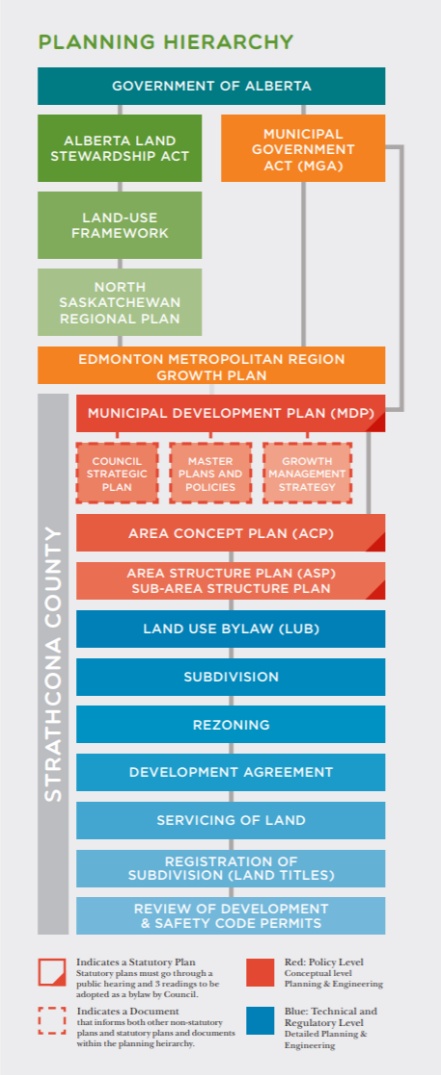
In addition to its high-level policy and legislative capabilities, the provincial government has environmental management tools available at local levels. The *Public Lands Act* (*PLA*) confirms the right, title, and interest of the Crown as owner of public lands.[71] The Act also regulates the use of public lands. In Alberta, the *PLA* is administered through government agencies, such as the Alberta Energy Regulator, to ensure that resource extraction (e.g., oil and gas activity) is conducted in a safe and sustainable manner.

There is debate as to whether the *PLA* applies to municipal lands. The potential application of section 3 is particularly contentious in the context of waterbodies within municipal boundaries. Section 3 grants the provincial government title to the beds and shores of all permanent and naturally occurring bodies of water, as well as all naturally occurring rivers, streams, watercourses, and lakes.[72] Some suggest that section 3 could be used to protect wetlands within municipal boundaries.[73] If these are provincial wetlands, local governments do not have the authority to develop or augment these areas without provincial approval. However, even if it was uncontested that section 3 applied to municipal waterways, there would be limitations to its protection. Municipalities would have to make an application to the provincial government to assess whether the local land in question was protected under the *PLA*. Without the municipality's initiation of this process, the waterways would not be protected.

ii. Regional Powers

There are two levels of regional organization that affect environmental planning at the municipal level: 1) *ALSA* watershed regions; and 2) Growth Management Board governed sub-regions, which are authorized under the *MGA*.[74] While *ALSA* regions cover every part of the province, not every municipality is subject to the oversight of a Growth Management Board. These forms of regional governance commonly provide general land management tools, rather than granting specific powers related to the environment. The graphic below illustrates the planning hierarchy. Note that municipalities outside a growth region would be required to develop intermunicipal development plans (discussed subsequently) at the growth plan step of the hierarchy (Figure 1, below, is specific to Strathcona County).

Figure 1: Strathcona County Hierarchy[75]



ALSA Regional Plans

Cabinet decides which watershed regions under the *ALSA* are required to develop a regional land-use plan. Currently, two of the seven regional plans have been created and approved with a third in the process of being drafted.[76] The plans must describe a vision for the planning region while also setting one or more objectives to achieve that vision. Both of the approved land-use plans recognize the importance of regional biodiversity conservation planning and have outlined related objectives.[77] For example, the *South Saskatchewan Regional Plan* commits to the development of a Biodiversity Management Framework to "help return Alberta to the levels of biodiversity found prior to European settlement."[78]

If there is a conflict or inconsistency between a municipal statutory plan or land-use bylaw and an *ALSA* regional plan, the regional plan prevails.[79] Plans adopted by Growth Management Boards under the *MGA* must also comply with *ALSA* regional plans.[80]

Conservation Directives

A conservation directive can only be used as part of an *ALSA* regional plan. The directive is an express declaration that prescribes land-use and can apply to public or private land. Compliance with the declaration is mandatory, even for private landowners.[81] The directive does not grant the issuing body an interest in the property; however, pursuant to sections 36 and 39 of *ALSA*, a landowner is entitled to seek compensation if the directive decreases the value of their land. Conservation directives are a recent development and have not previously been included in regional plans.[82]

MGA Growth Plans

Growth Management Boards can be created for any region upon the request of two or more municipalities, and are required by statute for the Edmonton and Calgary regions.[83] Growth Management Boards are able to create growth plans, which are long-term policy documents that outline objectives to achieve a planning vision for the region. Growth plans restrict local governments in some sense; for example, municipal statutory plans, bylaws, resolutions, and municipal agreements must conform with the growth plan. As well, any time that a municipality undertakes a public work, improvement, or structure, the action must conform to the growth plan.[84] Similar plans in other provinces have been interpreted generally as guides to future development, as well as creating permissible rather than mandatory action.[85]

This is an uncertain area of governance; however, if permissive, there are weaknesses in regional growth plan enforcement that are particularly relevant to environmental management. Biodiversity protection and preservation often require positive action to be effective, and the growth plan cannot compel municipalities to protect specific tracts of land. Furthermore, a municipality's failure to preserve biodiversity is unlikely to be in one of the forms enumerated under section 708.12(1) that are subject to the growth plan.[86] Any objective in the growth plan that requires positive action will only be successful through voluntary compliance, and will require initiative by and between local governments on the ground.

Furthermore, environmental management is commonly done through non-statutory plans such as Parks and Open Space master plans, which are not required to comply with regional growth plans.[87] Statutory plans will usually include environmental matters that are articulated as broad objectives or principles. These principles alone are typically not enough to achieve results envisioned in the growth plan.

iii. Municipal Powers

Statutory Plans

There are four types of statutory plans outlined in the *MGA*: intermunicipal development plans (IDPs); municipal development plans (MDPs); area structure plans (ASPs); and area redevelopment plans (ARPs).[88] IDPs represent the highest level of planning of the *MGA* statutory plans, and address future land-use for a given area involving multiple municipalities.[89] IDPs are also the only type of statutory plan required to address "environmental matters."[90]

MDPs are high-level planning documents through which municipalities articulate their vision, developmental strategy, and growth philosophy. They provide a foundation to guide the design and implementation of more detailed statutory plans. However, a municipality is generally not obligated to implement the MDP. Local governments have discretion as to whether the plans include environmental matters but are required address any future land-use changes. The aspects of an MDP that address land-

use must be consistent with any IDPs that apply to the same land.[91] Despite the discretional allowance, many municipalities do choose to incorporate conservation planning in their MDP.

In *Gruman v Canmore (Town)*, the Alberta Court of Queen's Bench found that as a procedure set out by council, citizens of a municipality have a reasonable expectation that the municipality will follow the provisions set out in the MDP.[92] This decision ran against the general principle that MDPs are not binding on municipalities, and raises interesting questions about the extent that municipal decisions must be consistent with the contents of the MDP.

***Gruman v Canmore (Town),* 2018 ABQB 507**

The case of *Gruman v Canmore (Town)* concerned the rezoning approval of a portion of land in the Peaks of Grassi neighbourhood in Canmore, Alberta. The land itself is a mixed coniferous forest with an area of limestone outcrop. One of the lots is adjacent to an environmental reserve. The applicant, an owner of land adjacent to the rezoned lands, sought an order invalidating Bylaw 2015-19, the *Peaks of Grassi Direct Control District Bylaw*. The amendment changed the zoning designation of three lots in the Peaks of Grassi area from Urban Reserve District to Direct Control District, Public Use District, and RIB Residential Single Use-Family Detached Plus District. Direct Control Districts are restricted by the *MGA*, in that the governing council is subject to other statutory plans as they regulate and control the use or development of the district.[93]

Canmore MDP provisions require an environmental impact statement (EIS) be submitted with a rezoning application when the development being proposed is within or adjacent to Environmentally Sensitive Areas (the Canmore equivalent of an Environmental Reserve). In these instances, the MDP requires an independent third party to evaluate the EIS. In this case, the lands were clearly adjacent to an Environmentally Sensitive Area. The Developer submitted an environmental report that was not a formal EIS, nor was it reviewed by a third party. Justice Gates stated that Canmore Town Council exercised its discretion both by including environmental matters in the MDP and by adopting a specific process for proposals where lands are within or adjacent to environmentally sensitive areas. While acknowledging that council should be afforded a significant degree of procedural autonomy, they cannot disregard their own legislative schemes.

The applicant had a reasonable expectation that council would follow their own procedures, and therefore council was required to afford a moderate level of procedural fairness. Additionally, Justice Gates found that the manner in which the EIS provision was disregarded "so devoid of the appearance of fairness that the administration of justice is brought into disrepute." The *Peaks of Grassi Direct Control District Bylaw* was invalidated.

ASPs provide a framework for the subdivision and development of specific areas of land. Unlike MDPs, ASPs are detailed and driven largely by developers and other actors in the private sector. They may also discuss matters related to reserves (e.g., conservation reserves or environmental reserves) if council deems necessary. ARPs are similar to ASPs but are specifically adopted for redevelopment areas. ARPs detail aspects such as objectives for the redevelopment area and strategies to achieve those objectives. Neither of these plans can be passed if they conflict with MDPs or applicable IDPs.

MDPs are the only statutory plan required by all municipalities. IDPs are required between municipalities who share a common border but are not governed by the same Growth Management Board. As

municipalities are not required to address "environmental matters" in MDPs, ASPs, or ARPs,[94] it is possible that they would adopt non-statutory plans to manage their conservation areas. Doing so would make regional biodiversity plans described in a growth plan difficult to enforce. However, many municipalities are choosing to include environment management plans in their MDPs, which makes enforcement of the growth plan more plausible.

Intermunicipal Collaboration Frameworks

Collaboration frameworks are required among two or more municipalities that share common borders. Municipalities adopt collaboration frameworks to guide the way that neighbouring municipalities provide intermunicipal services, steward scarce resources, and fund services that benefit their residents.[95] Though not directly related to conservation planning, these frameworks could feasibly be used to manage intermunicipal environmental goods and services, such as collaborative biodiversity management plans, and also to influence the development of environmentally sustainable IDPs.[96]

Land-Use Bylaws

The *MGA* requires municipalities in Alberta to pass a land-use bylaw.[97] Land-use bylaws regulate the use and development of the land and buildings in a municipality. A municipality must divide the land within its boundaries into districts that they deem appropriate in size. Then council must designate the "uses" permitted within each district. This process is known as zoning.

Landowners or developers must apply for a permit before beginning development.[98] The *MGA* requires that each municipality establish a development authority to decide development permit applications.[99] If the land developer does not comply or is not compliant with the permit that was issued, the municipality can issue a stop order. This power gives the municipality significant ability to enter the land and take any action necessary to carry out the order, including demolition or removal of the development.[100] Permits may be issued that do not comply with a land-use bylaw, but municipal council retains control over development officers who issue the permits.

Environmental Reserves

Environmental Reserves (ERs) are not primarily used for conservation purposes but can serve that function. Under the *MGA*, a municipality can, at the time of subdivision approval, require a developer to provide land (i.e., by title transfer) to the municipality or Crown that either threatens the physical integrity of the subdivision, that would result in development that could endanger people or property, or that is of potential value as either a natural feature or for pollution prevention benefits.[101] The transferred land is then designated as an ER. ER easements may also be created by mutual agreement between a landowner subject to a subdivision application and a municipality. ER easements can also provide protection and enhance the environment.[102]

ER designations cannot be removed. Land designated as ER is either left in its natural state or used as a public park. The *MGA* provides a process through which council can pass a bylaw to use ER land for other purposes, transfer the ER to the Crown, lease ER land for a limited term, or change the boundaries of an ER. Notice must be given, and a public hearing held before any bylaw can be passed.[103]

Conservation Easements

Conservation Easements (CEs) are the most commonly used tool under the *ALSA* legislation. CEs are utilized both independently and as a component of other programs, such as Transfer Development Credit Programs (examined below). They are an instrument that municipalities and private landowners can use

to protect and conserve environmentally valuable land, and unlike environmental reserves and conservation reserves, the landowner retains title to the land.

A CE is a voluntary agreement between a landowner (the grantor) and a qualified organization (the grantee) to protect the conservation value of an area of land. The landowner retains title and use of the land (subject to restrictions of the easement) and grants an interest in land to a land trust or otherwise qualified organization. Once negotiated, a CE is registered on title and all future owners are bound by the conditions.

A land trust is one of the most common grantee organizations that hold CEs. Land trusts are private, non-profit charitable organizations that acquire land for the purposes of conservation.[104] Land trusts can negotiate and register CEs with landowners. For example, the Edmonton and Area Land Trust has negotiated a CE with Parkland County across part of the Devon Dunes. The area includes a post-glacial dune field with a complex network of undisturbed wetlands that are habitat for waterfowl.[105]

While landowners generally enter into CE agreements for environmental preservation and protection purposes, there are also potential financial incentives. The Ecological Gift Program (EGP) (see below) provides a tax benefit to both individuals and corporations who donate "ecologically sensitive" lands. The benefits provided by the EGP are greater than the standard charity tax benefit that landowners receive for donating land to conservation initiatives. Compensation may also be negotiated in exchange for a CE. For example, the Cypress Hills Provincial Park management plan included the negotiation of CEs with private landowners adjacent to the park. The landowners were offered compensation based on a percentage of the fair market value for the land.

Ecological Gifts Program

Canada's EGP provides a tax benefit through the federal *Income Tax Act*[106] to landowners who donate lands or partial interests in land to a qualified recipient. To qualify, the lands must be donated in perpetuity and certified "ecologically sensitive." The designation can be made by the Minister of the Environment or a delegated authority (including the provincial government and certain environmental charities). Ecologically sensitive lands are those that currently, or may in the future, provide value to Canada's environmental heritage and biodiversity. Benefits include:

- For corporations: deduction of the amount of the gift directly from taxable income
- For individuals: value of the ecological gift converted to a non-refundable tax credit (rate of 15% for first $200, 29% of the balance)
- 10 year carry forward period for claiming donations

To date, CE agreements constitute more than 50% of all gifts of ecologically sensitive land.[107] If a landowner registers for the EGP through a land trust and then is deemed to have changed the use of the land from the conditions established in the CE, the land trust is penalized.

CEs can include both positive and negative clauses regarding land-use. Negative clauses restrict the activities a landowner can engage in on the specified land. Positive clauses require the landowner to perform certain actions. Clarity when negotiating the clauses and careful drafting are essential to ensure that the requirements of a CE are capable of being monitored and enforced. Clauses generally involve activities such as: drainage, cultivation, irrigation, grazing, tree harvesting, building, and sub-dividing. CEs are more common on natural grass lands and other natural areas than cultivated land.

CEs, as an agreement between the landowner who granted the CE and the qualified organization, binds all future landowners. Thus, amendments and termination can only be achieved by mutual agreement and renegotiation is only possible if both parties are willing participants. Additionally, amending or redrafting an agreement presents difficulties if the EGP was used in drafting the first agreement. The land trust can be penalized as much as 50% of the value of the tax benefit received by the original landowner.

Municipalities can hold CE agreements with private landowners. As part of an environmental stewardship program, CEs can help municipalities to preserve land valuable to local and regional biodiversity. Municipalities can accept donated CEs from landowners, purchase CEs from private landowners, or use CEs as a development planning tool. The *MGA* does not authorize municipalities to require a CE as part of a subdivision; however local authorities may require developers to implement measures that enhance conservation, and CEs are one possible tool that may be used to fulfil this requirement although this is unsettled.[108]

While CEs are typically negotiated in perpetuity, a term CE is possible under the existing legislation. Term or renewable easements are a potential area of innovation in the use of CEs, although the value of the land for a specified duration would be difficult to value.

Conservation Reserves

Conservation Reserves (CRs) are a relatively new tool introduced by recent amendments to the *MGA*.[109] Land may be designated as a CR during subdivision when it has "environmentally significant" features and does not qualify for ER designation. Municipalities are required to provide developers with compensation for the land covered by CR at a rate equal to fair market value at the time of application. Once land is designated as a CR, it cannot be sold or leased. The land may be disposed of if the features of the land are wholly or substantially destroyed by fire, flood, or any other act outside the municipality's control.[110]

CRs are authorized through the *MGA* and are therefore not available to land trusts or other organizations that may commonly use CEs. The conditions to use a CR designation are more specific and less flexible than those of CEs and municipalities may be hesitant to utilize this tool due to the cost of purchasing land from developers. Furthermore, if the CR designation is changed and the land is sold, the proceeds can only be used for purposes of conserving and protecting environmentally significant lands. Present council may be unwilling to tie the hands and finances of future council.

iv. City Charters: Tools for the Future

Recognizing the diverse needs and evolving capabilities of large urban municipalities in Alberta, the legislature amended the *MGA* to allow for the establishment of "city charters." Charters govern "all matters related to the administration and governance of the charter city, including, without limitation, the powers, duties and functions of the charter city."[111] Provisions of the *MGA* or any other enactment can be replaced, modified, or rendered non-applicable by charter provisions when the charter is approved by the Lieutenant Governor in Council.[112] The establishment of a charter does not affect the obligations of that city, nor does it affect the rights of the Crown of Alberta, except to the extent that the charter provides.[113]

Expanded Bylaw Powers

To date, city charter regulations have been passed for the cities of Edmonton and Calgary, which are piloting this initiative.[114] The regulations expand bylaw-creation powers, and grant council the authority

to pass bylaws for a number of environmentally related purposes, such as "environmental conservation and stewardship" and "the protection of biodiversity and habitat." In addition, the maximum fine council may impose for the violation of a municipal bylaw has increased substantially, from $10,000 to $100,000 for "egregious offenses."

Climate Change Adaptation Plan

Charter cities are required to adopt a Climate Change Adaptation Plan (CCAP) based on an assessment of the risk, exposure, or vulnerability of systems within the city to climate change.[115] Biocultural aspects are likely to play a role in determining how and which city systems are chosen for assessment, as well as the types of action taken to protect or enhance those systems.

CCAPs must consider the short, intermediate, and long-term effects of climate change, such as impacts on biodiversity. Actions to improve biodiversity management are explicitly listed and authorized under the CCAP scheme. As such, the plans are potential mechanisms for charter cities to organize and implement environmental conservation and stewardship policies or initiatives. The extent of the expectation that charter cities be consistent with their plans while carrying out decision-making and regulatory functions will determine the plans' effectiveness in fighting climate change at the local level.

v. Economic Mechanisms

Economic mechanisms are authorized by statute and may be put in place at multiple levels of government.[116] However, they are market-driven and therefore the nature of each mechanism's outcome will differ from those of the mechanisms described previously.

Transfer Development Credits

Transfer development credits (TDCs) are a tool that can be established through a regional plan or by municipal councils.[117] Implemented as programs for a given area, they provide the opportunity to identify and balance development in valuable landscapes by creating a financial incentive to build away from conservation areas. Communities identify parcels of land for either increased development or conservation. Development credits are assigned to each parcel of land within the designated area. Parcels in development areas are often called "receiving areas" while parcels in the conservation area are called "sending areas" because development potential is sent from one area and received by another, which generally results in increased allowable density for developers. In order to ensure that conservation work completed by one council is not undone by another, TDCs are often coupled with conservation easements to prevent any future development on the conservation parcels.

TDC programs can have a lengthy establishment process because approval by Cabinet is required. Alterations to council and provincial government regimes can result in changes to funding and approval requirements. Presently, there are two TDC programs in existence in Alberta. The Beaver Hills initiative has incorporated a multi-jurisdictional TDC system, and an ASP for the Carraig Ridge region of the Municipal District of Bighorn No. 8 incorporates both a TDC program and an associated CE as conservation mechanisms.

Conservation Offsets

Conservations offsets (COs) are a tool that can be used in to counter environmental losses caused by development. They have been defined as "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken."[118] Developers may

be required to create conservation gains to mitigate or offset development environmental impacts. The developer may choose to undertake a conservation offset project themselves or they may decide to purchase credits from a third-party as part of a conservation offset banking program. Offsets are only to be used after all appropriate mitigation and prevention measures have been undertaken. To gain credits, the benefits realized from the activity must be measurable and additional to those which would have occurred otherwise.[119] The goal of COs is to take a development that would likely have a residual negative impact on biodiversity and create a net zero or positive biodiversity impact at the relevant ecosystem scale. The Alberta Association for Conservation Offsets is working on the development and implementation of a CO system in Alberta. The group works with a wide variety of both private, public, and corporate partners, including Ducks Unlimited Canada, the Alberta Biodiversity Monitoring Institute, the City of Calgary, the Alberta Conservation Association, and Suncor.

CONCLUSION

The subsidiarity principle has a relatively short history in terms of its emergence in Canadian jurisprudence and application to environmental management; it remains an evolving area of study. While there are differing interpretations of exactly how to properly put the principle to work, the SCC's decision in *Spraytech* remains starting point for the application of subsidiarity in the context of this study as justification for municipal biodiversity conservation in a manner that is responsive to local conditions.

The *ALSA* and the *MGA* present a range of tools that Alberta's municipalities can employ to create, implement, and enforce their own systems of environmental and biodiversity conservation measures. However, the mere availability of such tools does not guarantee that municipalities will use them effectively, efficiently, or at all. In fact, TDC and conservation offset programs both require regulatory oversight to provide greater clarity on their application, which is currently lacking in the province. The next portion of this study considers the status of biodiversity conservation initiatives currently used by Alberta's municipalities, highlighting key strengths and weaknesses of various approaches.

Endnotes

[1] *114957 Canada Ltée (Spraytech, Société D'arrosage) v Hudson (Town),* 2001 SCC 40 [*Spraytech*].
[2] *Reference re Secession of Quebec*, [1998] 2 SCR 217, 161 DLR (4th) 385 [*Secession Reference*] ("[t]he federal structure of our country also facilitates democratic participation by distributing power to the government thought be most suited to achieving the particular societal objective having regard to diversity" at para 58).
[3] *Spraytech*, *supra* note 1 at para 3. This definition has subsequently been cited by the Supreme Court in *Canadian Western Bank v Alberta*, 2007 SCC 22 at para 45, and *Quebec (Attorney General) v Lacombe*, 2010 SCC 38 at para 109.
[4] *Spraytech*, *supra* note 1 at para 3; World Commission on Development and Environment, *Our Common Future*, UNGAOR, 1987, 42nd Sess, Supp No 25, UN Doc A/42/427.
[5] There was a reference to the principle in *Canadian Western Bank v Alberta*, *supra* note 3 at para 45, and recognition of subsidiarity as a principle of federalism in *Quebec (Attorney General) v Lacombe*, *supra* note 3 at para 119.
[6] *Reference Re Assisted Human Reproduction Act,* 2010 SCC 61 [*Human Reproduction Reference*].
[7] *Ibid* at para 70 [emphasis added].
[8] *Ibid.*
[9] *Ibid* at para 72.
[10] *Ibid* at para 183.
[11] *Ibid* at para 273 [emphasis added].
[12] *Rogers Communications Inc v Châteauguay (City)*, 2016 SCC 23 [*Rogers*].
[13] *Ibid* at 110.
[14] *Canada Post Corporation v Hamilton (City)*, 2016 ONCA 767 at para 84 [*Canada Post*].
[15] *Ibid* at para 85.
[16] *Reference re Environmental Management Act (British Columbia)*, 2019 BCCA 181.
[17] *Ibid* at paras 52, 104.
[18] Marguerite Moore "Throwing the Precautionary Principle to the Wind: The Green Energy Act, a Permitting Process in Search of the Precautionary Principle and the Principle of Subsidiarity" (2010) 74 Municipal & Planning L Reports Articles 58 at 88.
[19] Eugénie Brouillet, "Canadian Federalism and the Principle of Subsidiarity: Should We Open Pandora's Box" (2011) 54 SCLR 601 at 631.
[20] *Ibid* at 630.
[21] *Ibid*. See also *Treaty on European Union*, 7 February 1992, OJ C 325/5, (entered into force 1 November 1993), art 3(b).
[22] Dwight Newman, "Changing Division of Powers Doctrine and the Emergent Principle of Subsidiarity" (2011) 74 Sask L Rev 21 at 29.
[23] Gregory R Beabout, "Challenges to Using the Principle of Subsidiarity for Environmental Policy" (2008) 5:1 U St Thomas LJ 210 at 212.
[24] See Antonio Estella, *The EU Principle of Subsidiarity and its Critique*, (New York: Oxford University Press, 2001) at 74. Estella argues that the European Court of Justice has been reluctant to invoke the principle because subsidiarity is not a legal principle and to treat it as such would create a legitimacy problem for the Court (*ibid* at 167). In Canada, the courts have appeared to reach consensus on the position that subsidiarity is an interpretive legal principle. See e.g. *Human Reproduction Reference*, *supra* note 6 at para 273; *Canada Post, supra* note 14 at para 84.
[25] Eris D Schoburgh, "Is Subsidiarity the Panacea for Local Government Problems in the Caribbean?" (2010) 59:4 Social & Economic Studies 27 at 31.
[26] Josephine van Zeben, "Subsidiarity in European Environmental Law: A Competence Allocation Approach" (2014) 38 Harvard Environmental LR 415 at 415.
[27] *Ibid* at 417.

[28] Nicolas de Sadeleer, "Principle of Subsidiarity and the EU Environmental Policy" (201) 9:1 J of Environmental & Planning L 63 at 67. The environment is also an area of shared jurisdiction in Canada, see Justice La Forest's reasons in *Friends of the Oldman River Society v Canada (Minister of Transport*), [1992] 1 SCR 3 at 64-68, [1992] 88 DLR (4th) 1 [*Oldman River*].
[29] Van Zeben, *supra* note 26 at 417.
[30] *Ibid*.
[31] *Ibid* at 433.
[32] *Ibid* at 428-29. See also de Sadeleer, *supra* note 28 at 67.
[33] Van Zeben, *supra* note 26 at 430.
[34] *Ibid* at 431.
[35] *Oldman River*, *supra* note 28 at 64.
[36] *R v Hydro-Québec*, [1997] 3 SCR 213 at para 127, 151 DLR (4th) 32.
[37] Carolyn Poutiainen, "The Constitutional Implications of the Hudson Decision: Lessons for Adapting to the Health Effects of Climate Change in Canada" (2013) 18 Appeal R Current L & L Reform 139 at para 6.
[38] Charles H Nilon et al, "Planning for the Future of Urban Biodiversity: A Global Review of City-Scale Initiatives" (2017) 67:4 BioScience 332 at 332.
[39] Sara Jaremko, "Legislative Frameworks for Urban Biodiversity, Ecosystems, and Wildlife in Alberta" (2018) Canadian Institute of Resources Law Occasional Paper 65 citing Myla FJ Aronson et al, "Biodiversity in the city: key challenges for urban green space management" (May 2017) 15:4 Frontiers in Ecology & the Environment 189.
[40] Ecosystem Services are benefits that flow to human societies from the environment around them. The Millennium Ecosystem Assessment identified four categories of services: provisioning (such as food, fibre and timber), regulating (e.g. services that mitigate climate change, provide flood regulation and water quality), cultural (recreational, aesthetic or spiritual services) and supporting services (e.g. soil formation and photosynthesis). Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis*, (Washington, DC: Island Press, 2005) at v, online (pdf): <www.millenniumassessment.org/documents/document.356.aspx.pdf>.
[41] Donald C Dearborn & Salit Kark, "Motivations for Conserving Urban Biodiversity" (2010) 24:2 Conservation Biology 432 at 434.
[42] Esther Carmen, Allan Watt & Juliette Young, "Arguing for Biodiversity in Practice: A Case Study from the UK" (2018) 27 Biodiversity Conservation 1599 at 1604-1607.
[43] Nilon et al, *supra* note 38 at 332.
[44] Dearborn & Kark, *supra* note 41 at 434.
[45] *Ibid* at 338.
[46] *Spraytech, supra* note 1 at para 3.
[47] Judy Stewart, "Do Recent Amendments to Alberta's *Municipal Government Act* Enable Management of Water Resources and Air Quality?" (2018) 55:4 Alta L Rev 1009 at 1010.
[48] Howard M Epstein, "Subsidiarity at Work – The Legal Context of Sustainability Initiatives at the Local Government Level: How an Environmental Agenda Could be Advanced by Canadian Municipalities" (2009) Municipal and Planning Law Reports (Articles) 4th series as cited in Meinhard Doelle & Chris Tollefson, *Environmental Law: Cases and Materials,* 2nd ed (Toronto: Carswell, 2013) at 253.
[49] *Constitution Act, 1867*, 30 & 31 Victoria, c 3, reprinted in RSC 1985, Appendix II, No 5.
[50] *Spraytech*, *supra* note 1 at para 33 citing *Hydro-Quebec*, supra note 36 at 286, and *Oldman River*, *supra* note 28 at 63-64.
[51] *Rogers, supra* note 12 at para 85. Constitutional law expert Peter Hogg describes "cooperative federalism" as "a system of relationships between various political actors that allow for the continuous reallocation of responsibilities and resources" (Peter W Hogg, *Constitutional Law of Canada: 2012 Student Edition*, 5th ed (Toronto: Carswell, 2012) at 5-45 to 5-46.)
[52] William R MacKay, "Canadian Federalism and the Environment: The Literature" (2004-2005) 17 Geo Intl Environmental L Rev 25 as cited in Doelle & Tollefson, *supra* note 48 at 218.
[53] *Ibid* at 215.
[54] *Ibid* at 217.

[55] *Ibid* at 27.
[56] Cameron Jefferies & Eran Kaplinsky, "Municipal Governance and Innovative Shark Conservation Efforts: Problems and Prospects" in Peter Sankoff, Vaughan Black, & Katie Sykes, eds, *Canadian Perspectives on Animals and the Law* (Toronto: Irwin Law Inc, 2015) at 140.
[57] Alexis Bélanger, "Canadian Federalism in the Context of Combating Climate Change" (2011) 20:1 Constitutional Forum 21 at 27, argues that local action can serve as "veritable laboratories for the development of solutions adapted to local realities," which can, in turn, constitute a "priceless asset for sustainable development."
[58] "What is municipal government?" at "How are municipalities organized in Alberta?", online: *Alberta Urban Municipalities Association* <auma.ca/what-municipal-government>.
[59] *Constitution Act, 1867*, *supra* note 49, s 91(8).
[60] *Municipal Government Act,* RSA 2000, c M-26, s 8.
[61] *Ibid* [emphasis added].
[62] *Ibid*, s 7.
[63] *Ibid*, s 8.
[64] *Ibid*, ss 616-618.2.
[65] Stewart*, supra* note 47 at 1015.
[66] Alberta, Legislative Assembly, *Hansard*, 29th Leg, 3rd Sess, (2 May 2017) at 784 (Shaye Anderson).
[67] *Municipal Government Amendment Act*, 2015, 3rd Sess, 28th Leg, Alberta, 2015.
[68] Bill 8, *An Act to Strengthen Municipal Government*, 3rd Sess, 29th Leg, Alberta, 2017.
[69] *Alberta Land Stewardship Act*, SA 2009, c A-26.8 [*ALSA*].
[70] *MGA, supra* note 60 at Preamble.
[71] *Public Lands Act*, RSA 2000, c P-40 at s 2.1 [*PLA*].
[72] See Appendix I at *Public Lands Act*, s 3.
[73] E.g. Arlene Kwasniak, "Alberta Crown Ownership of Slough/Marsh Wetlands" (2007) 18 J Environmental L & Practice 57.
[74] See *MGA, supra* note 60 at Part 17.1.
[75] Strathcona County, revised bylaw No 20-2017, *Municipal Development Plan* (13 June 2018), s 2.1. Reproduced with the permission of Strathcona County.
[76] *"*Land-use Framework: Regional Plans" at *"*Lower Athabasca Region" and *"*South Saskatchewan Region", online: *Government of Alberta Environment & Parks* <landuse.alberta.ca/REGIONALPLANS/Pages/default.aspx>.
[77] See *Lower Athabasca Regional Plan 2012-2022*, (1 September 2012) at 24, online (pdf): *Government of Alberta Environment and Parks* <landuse.alberta.ca/RegionalPlans/LowerAthabascaRegion/Pages/default.aspx>; see also *South Saskatchewan Regional Plan 2014-2024*, (as amended 31 May 2018) at 39, online (pdf): *Government of Alberta Environment & Parks* <landuse.alberta.ca/RegionalPlans/SouthSaskatchewanRegion/Pages/default.aspx> [*South Saskatchewan Regional Plan*].
[78] *South Saskatchewan Regional Plan*, *supra* note 77 at 56. Note that neither the South Saskatchewan nor the Lower Athabasca Biodiversity Management Frameworks are in effect, despite finalization of the regional plans in 2014 and 2012, respectively ("Status of Biodiversity Management Frameworks in Alberta" (25 July 2018), online: *Land Use Planning Hub* <landusehub.ca/status-of-biodiversity-management-framework/>). The frameworks were due in 2015 and 2013, but completion was deferred to 2018 (see *ibid; Land-Use Framework Regional Plans Progress Report: A Review of Our Progress,* (2016) at 8, 13, online (pdf): *Government of Alberta Environment & Parks* <landuse.alberta.ca/LandUse%20Documents/Progress%20Report%202016%20-%20Final%20PDF.pdf>).
[79] *MGA, supra* note 60, s 638.1.
[80] *Ibid,* s 708.15.
[81] Conservation directives are the only non-voluntary mechanism available under *ALSA*.
[82] "Conservation & Stewardship Tools" (2019) at "Conservation Directives", online: *Government of Alberta Environment & Parks* <landuse.alberta.ca/ConservationStewardship/ConservationStewardshipTools>.
[83] *MGA, supra* note 60, s 708.02(1.2).

[84] *Ibid,* s 708.12(1). Note that section 708.12(1)(a) states that a municipality cannot undertake a public work, improvement, structure or other thing;" [emphasis added]. Our research indicates that the definition of "other thing" remains ambiguous.
[85] See e.g. *Old St Boniface Residents Assn Inc v Winnipeg (City)*, [1990] 3 SCR 1170, [1990] SCJ No 137 [QL]. Statute required Council to act in conformance with development plan for the Greater Winnipeg region; Sopinka, J wrote at page 1200 that the statutory definition of the Greater Winnipeg plan shows that the Plan was not intended to alter zoning, but to guide future development and planning. At issue was an area that the Greater Winnipeg plan had designated as "potential park", which a developer sought to build a high-rise upon. Council passed a bylaw to change the land designation to allow the development, which was alleged to be in non-conformance with the Greater Winnipeg plan. The lower courts refused to overrule the Commissioner's decision that the rezoning was not contrary to the plan and found that the zoning decision conformed to the spirit of the Plan. The Supreme Court also deferred to the decision of the Commissioner. See also *Re Cadillac Development Corp Ltd et al and City of Toronto*, [1974] 1 OR (2d) 20, 39 DLR (3d) 188, which concerned the City of Toronto development Plan. Ultimately the Court found that where the Plan designated areas of high density, zoning bylaws for the same area prescribing lower density conformed with the Plan, as the Plan reflected permissions for Council to designate high density areas, not requirements. Note that the interpretation of development plan effect is highly dependent upon the wording of individual provincial statutes, and therefore the effect of Alberta's regional Growth Plans must be assessed in direct relation to the *MGA,* or *ALSA.*
[86] See *MGA, supra* note 60, s 708.12(1): i.e., a statutory plan, bylaw, resolution, municipal agreement, or other thing.
[87] See "What is a Land Use Plan?" at 6-9, online (pdf): *City of Edmonton* <www.edmonton.ca/city_government/documents/What_is_a_Land_Use_Plan.pdf>; see also City of St. Albert, *Parks and Open Spaces Management Plan* graphic at 5, online (pdf): *City of St. Albert* <stalbert.ca/uploads/legacy/documents/city/Parks-and-Open-Spaces-Management-Plan.pdf>.
[88] See *MGA, supra* note 60, ss 631-635.
[89] *Ibid*, ss 631(1) and (2).
[90] See *ibid*, s 631(2)(v).
[91] *Ibid*, s 632(4).
[92] *Gruman v Canmore (Town)*, 2018 ABQB 507.
[93] *MGA*, supra note 60, s 641(2).
[94] See *ibid,* ss 632(3), 633(3), 635.
[95] *Ibid*, ss 708.27, 708.28.
[96] See *ibid*, s 708.29.
[97] *Ibid*, s 639.
[98] *Ibid*, s 616(b). The *MGA* defines "development" broadly, including an excavation, building, or a change of use or intensity of use of land or a building.
[99] *Ibid*, s 624.
[100] *Ibid*, s 645(1).
[101] *Ibid*, s 664(1.1). Additional authorized reasons for creating an ER are listed under ss 664(1) and (1.1)(a-c).
[102] *Ibid*, s 664(2).
[103] *Ibid*, s 676(1).
[104] "Ontario Land Trust Alliance: Who We Are", online: *Ontario Land Trust Alliance* <olta.ca/who-we-are/>.
[105] "Eastern Parkland County Conservation Easement", online: *Edmonton and Area Land Trust* <www.ealt.ca/conservation-easements>.
[106] *Income Tax Act*, RSC 1985, c 1 (5th Supp).
[107] "Ecological Gifts Program" (8 May 2019), online: *Government of Canada* <www.canada.ca/en/environment-climate-change/services/environmental-funding/ecological-gifts-program/overview.html>.
[108] Guy Greenaway, "Conservation Easement Guide for Municipalities" (October 2017), online (pdf): *Community Conserve* <www.communityconserve.ca/wp-content/uploads/2017/05/Cons-Easement-Guide-for-Municipalities-_Oct-2017_Final.pdf>.
[109] *Modernized Municipal Government Act,* SA 2016, c C-24.

[110] *MGA, supra* note 60, s 674.1(2).
[111] *Ibid*, s 141.5(1).
[112] *Ibid*, s. 141.5(3).
[113] *Ibid*, s 141.9.
[114] *City of Calgary Charter, 2018 Regulation*, Alta 40/2018; *City of Edmonton, 2018 Regulation*, Alta 39/2018 [together *City Charter Regulations*].
[115] See Appendix I, *City Charter Regulations,* s 615.5.
[116] *ALSA*, *supra* note 69, ss 45-50.
[117] *Ibid*, s 48(2). Note that to be established by a municipal council or by multiple councils, the Lieutenant Governor in Council must give approval.
[118] Business and Biodiversity Offset Programme, "To No Net Loss and Beyond: an Overview of the Business and Biodiversity Offsets Programme" (Washington, Forest Trends, 2013) at 4, online: BBOP <https://www.forest-trends.org/wp-content/uploads/imported/bbop-overview-document_2012_v11_april-22_2013_web-pdf.pdf>.
[119] David W Poulton, "Biodiversity and Conservation Offsets: A Guide for Albertans" (2015), Canadian Institute of Resources Law Occasional Paper No 48, online: SSRN, DOI: http://dx.doi.org/10.2139/ssrn.2797396.

PART III: THE STATE OF BIODIVERSITY MANAGEMENT IN ALBERTA'S MUNICIPALITIES

As introduced in Part II, the *MGA* has been amended to, amongst other objectives, better recognize the role that municipalities play in promoting local environmental sustainability and prosperity.[1] Alberta's municipalities now have a responsibility to consider the well-being of the environment when implementing policy and planning future development. To better assess the impact of these amendments on biodiversity conservation, a review of biodiversity polices was conducted in Edmonton. This was complemented by interviews with municipal staff. The ecological networks in Edmonton were then examined in the context of a regional framework. Biodiversity policies from the cities of Spruce Grove and St. Albert and Strathcona County were reviewed for their focus on connectivity and inter-municipal efforts. A comparison between biodiversity policies and actions in Edmonton and Calgary highlights the challenges municipalities face when looking to conserve ecologically important spaces.

CONSERVATION INITIATIVES IN ALBERTA

i. City of Edmonton

The City of Edmonton has been recognized as a Canadian leader in biodiversity conservation. *The 2011 Sustainable Cities Ranking* by Corporate Knights ranked Edmonton first for ecological integrity and second overall amidst large Canadian cities.[2] Through its municipal plans, Edmonton has set a goal of achieving the highest standards of environmental preservation and sustainability, protecting 10% of its land as natural area, and doubling the urban tree canopy.[3]

Thanks to the vision of early city officials and residents, Edmonton's River Valley Park and connected ravine system is the largest municipally owned park in Canada and the fifth largest in North America.[4] The river valley covers 7400 hectares, and contains 22 major parks and over 150 kilometres of interconnecting trails.[5] In 1992, the *Ribbon of Green Master Plan* was developed to prioritize conservation efforts within the river valley and ravine system.[6]

Building on this history of conservation, in 2001, the city published *Conserving Edmonton's Natural Areas: A Framework for Conservation Planning in an Urban Landscape* in partnership with several local conservation organizations.[7] This framework is regarded as a turning point in the city's approach to conservation.[8] It emphasized a need for an integrated plan to translate the city's goals and policies for natural areas into a clear vision that balances future development and conservation.[9] The city aimed to integrate biodiversity management into the day-to-day business of local governance and established an Office of Biodiversity. The corporate structure of the city has since changed multiple times; the Office of Biodiversity no longer exists and municipal ecological planners are now dispersed among various departments. This dispersal means that they are better situated to ensure ecological connectivity is considered within all city departments, however, it also means that there may be no biodiversity champion at the management table.

Strategies and Plans

In 2007, the City of Edmonton adopted *Natural Area Systems Policy: C531*.[10] This policy guides decision makers to balance ecological and environmental considerations with economic and social considerations,

and requires ecological information to be included alongside planning and development applications. Conceptual maps identifying ecological linkages have been developed for new neighbourhoods, which helps focus discussions between planners and developers and promotes connectivity at the local level. Also developed in 2007, the *Natural Connections Integrated Conservation Plan* supports the policy and consists of a strategic plan, a biodiversity action plan, and a biodiversity report.[11] The *Natural Connections Strategic Plan* was completed in 2007 and lays out the strategy, approach and desired conservation outcomes—an ecologically functional connected network of natural areas.[12] Two years later, the implementation plan entitled *Natural Connections Biodiversity Action Plan* was finalized.[13] The action plan outlines roles, responsibilities, timelines, and performance indicators. The 2008 *Biodiversity Report* includes a review and assessment of Edmonton's biodiversity alongside an overview of its governance structure for biodiversity goals and tools, and opportunities for greater public participation in local efforts.[14] Indicators of success include measurements of structural and functional connectivity, the percentage of natural areas under effective management, and increased levels of biodiversity. To this end, a number of community organizations are involved in monitoring biodiversity with projects ranging from bird counts to fungal diversity databases to amphibian monitoring.[15]

Biodiversity Loss and Habitat Connectivity

Habitat loss is a major threat to global biodiversity.[16] As the human population increases, more land is required for agriculture, urban development, and forestry, resulting in habitat loss and a decline in dependent species.[17] As an extreme outcome, habitat loss can lead to extinction of both plant and animal species.[18] In Alberta, there have been significant losses to wetland and native prairie habitats.[19]

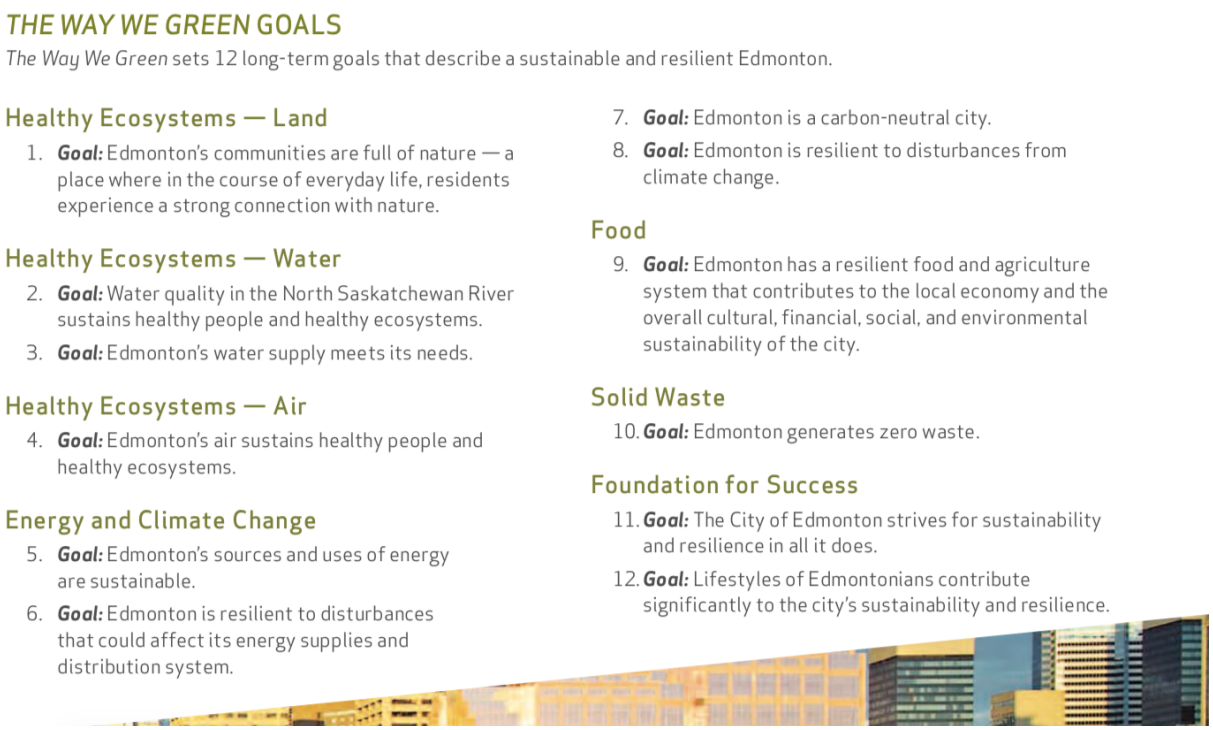
Habitat loss is exacerbated by the tendency of resource patches to become "ecological islands," which are natural areas surrounded by developed land and isolated from other patches.[20] This process is referred to as habitat fragmentation.[21] Fragmentation is related and yet distinct from habitat loss. Fragmentation refers not only to the loss of the original habitat, but also to the ongoing reduction in patch or fragment area, and increasing isolation from other habitat fragments.[22] In nearly all cases, habitat fragmentation leads to a loss in biodiversity.[23]

The "linkage strategy" has been developed as a countermeasure to habitat fragmentation. It aims to increase the connectivity between resource patches, thereby reducing the insular effect of fragmentation.[24] Though it is used broadly, the term "connectivity" generally refers to "the degree to which the landscape facilitates or impedes movement along resource patches."[25] A landscape's degree of connectivity is affected by factors such as distance and the biophysical nature of the land.[26] Furthermore, the sum of all habitat patches and linkages in a given area is referred to as an "ecological network".[27] Increasing the connectivity within and between ecological networks encourages the movement of local populations, which promotes dispersal, reduces inbreeding, and allows species to maintain niche habitats. This movement improves overall species resilience and enhances biodiversity in the larger landscape.[28]

Ecological networks are inherently transboundary and do not align well with jurisdictions of authority.[29] To effectively implement these networks, local governments must coordinate complementary conservation initiatives and land-use policies.[30] Without coordination, application of the linkage strategy may partially replicate the ecological island effect whose limits follow jurisdictional boundaries.

All these policies, strategies, and plans were reflected in Edmonton's 30-year environmental strategic plan developed in 2011. *The Way We Green* focuses on sustainability and resilience and lays out twelve long-term goals, a number of which address conservation matters including: Goal 1: "Edmonton's communities are full of nature—a place where in the course of everyday life, residents experience a strong connection with nature" and Goal 2: "Water quality in the North Saskatchewan River sustains healthy people and healthy ecosystems." With Goals 11: "The City of Edmonton strives for sustainability and resilience in all it does," and 12: "Lifestyles of Edmontonians contribute significantly to the city's sustainability and resilience"—Edmonton entrenched the concepts of sustainability and resilience into city planning. However, it remains unclear whether these concepts were fully embodied by city managers or if their inclusion simply mandated a cursory overview of the ecological and environmental impacts of projects prior to proceeding due to the perceived economic and social benefits. The full list of goals is included in Figure 2.

Figure 2: City of Edmonton "The Way We Green" Goals[31]



Prior to the development of the *Natural Connections Integrated Conservation Plan*, the City of Edmonton practiced conservation in a more ad hoc manner. Recognizing the importance of spatial connectivity, the city now looks at biodiversity using a systems approach where the concept of "ecological networks" is at the centre of conservation planning.[32] The idea of a "general systems theory" was established by biologist Ludwig von Bertalanffy in the early 20th century.[33] He defined systems as "entities composed of interacting parts."[34] Building on this early work, it was recognized that it was not sufficient to study the individual components of a system (a reductionist approach) conceptualizing a method of thinking that emphasizes the interdependence and interactive nature of the system was necessary.

Professor of Zoology Ken Norris defines a systems approach as one where "characteristics of one level of hierarchy are explored as emergent properties of processes lower down in the hierarchy."[35]

Environmental scientist Hartmut Bossel describes a complex web of interacting systems that can be broken down first into a network of component systems and then further into subsystems.[36] The health of the system is dependent on the performance and viability of all the interacting parts. Within the field of ecology, experts now recognize that social components should be considered alongside ecological components when assessing overall system well-being.[37]

Edmonton's *Natural Connections Integrated Conservation Plan* emphasized consideration of ecological systems and connections between natural areas within a planning area. Currently individual city departments and branches are responsible for including biodiversity protection into their planning.[38] This new approach has allowed the city to focus on identifying and protecting important areas that connect habitat when considering future developments or land purchases. This change in focus led to the design of neighbourhoods that include linked natural and open space, and developers have gone beyond this to include native species in the landscape design and wildlife-friendly lighting.[39]

Breathe, Edmonton's Green Network Strategy released in July 2016 changed the municipality's viewpoint on land in the city. It was the first-time open space and park planners worked together on a plan that lays out the intention to use land for its best purpose, keeping the central themes of wellness, ecology, and celebration front of mind and integrating parks and biodiversity thinking. The strategy is "a holistic approach to fostering a multifunctional, integrated network of open spaces within the city."[40]

In June 2019, the City of Edmonton released *ConnectEdmonton*—its new strategic plan for 2019-2028. This is a pared-down version of the previous plan *The Way Ahead* of which *The Way We Green* was one part. The guiding principle of the new plan states:

> We create a community to connect people to what matters to them.
> We care about the impact of our actions on our social, economic, cultural, spiritual and environmental systems. [41]

While the new strategic plan has Climate Resilience as one of its four strategic goals (along with Healthy City, Urban Places, and Regional Prosperity), neither biodiversity nor habitat conservation are listed among the goals or indicators. The city's new municipal development plan entitled *The City Plan* is due for release in 2020. City planners have identified several Big City Moves, one of which is "Greener as We Grow."[42] Feedback to date on "Greener as We Grow" outlines a goal to "increase and protect natural greenspaces for ecosystem integrity and education." It is unclear whether the new municipal development plan will build on the municipality's past work to facilitate biodiversity connections.

The natural areas within Edmonton, including those connected to the river valley, are under tremendous pressure "as a result of urban, commercial and industrial development, and many have already been degraded, fragmented, or lost altogether."[43] As far back as 2001, it was recognized that there was a tight timeline for securing natural areas important to the city and region.[44] It has been projected that by 2024, Edmonton will have secured or lost the remaining natural habitat within its borders.[45]

Conservation Initiatives

Edmonton's conservation efforts are constrained in part due to lack of authority over private lands, forests, and provincial and federal land.[46] Municipalities in Alberta are required to pay market price for land acquired for conservation purposes. As a result, in 1999 the city council allocated funds to a Natural Area Reserve Fund to assist in the acquisition of forests and wetlands. The fund, originally set at $250,000 per year, was increased to $1 million per year yet even this amount proved insufficient. So in 2008,

Edmonton's council approved a strategy to borrow additional funds to purchase natural areas using the reserve fund to repay the loan.[47]

The City of Edmonton has undertaken a number of biodiversity initiatives with local partners in Edmonton. The City of Edmonton is one of six founding members of the Edmonton and Area Land Trust (EALT), one of the only urban land trusts in Canada. The EALT acquires lands (primarily through donations from private landowners) and helps facilitate conservation easements to advance biodiversity protection in the Edmonton region. To date, the EALT has secured 11 natural areas in the region. These natural areas are conserved for the benefit of people and wildlife; low-impact activities such as hiking, bird watching, and nature photography are allowed on the sites.[48]

International Commitments

The City of Edmonton is a partner or member in many international conservation initiatives. Edmonton joined the International Council for Local Environmental Initiatives' (ICLEI) Local Action for Biodiversity Project in 2007 a ten-year commitment, which prompted the development of the *Biodiversity Report,* a *Communication Education and Public Awareness Plan*, and the *Natural Connections Biodiversity Action Plan*.[49] Edmonton is the sole Canadian member of the Biophilic Cities Network.[50] The city is also an original signatory to the *Durban Commitment,* an agreement that recognizes the link between biodiversity and human well-being and commits the signatories to protect and enhance biodiversity at the local level. To help evaluate and benchmark biodiversity conservation efforts, the city not only implemented the *Singapore Index on Cities' Biodiversity* (*SICB*) but was instrumental in creating the index. The *SICB* is a "self-assessment tool for cities to evaluate and monitor the progress of their biodiversity conservation effort against their own individual baseline."[51] The index consists of 23 indicators that measure both native biodiversity as well as ecosystem services provided by biodiversity. The index also examines governance and management of biodiversity and can be used to facilitate capacity building and assist in the development of conservation priorities. The year 2020 marks the ten-year anniversary of the index and the City of Edmonton will be joining other city signatories in undertaking a ten-year retrospective.[52] Interestingly, Edmonton chose to be so active in international organizations due to the lack of support at the provincial and federal level.[53]

ii. Connecting Conservation: Intermunicipal Biodiversity Planning in the Edmonton Region

Edmonton's *Natural Connections Biodiversity Action Plan* envisions "a system of conserved natural areas, ecologically and effectively managed, connecting the river valley with tableland natural areas, restored green spaces, and regional natural areas."[54] The city's existing ecological network includes the North Saskatchewan River Valley corridor and areas such as the Whitemud Ravine and Big Island.[55] There are eight core planning areas that will one day be connected with the corridor to form a city-wide ecological network: Big Lake in Lois Hole Centennial Provincial Park, the Whitemud and Blackmud Creeks, the Upper North Saskatchewan River Valley, the Central North Saskatchewan River Valley, the Lower North Saskatchewan River Valley, Horsehills Creek, Mill Creek, and the Southeast Edmonton Moraine.[56]

To create the envisioned ecological network, linkages must be established between the river valley and planning areas, some of which lay in the surrounding municipal region. For the linkages to be effective, neighbouring municipal governments must be willing to establish complementary biodiversity initiatives and land-use policies. This section reviews existing strategies and plans in the region to assess the degree

of intermunicipal collaboration present, which is necessary for the success of the Natural Connections ecological network.

Edmonton Metropolitan Growth Region

The Edmonton area is part of the North Saskatchewan *ALSA* region. However, the *North Saskatchewan Regional Plan* is still in development. Therefore, a growth management board called the Edmonton Metropolitan Region Board (EMRB) coordinates regional management for this area.[57] Pursuant to their mandate, the EMRB created the *Edmonton Metropolitan Region Growth Plan* (*EMRGP*), which was approved in 2017.[58] The *EMRGP* includes objectives designed to promote connectivity and alleviate the effects of fragmentation under the "Natural Living Systems" policy. These objectives include strategies to "conserve and restore natural living systems through an ecological network approach" and to "minimize and mitigate impacts of regional growth on natural living systems."[59]

To implement the Natural Living Systems policy, the EMRB will create the *Integrated Regional Open Space Master Plan to* outline a strategy that connects parks, open spaces, greenways, and trails across the Edmonton growth region.[60] Recently, an assessment of member municipalities' open spaces was completed in partnership with the University of Alberta.[61] The assessment provides baseline information to inform future work on the plan and other open space planning initiatives.[62] Overall, progress on the plan has not moved beyond the early stages of development since the *EMRGP*'s approval in 2017.

At present, municipalities are not compelled by the *EMRGP* to take positive steps to create ecological networks with their neighbours. The only real effect of the *EMRGP* is that municipal statutory plans, bylaws, agreements, and "[undertakings related to] a public work, structure or other thing" cannot be in conflict or inconsistent with the growth plan.[63] The *EMRGP* requires intermunicipal initiatives and cooperation to create the ecological networks envisioned in its Natural Living Systems policy. The *Integrated Regional Open Space Master Plan* may grant the EMRB more ability to compel positive conservation action from member municipalities, but the plan's implementation may be several years away.

City of Spruce Grove

Spruce Grove is a municipality located 11 kilometres from Edmonton and is home to approximately 35,000 people. Between Edmonton and Spruce Grove are two provincially-designated conservation areas: the Wagner Natural Area and Lois Hole Centennial Provincial Park.

Spruce Grove's *Your Bright Future: Municipal Development Plan* (MDP) sets environmental management goals for 2010–2020. Those goals include protecting and enhancing the ecological integrity of the community's environmentally significant and natural areas.[64] The MDP does not articulate strategies to increase connectivity between natural areas but does discuss efforts to integrate them into the parks and open space network described in the *Parks and Open Space Master Plan* (discussed below).

In 2011, Spruce Grove developed an *Environmental Sustainability Action Plan* (*ESAP*) that outlined goals for environmental management over the next decade.[65] The plan specifies that the protection and enhancement of biodiversity should guide policy development.[66] Spruce Grove adopted short- and long-term strategies for priority policy areas, such as land-use and natural areas management.[67] One such strategy was a biodiversity assessment. The *ESAP* does not identify the implementation of ecological networks as a strategy to achieve its biodiversity goals. The nearest reference made to ecological networks was the "open space network" to be created through the *Parks and Open Space Master Plan* (*POSMP*).[68]

However, the *ESAP's* open space network is described as a strategy to provide residents with access to green space, not as a strategy to protect sustainable natural areas.[69]

Unlike the *ESAP*, the *POSMP* does recognize landscape connectivity under the concept of ecological integrity but tends to focus on the protection and preservation of existing natural areas rather than creating or restoring linkages between them.[70] The *Parks & Open Space Master Plan* does suggest consideration of neighbouring municipalities' conservation approaches when developing the open space network but does not discuss working with neighbouring municipalities to develop collaborative plans.[71] The *ESAP* outlines a need for collaboration as one of its guiding principles but is vague in its reference to "formal and informal partnerships."[72] In the list of final recommendations, the plan does propose that the city develop strategic partnerships to achieve its environmental sustainability objectives.

In 2016, the Mayor's Task Force on the Environment conducted the *Mid-Process Review of the Sustainability Action Plan*.[73] The purpose of this review was to assess the success and progress of the initiatives, and to provide further direction to the Sustainability Department. At that time, the city's biodiversity assessment had not yet occurred but was scheduled to be conducted in 2017.[74] Upon conclusion of the assessment, the city planned to work with a focus group to develop a policy "that defines natural and/or ecological values, the benefits of protecting sustainable natural areas, and the city's role and commitment to protecting and affirming the status of these areas."[75] Intermunicipal efforts towards biodiversity initiatives were not mentioned in the review; however, the progress report did discuss collaboration in the context of watershed alliances as Spruce Grove is part of both the Sturgeon River Watershed Alliance and the greater North Saskatchewan Watershed Alliance.[76]

Strathcona County

Strathcona County lies east of Edmonton, bordered on the east by Elk Island National Park and extending north to the North Saskatchewan River. A substantial portion of the county's population lives in Sherwood Park.

Strathcona County's MDP operates in collaboration with other instruments, such as the county's *Strategic Plan*,[77] to present a vision for the municipality's future that demonstrates how everyday decisions can help achieve long-term goals. One of the "General Policy Sections" in the MDP addresses goals for the environment. This policy area has three broad objectives: 1) responsible use of the natural landscape; 2) restoration of disturbed natural systems; and 3) actions or initiatives that work toward creating a more environmentally responsible community.[78] Strategies to achieve the objectives include encouraging the restoration of wetlands, promoting actions or initiatives that highlight the importance of environmentally significant areas or biodiversity in the county, and encouraging intermunicipal programs that aid in the conservation of environmentally significant areas.[79]

The *2013–2030 Strategic Plan* is influenced by the MDP, and it sets clear goals relating to collaborative biodiversity initiatives.[80] Strathcona County's fourth objective under the *Strategic Plan* is to "ensure effective stewardship of water, land, air and energy resources."[81] Through this goal, the county will promote efforts to address threats to biodiversity. Though there is no explicit commitment under this goal to collaborate and cooperate with neighbouring municipalities to deliver biodiversity programs, there is capacity for recognition of this responsibility in the plan's definition of "environment," which includes areas "within and surrounding" Strathcona County.[82]

The fifth goal in the *Strategic Plan* articulates Strathcona County's plans to "foster collaboration through regional, community, and governmental partnerships" in order to improve land-use and resource

management planning. The objective recognizes that collaboration and cooperation will assist in delivering services to citizens and addressing "common issues that impact the success of the community."[83] "Services" used in this context may be broad enough to encompass environmental services, including those derived from biodiversity.

The *Strategic Plan* also sets goals for Strathcona County's continued protection of the Beaver Hills Biosphere.[84] The Biosphere encompasses 1572 square kilometres and includes Elk Island National Park, Miquelon Lake Provincial Park, the Cooking Lake-Blackfoot Provincial Recreation Area, the Ukrainian Cultural Heritage Village, and the Strathcona Wilderness Centre.[85] The Beaver Hills Biosphere was designated a United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve in 2016, which means that it is an area where solutions to reconcile biodiversity conservation and sustainable use are being promoted."[86] Over 20 organizations participate in the Beaver Hills Initiative undertaking research, conservation, and tourism activities related to the biosphere.[87]

The biosphere overlaps five different counties—Leduc, Camrose, Lamont, Beaver, and Strathcona—and therefore involves five different municipal governments. To coordinate policy, the Beaver Hills Initiative has created the Planners Working Group (PWG). The PWG includes representatives from the University of Alberta, Elk Island National Park, Agriculture and Agri-Food Canada, Alberta Tourism, Parks, and Recreation, and each of the municipalities.[88] The working group is an example of what extensive intermunicipal collaboration may look like. Participating municipalities have adopted complementary policies developed in coordination with the PWG. Strathcona County's *Strategic Plan* and their continued participation in the Beaver Hills Initiative are indicators of their awareness of the importance of biodiversity and maintaining ecological networks.

Strathcona County has collaborated with the City of Edmonton to build ecological networks. *The Joint Planning Study: Boundary Interface Protocols and Strategies* (*JPS*) is a document designed to facilitate collaboration between the two municipalities and to guide the development of strategies relating to topics such as land-use management and planning, the environment, and parks and trails.[89] The study's policy recommendations include protecting ecological networks and maximizing wildlife corridors.[90] Both local governments have committed to supporting the objectives, following the principles, and implementing the recommendations included in the *JPS*.[91] This document is remarkable as the lone example of explicit collaboration between the regional municipalities assessed and the City of Edmonton to create complementary conservation policy.

City of St. Albert

The City of St. Albert is located to the northwest of Edmonton. As of 2018, the municipality's population was approximately 66,000.[92] The Sturgeon River valley connects urban forest areas with other open recreation spaces. Lois Hole Centennial Provincial Park sits on the western edge of the city, with Big Lake as the park's dominant feature.

The city is currently working on a new municipal development plan, though the 2007 version remains in effect. The 2007 MDP clearly sets goals to improve linkages between natural areas, to protect natural areas, and to consider creating "manmade" natural areas in parts of the city where natural areas are lacking.[93] It does not set goals to collaborate with neighbouring municipalities to encourage ecological networks, but does demonstrate a commitment to collaboration with municipalities under the Capital Region Board (predecessor to the EMRB) to coordinate land-use, transportation, and other regional municipal services.[94] Strategies to achieve these goals include "protecting and preserving environmentally sensitive areas with neighbouring municipalities."[95]

St. Albert has also implemented an *Environmental Master Plan*, which is updated every five years.[96] The Environmental Advisory Committee submits an annual report to city council, which reviews progress made on the plan and provides recommendations on strategies to encourage environmentally sustainable practices and environmentally sustainable development plans. The *Environmental Master Plan* outlines nine goals that fall into four topic areas: air, water, land, and people.

The plan's fourth goal encourages the preservation and management of trees, parks, and natural areas. St. Albert has set targets to increase urban canopy cover and to protect three priority natural areas that exist in undeveloped areas of the city. These targets were explicitly set with the recognition that city programs can and should maintain biodiversity within the city, as well as landscape connectivity for wildlife.[97] A biodiversity assessment completed by the municipality recognized that:

> The preservation of trees, parks and natural areas, which include forested areas and bodies of water, also contribute to biodiversity. Biodiversity is the range in variety of plant and animal life in an ecosystem and is vital to that ecosystem's success. The components of an ecosystem— plants, animals, soil and water—are interconnected and dependent upon one another. Natural areas provide food, habitat and movement corridors for animals.[98]

The city acknowledged that municipal policy plays a significant role in developing landscape connectivity. Landscape connectivity was further legitimized and operationalized in the *Environmental Sustainability Policy*, which states the following: "The City shall [...] protect and restore City and regional ecosystems to maintain essential habitat and wildlife corridors to enhance biodiversity."[99] The *Sustainability Policy* also encourages collaboration on environmental initiatives through requirements that the city share environmental monitoring and reporting processes with other municipalities, and establish collaborative "partnerships" that will support the policy.[100]

To increase biodiversity, the city has implemented five specific subprograms. Three of these programs address management strategies of non-native species, while two are relevant to the development of ecological networks. The first of these relevant programs is the *Natural Area Conservation and Management Plan* (*NACMP*).[101] There are several types of natural areas within the city that are prioritized under the *NACMP* for protection, including treed areas (e.g., the Grey Nuns White Spruce Park and Forest Lawn Ravine); riparian areas near the Sturgeon River characterized by the presence of cattails and willows; and wetlands adjacent to Big Lake in the Lois Hole Centennial Park, such as the John E. Poole Wetland.

The *NACMP* makes several recommendations that serve to protect these areas. The plan advises the city to initiate proactive conversations with future developers of wetland supporting areas to have the land dedicated as an environmental reserve. The *NACMP* also suggests restricting development near the Carrot Creek Greenway and the flood line. Most significantly, the *NACMP* recommends the adoption of an Ecological Network Planning Framework, which would provide guidance to city development and outline goals to maintain connectivity between natural areas. The *NACMP* acknowledges the inherently cooperative nature of conservation initiatives and suggests that intermunicipal collaboration be used to achieve its biodiversity and conservation goals.[102]

The second program of relevance is the *Urban Forest Management Plan* (*UFMP*), which aims to enhance forest canopy cover within the city.[103] The goals of the *UFMP* are to design and manage an urban forest to create connected ecosystems, which will "maximize watershed health, biodiversity, and conservation

of sensitive ecosystems." The urban forest will also provide habitat for wildlife.[104] This policy approach shows how forest management can provide linkages within and between urban ecological networks.

St. Albert's policies prioritize biodiversity and endeavour to develop ecological networks both within and external to the municipality's boundaries. The *Environmental Master Plan* shows a willingness to collaborate with other municipalities to execute biodiversity initiatives, though specific partners are not identified.[105] The city has not explicitly considered connecting its networks with Edmonton's envisioned ecological system. One of the key planning areas identified in Edmonton's ecological network plans is Big Lake, which also features in St. Albert's *Environmental Master Plan* and therefore provides an opportunity for collaboration.

Overall Trends

Collectively, the municipalities surveyed here have identified biodiversity as an important policy objective and have, as a stated goal, the objective of increasing biodiversity within their municipal boundaries. St. Albert and Strathcona County articulated and emphasized intentions to create and maintain ecological networks for biodiversity purposes. Spruce Grove has alluded to the need for landscape connectivity, but has not included it as a strategy to achieve biodiversity outcomes.

Each municipality recognized the importance of collaboration in varying degrees. However, there were two apparent trends related to the application of collaboration in conservation initiatives. First, goals relating to intermunicipal collaboration were often general and not always linked to biodiversity targets. Second, municipalities rarely collaborated with the City of Edmonton for conservation purposes. This lack of specificity and collaboration may be indicative of the municipalities' reliance on regional entities to orchestrate conservation policy with the urban core.

Regional institutional structures offer useful forums to discuss collaboration initiatives, but relying on them to implement or develop policy without individual municipal action can be problematic. Specific tracts of land must be identified and protected, which is not always possible at high levels of policymaking. Vague or theoretical collaboration goals encourage flexibility but also allow municipalities to evade obligations to protect specific, naturally significant areas. The *JPS* document and the related agreement between the City of Edmonton and Strathcona County exemplify the way that complementary conservation policy should be negotiated at a local level, while also contributing to regional governance objectives.

iii. Biodiversity Conservation in Alberta's Urban Centres: A Comparison

Over the last decade, Edmonton and Calgary have acknowledged the importance of maintaining and restoring biodiversity within their boundaries. They have recognized the contributions that cities can make to better connect natural areas, despite their highly urbanized landscapes. Both municipalities are working to ensure that new developments consider connectivity throughout the planning process, while also examining ways to remove barriers to wildlife movement and increase habitat through naturalization in mature neighbourhoods. As well, both cities are now subject to the newly developed *City Charter Regulations,* which call on the urban centres to protect biodiversity and habitat.

Both cities have developed policies that address biodiversity. Edmonton's *Natural Area Systems Policy*[106] takes a broad approach and guides decision makers to balance ecological and environmental considerations with economic and social considerations. Biodiversity protection, conservation, and

restoration are addressed through the maintenance of ecological functions within the system of natural areas. In comparison, Calgary took a more direct look at biodiversity, adopting *Biodiversity Policy: CSPS037* in 2015, which guides biodiversity conservation decision-making and provide a basis from which municipal activity can be assessed.[107]

While both cities recognize the importance of biodiversity and the natural living systems that maintain it, interviews with experts in both municipalities indicate that it has proven difficult to overcome economic and political pressures to allow full implementation of the policies.

> In practice, we are not seeing the biodiversity policy having a significant effect on land-use decisions. We are more rigorous when it comes to identifying environmentally significant areas in planning policy [...], but ultimately, we end [up] protecting primarily lands that qualify as Environmental Reserve in accordance with the *MGA*. It has not yet resulted in any additional ability or political will to acquire lands for biodiversity purposes—land-use decisions are often driven by economic considerations.
>
> - Chris Manderson, Urban Conservation Lead, City of Calgary[108]

The City of Edmonton was an early signatory of the *Durban Commitment*, and the development of the *Natural Connections Integrated Conservation Plan* in the 2007–2008 period was a sign of this commitment. After releasing its ten-year biodiversity strategic plan, *BiodiverCity*, in 2015, the City of Calgary also became a signatory to the Commitment in 2016. *BiodiverCity* lays out Calgary's goals during the 2015–2025 period. These goals include the following:

- To evaluate the landscapes within Calgary and set targets for conservation measures to identify, protect and manage ecological cores and corridors;
- To restore 20% of Calgary's current open space to increase biodiversity; and
- To identify invasive species in the city's open space and complete strategies for their management.[109]

The recently developed *BiodiverCity Action Plan*—an implementation plan for Calgary's biodiversity strategic plan—outlines three program areas: ecological resilience, ecological literacy, and ecological planning.[110] This initial workplan lays out outcomes for each program area with a short timeline of 2018–2020 (to be expanded in the coming years).

Due to recent changes in Edmonton's governance framework and how biodiversity planning is situated within the framework, Edmonton has lost some of its important biodiversity outreach programs. The innovative Master Naturalist program recruited Edmontonians to promote biodiversity protection and awareness. The world-renowned training program fostered appreciation for the natural world and built a core group of citizen scientists. Unfortunately, this program no longer exists, and its loss results in a missed opportunity to engage and educate local biodiversity leaders.

On the other hand, Calgary seems to be embracing the citizen science model, as demonstrated by the recent launch of "Calgary Captured." Calgary Captured asks citizen scientists to identify wildlife whose images are captured by motion activated cameras in the city's open spaces.[111] The program will help the city better understand local biodiversity and its relative abundance. In addition, Calgary has partnered with the Miistakis Institute and other local organizations to provide the Call of the Wetland program. This program calls on the public to monitor amphibians within the city, recognizing that amphibians are an important indicator of wetland health.

Since 2010, Edmonton has been promoting smart transportation design that considers wildlife movement. The *Wildlife Passage Engineering Design Guidelines*[112] have led to the creation of 28 wildlife passage structures, with an additional four under development, and this initiative is associated with a correlated 51% reduction in wildlife collisions in the city.[113] Calgary does not yet have wildlife passage guidelines in place, but a recent study conducted by the city examined means to reduce animal-human conflict on transportation corridors.[114] An economic assessment of the costs of wildlife strikes has also been undertaken and the results will hopefully help build the case for improved wildlife crossings in Calgary.

In interviews, representatives from both cities expressed some frustration in regards to the recent *MGA* amendments. While good in intention, the creation of Conservation Reserves does not provide municipalities with any financial or policy instruments to conserve land within their boundaries. The requirement that municipalities pay market value for properties that are considered ecologically significant is prohibitive to most due to tight fiscal budgets. Municipalities have also expressed a need for greater clarity regarding the language within the *MGA* that specifies they should "foster environmental well-being" while not providing any financial tools to do so.

> ER [Environmental Reserve] has not significantly changed under the *MMGA*.[115] It is still the most effective tool for conservation as it is [land] taken without compensation, but it is not a true conservation tool, it's really aimed at "hazard" lands that should not be developed. Conservation Reserve provides a means to take lands that have ecological value, but effectively won't be used due to the need to purchase the land.
>
> - Chris Manderson, Urban Conservation Lead, City of Calgary[116]

> I don't see that the changes in the *MGA* nor Big Cities Charter [the *City Charter Regulations]* enable cities to conserve important landscapes. We can and have used our natural person powers to borrow money to buy land. The Conservation Reserve provisions in the *MGA* are useful but, thus far, the general feeling with colleagues throughout the province is that it would provide minimal utility. Having to pay for conservation land within 30 days of subdivision doesn't seem feasible operationally. It takes time to appraise the value of the land—probably more than 30 days—and in periods of high growth, most municipalities won't have reserve accounts large enough to pay for land. Also, a landowner could hold off on subdividing certain parcels until the land prices reach the full developed land values—particularly in the large cities.
>
> - Grant Pearsell, Director, Urban Analysis, City of Edmonton[117]

Biodiversity awareness is growing in Alberta's urban municipalities. While Calgary and Edmonton are taking steps to ensure ongoing conservation of natural areas, efforts continue to be challenged by economic and political constraints.

Endnotes

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[9] *Conserving Edmonton's Natural Areas*, *supra* note 7 at 6.
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[14] *Biodiversity Report*, supra note 8.
[15] *Ibid* at 57-88.
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[17] *Ibid* at 1248.
[18] *Ibid.*
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[26] Taylor et al, *supra* note 21.

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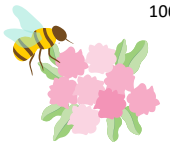

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PART IV: INTERPRETING THE ENVIRONMENTALLY FOCUSED *MGA* AMENDMENTS

This section examines the impact of the recent amendments made to the *MGA*[1] to illuminate the anticipated effects on municipal bylaw authority and jurisdiction over the environment.[2] To accomplish this, the phrase "foster the well-being of the environment," added as a municipal purpose under section 3(a.1) of the *MGA,* is analyzed using the accepted approach of statutory interpretation—the process through which the statutory language is explained and applied. Next, key provisions of the two *City Charter Regulations,*[3] recently enacted by the Government of Alberta that apply specifically to the cities of Edmonton and Calgary, are examined to consider how the bylaw-making powers of these municipalities differ from those operating under the general *MGA* provisions. Specifically, section 4(2) of these regulations, which adds new municipal purposes, is interpreted to consider how this provision may expand Edmonton and Calgary's bylaw-making authority beyond the authority of other Alberta municipalities. Together, these amendments are significant from the municipal biodiversity conservation perspective because they create new, additional sources of authority for environmentally-focused municipal action. Further, unlike other sources of municipal authority that have been used in the past to justify environmental action, these are environment-focused and do not require human-centric pretext.

Building upon this analysis, this study will consider the legal limits of section 3(a.1) of the *MGA* and section 4(2) of the *City Charter Regulations* through hypothetical bylaws in order to outline what authority Alberta municipalities will hold under these new provisions to pass bylaws relating to the environment, and where applicable, biodiversity conservation. Pertinent developments from other Canadian municipalities included in this study further contextualize municipal environmental stewardship and differentiate it from provincial or federal action. Ultimately, the goal is to introduce the intersection of municipal authority and environmental stewardship and to consider what novel possibilities exist at this convergence point.

STATUTORY INTERPRETATION OF THE MGA AMENDMENTS

Statutory interpretation is the "process and result of deriving meaning from legislation" and other legal instruments.[4] This technical exercise starts with the legislative language in question and works to elucidate the legislative intent and purpose behind the words.[5] The SCC has endorsed what is commonly referred to as the modern principle to statutory interpretation, which has been defined in the following terms:

> […] [T]he words of an Act are to be read in their entire context and in their grammatical and ordinary sense harmoniously with the scheme of the Act, the object of the Act, and the intention of Parliament.[6]

The modern approach balances the various inputs that are pertinent to uncovering the legislative intent and, where necessary, the "rational development of the law."[7] Interpreting the key amendments to the *MGA* enables consideration of what is currently possible by way of innovative local biodiversity conservation in Alberta's municipalities.

As set out by the SCC in *R v Sharma*:

> [...] [A]s statutory bodies, municipalities "may exercise only those powers expressly conferred by statute, those powers necessarily or fairly implied by the expressed power

in the statute, and those indispensable powers essential and not merely convenient to the effectuation of the purposes of the corporation."[8]

i. Interpreting the *MGA* Amendments – Section 3(a.1)

Ordinary & Grammatical Meaning

The starting point to the modern approach is to construe the ordinary meaning of the statutory language in question, which can also be described as "the natural meaning [that] appears [in the reader's mind] when the provision is simply read through."[9] Turning to section 3(a.1), the municipal purpose "to foster the well-being of the environment" is, at first glance, quite expansive. This potentially enables a broad range of municipal actions that take positive steps to not only maintain the environment but also to actively achieve a better state of environmental quality. However, the expansive nature of the provision's ordinary meaning—and the words "foster" and "well-being," in particular—requires additional scrutiny to best determine the intended legislative meaning.

Dictionary definitions serve as a source of tangible and objective textual meaning.[10] The *Oxford English Dictionary* defines the word "foster" as follows: "to encourage, promote the development of; (of things, circumstances) to be favourable or conducive to."[11] The same dictionary defines "well-being" as: "the state of being healthy, happy, or prosperous."[12] It is reasonably inferred from these definitions that municipalities are enabled to take positive steps towards developing a healthy natural environment through the regulation and stewardship of the environment's components. Whether the environment, or its components, are "healthy" is something that science can help measure.[13]

One approach to interpreting "environment" and its components is through the *in pari materia* maxim. Statutes that are *in pari materia* "are those which relate to the same person or thing, or to the same class of persons or things."[14] Judy Stewart, municipal and water law specialist, has argued that, pursuant to this maxim, the definition of "environment" from Alberta's *Environmental Protection and Enforcement Act*[15] may be applied to the *MGA* provision.[16] *EPEA* defines "environment" as follows:

> "[E]nvironment" means the components of the earth and includes
>
> i. air, land and water,
> ii. all layers of the atmosphere,
> iii. all organic and inorganic matter and living organisms, and
> iv. the interacting natural systems that include components referred to in subclauses (i) to (iii)[17]

Accordingly, the defined meaning of the words within the *EPEA* corroborates the ordinary meaning of section 3 of the *MGA.* On its face, municipalities appear to have broad discretion to pass bylaws for the municipal purpose of developing and maintaining a healthy environment, which includes the earth's air, land, water, atmosphere, organic and inorganic matter, and living organisms, as well as the interacting natural systems among these components.[18]

However, even when the textual interpretive exercise yields a reliable and specific meaning for a particular phrase, the provision as a whole must still be construed to fit within the context, purpose, and intent of the legislation.[19]

Legal & Statutory Context

The legal context is the existing substantive law, involving relevant case law, common law, and international law that may assist in uncovering legislative intent.[20] The statutory context requires that specific provisions be interpreted in view of the text in the same or related statutes.[21] The significance that context plays in the interpretive exercise was confirmed in *Bell ExpressVu Limited Partnership v Rex,* where the SCC held:

> The preferred approach recognizes the important role that context must inevitably play when a court construes the written words of a statute […] "words, like people, take their colour from their surroundings."[22]

Applying this contextual analysis, section 9 of the *MGA* states that:

> [t]he power to pass bylaws [...] is stated in general terms to (a) give broad authority to councils and to respect their right to govern municipalities in whatever way the councils consider appropriate, within the jurisdiction given to them under this or any other enactment, and (b) enhance the ability of councils to respond to the present and future issues in their municipalities.[23]

The substance of this provision was clarified by the SCC's decision in *United Taxi Drivers' Fellowship of Southern Alberta v Calgary (City)*, confirming that:

> [s]everal provinces have moved away from the practice of granting municipalities specific powers in particular subject areas, choosing instead to confer them broad authority over generally defined matters [...] This shift in legislative drafting reflects the true nature of modern municipalities which require greater flexibility in fulfilling their statutory purposes [...] [T]he provisions of the [*MGA*] must be construed in a broad and purposive manner.[24]

In *Spraytech*, the SCC clarified one of the limits of this broad interpretation, holding that a municipal bylaw may still be valid even if there exists, or could exist, provincial or federal law in the same area. The existence of federal or provincial law does not forbid municipalities from regulating the same subject matter, so long as it is possible to comply with the bylaw and the federal or provincial law. The "impossibility of dual compliance" would only become an issue when a conflict between the municipal bylaw and federal or provincial law exists such that obeying one results in disobeying the other. As previously discussed, the Court in *Spraytech* found that controls set out in municipal bylaws may even exceed or be more restrictive than federal or provincial standards, which raises no issues of dual compliance.[25]

Section 13 of the *MGA* contains a provision that overrides municipal bylaws when they are in conflict with other legislation. Specifically, section 13 provides that "if there is an inconsistency between a bylaw and this or another enactment, the bylaw is of no effect to the extent of the inconsistency."[26] In practice, section 13 works such that "[a] municipal bylaw should be rendered inoperative in this situation only where it is impossible to comply with both legislative regimes at the same time."[27] The result is that municipal jurisdiction to regulate on a matter is not lost simply when there is an overlap with provincial or federal jurisdiction.[28] In fact, it was recognized in *Spraytech* and subsequent court decisions in Alberta that municipal bylaws may impose stricter standards than provincial or federal legislation.[29]

Section 12 of the *MGA* prescribes the geographical borders for the application of bylaws as the respective boundaries of the municipality in question.[30] However, section 12 sets out two exceptions, the first being that bylaws may affect other municipalities, so long as there is an agreement between the involved municipalities along with each municipality passing a bylaw to approve the agreement.[31] While this offers a mechanism to apply bylaws outside of a single municipality, the provision still limits that application to the physical boundaries of another, ignoring the inherent transjurisdictional nature of the environment.[32] The second exception is that the *MGA*, or any other enactment, can explicitly state that "the bylaw applies outside the boundaries of the municipality."[33] This exception highlights significant legislative control over the scope of municipal bylaws and their application since a provincial or federal enactment must be passed and expressly authorize a bylaw's application to extend beyond the geographical boundaries of the acting municipality.

Returning to the core statutory interpretation exercise, it is critically important to the contextual analysis to ascertain how different provisions within a particular statute function together coherently.[34] Specifically, a municipal government passing a bylaw "to foster the well-being of the environment" under section 3(a.1) of the *MGA* must do so relating to one of the matters enumerated under section 7; furthermore, the operative power of municipal bylaws is clarified in section 8. Substantively, section 9 of the *MGA*, which has been interpreted by the SCC in *United Taxi*,[35] is clear that municipalities have broad authority to pass bylaws. Further, "[m]unicipal councils have extensive latitude in what factors they may consider in passing a bylaw. They may consider objective factors directly relating to consumption of services. But they may also consider broader social, economic and political factors that are relevant to the electorate."[36] This authority, however, must operate in accordance with the limits set out in section 12, whereby it is established that the legislative intent is to limit the general application of bylaws passed by councils to within the physical boundaries of the acting municipality—unless otherwise expressly noted by another enactment. Additionally, bylaws must operate so as to not frustrate or run contrary to the *MGA*, per section 13, or any provincial or federal law as per the "dual compliance test."[37]

Purpose

The next step under the modern approach is to decipher the purpose of section 3*(*a.1) of the *MGA*. "Purpose" in this context refers to the "the goal or object of the [...] specific provision in issue."[38] In other words, it addresses what societal mischief or problem a legislative provision intends to address.[39] Such an interpretation is intended to assist in achieving the legislation's goals or in remedying the identified mischief or problem.[40] It is often useful to refer to the legislative record and history or the enactment—legislative amendments—in question; Hansard, which is a record of the legislative debate, may also be helpful.[41]

The SCC has acknowledged that "the protection of the environment is a major challenge of our time. It is an international problem, one that requires action by governments of all levels."[42] Further, the federal *Canadian Biodiversity Strategy* notes that "the global decline of biodiversity is now recognized as one of the most serious environmental issues facing humanity."[43] Thus, environmental degradation generally, and the loss of biodiversity specifically, is a societal problem. As discussed, one contributing factor to humanity's expanding environmental impact is the development of urban centres. In Alberta, municipalities are currently growing rapidly and their growth is expected to continue.[44]

Furthermore, the Alberta *Interpretation Act* states that "the preamble of an enactment shall be read as part of the enactment intended to assist in explaining its purport and object."[45] Preambles do not "create legal obligations in and of themselves" but instead operate to guide interpretation.[46] While the importance of the purpose of the *MGA* as a whole enactment is beyond the scope of this study, the

recently amended Preamble provides interpretive value to construing the purpose of section 3(a.1) of the *MGA*.

The Preamble of the *MGA* reads: "WHEREAS Alberta's municipalities play an important role in Alberta's economic, environmental and social prosperity today and in the future."[47] By adding "environmental prosperity," the legislature recognizes both the importance of safeguarding environmental services and the important role that municipalities can play in achieving this goal. This interpretation is clearly supported by statements from the floor of Alberta's legislative assembly:

> [S]pecifically enabling municipalities to consider environmental well-being will encourage them to take a leadership role in addressing this critical issue and will better position them as key partners with the Government of Alberta in addressing environmental matters […] We're going to foster environmental well-being by including it in the *MGA* as a municipal purpose. Expanding municipal purpose in the *MGA* to include fostering environmental well-being will give municipalities a clear signal to consider the environment in a multitude of operational and growth decisions.[48]

Accordingly, the reasons behind this new municipal purpose, as articulated in the legislative record, support the position that municipalities are to consider the environment in a multitude of operational and growth decisions, as well as through the creation of environmental bylaws. However, this purpose is not absolute in the sense that the identified goal of section 3(a.1) and the relevant preambular text are not intended to be advanced unconstrained since the Preamble intimates that economic and social prosperity are co-terminus goals and must be considered alongside environmental stewardship.[49]

ii. Interpreting the *MGA* Amendments: Section 4(2) of the *City Charter Regulations*

Part 4.1 of the *MGA* enables the creation of city charters. The express purpose of city charter provisions "is to authorize the establishment of charters to address the evolving needs, responsibilities and capabilities of cities in a manner that best meet the needs of their communities."[50] Section 141.5 details what may be included in a city charter and how charters may modify the application of the *MGA* to charter cities. Pursuant to section 141.5(1), "a charter governs all matters related to the administration and governance of the charter city, including, without limitation, the powers, duties and functions of the charter city and any other matter that the Lieutenant Governor in Council considers desirable."[51] Under section 141.5(3), a charter may do one or more of the following:

> (a) provide that a provision of this Act or any other enactment does not apply to the charter city or applies to the charter city with the modifications set out in the charter;
> (b) specify or set out provisions that apply in respect of the charter city in addition to, or instead of, a provision of this Act or any other enactment;
> (c) authorize the charter city to modify or replace, by bylaw, a provision of this Act or any other enactment, with respect to the charter city, to the extent set out in the charter.[52]

Section 141.6 provides that "[e]xcept to the extent that this Part provides otherwise, if there is a conflict or inconsistency between a charter or a bylaw made pursuant to section 141.5(3)(c) and a provision of

this Act or any other enactment, the charter or bylaw prevails to the extent of the conflict or inconsistency."[53]

Currently, city charters exist for Alberta's two largest municipalities, Calgary and Edmonton. These instruments delegate additional authority to these two cities to, among other things, pass bylaws to regulate and manage the local environment. Section 4(2) of the *City Charter Regulations* supplement the enumerated list of municipal purposes under section 7 of the *MGA*, as follows:

> (2) Section 7 of the [*MGA*] is to be renumbered as section 7(1), and
>
> (a) in subsection (1),
>
> (i) the following is added after clause (h):
>
> (h.1) the well-being of the environment, including bylaws providing for the creation, implementation and management of programs respecting any or all of the following:
>
> (i) contaminated, vacant, derelict or under-utilized sites;
> (ii) climate change adaptation and greenhouse gas emission reduction;
> (iii) environmental conservation and stewardship;
> (iv) <u>the protection of biodiversity and habitat;</u>
> (v) the conservation and efficient use of energy;
> (vi) Waste reduction, diversion, recycling and management.[54]

Ordinary & Grammatical Meaning

As the legislature did not define the pertinent terms within subsection (h.1). The scope of "well-being of the environment" has already been construed and, therefore, can be relied on for the purpose of this interpretation. The legislature has maintained the expansive nature of this phrase through its use of the word "including", which is intended to extend the ordinary meaning of the phrase "well-being of the environment" to encompass the subject matter listed under subsection (h.1)(i)–(vi).[55]

While each subsection under (h.1) is relevant for understanding the overall scope of the enhanced authority vested in Calgary and Edmonton, only subsection (h.1)(iv) will be interpreted here since it relates specifically to biodiversity conservation. Recalling Stewart's recourse to the *in pari materia* maxim in defining "environment" with reference to related legislation,[56] the same logic applies in this case for defining key terms.

Alberta's environmental legislation does not offer a definition of biodiversity. Federally, the *Canadian Environmental Protection Act, 1999* essentially adopts the *CBD's* definition of biodiversity, which was reproduced earlier in this study.[57] The *CBD* defines "habitat" as "the place or type of site where an organism or population naturally occurs."[58] Canada's federal *Species at Risk Act* defines "habitat" as follows:

> (a) in respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly

in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced; and

(b) in respect of other wildlife species, the area or type of site where an individual or wildlife species naturally occurs or depends on directly or indirectly in order to carry out its life processes or formerly occurred and has the potential to be reintroduced.[59]

Finally, while "protection" is not defined in any relevant treaties or legislation, the *Oxford English Dictionary* definition accords with its ordinary, if not somewhat tautological meaning: "[t]he action of protecting someone or something; the fact or condition of being protected."[60] Finally, it must be noted that (h.1) stipulates that bylaws can serve a variety of purposes for biodiversity protection, including the "creation, implementation and management of programs."[61] According to the *Oxford English Dictionary*, a "program" is "a plan or scheme of any intended proceedings; a planned series of activities or events."[62] This is also an expansive term that captures not only one action or activity but also the collected sum of a number of measures targeting biodiversity protection. Thus, section (h.1)(iv) encompasses the protection of diversity, both within and between species of living organisms, and in all ecosystems and pertinent habitats, as achieved through one or more activities or measures.

Purpose

On its face, the text of (h.1)(iv) is expansive; an examination of the purpose and context of the provision may help construe the legislature's intention. Schematically, the *City Charter Regulations* provide express authority to pass bylaws for the municipal purpose to "foster the well-being of the environment" pursuant to section 3(a.1) of the *MGA* relating to the matters enumerated under section 4(2)(a)(i)(h.1).[63] This scheme contributes to the Legislature's objective to delegate additional jurisdiction over the environment to the two large Alberta municipalities, which collectively represent more than half of Alberta's population.[64] This accords with the overarching theme of the city charters, which is to further empower those municipalities that house larger populations and arguably encounter more complex social challenges.[65] Whether this additional grant of authority will result in innovative biodiversity-related action in Calgary or Edmonton is yet to be seen.

ENVIRONMENTAL BYLAWS UNDER THE AMENDED *MGA*

The four bylaw examples provided in this section offer some insight into how the new municipal purpose and expanded bylaw-making authority, interpreted above, could be put to work in an innovative manner. The bylaw examples aim to demonstrate ways in which a municipality in Alberta could create a stand-alone biodiversity-targeted action or a program.

i. Bylaw Example #1: Landfill Greenhouse Gas Bylaw

Global warming is a significant threat to biodiversity,[66] and unless action is taken to decrease greenhouse gas emissions, rising global temperatures will continue to increase the risk of extinction for 20–30% of species worldwide.[67] Achieving the emission reductions necessary to curb anthropogenic climate change requires international, national, and sub-national action across economic sectors. One significant contributor to greenhouse gas emissions is landfills, which collectively account for 20% of Canada's methane emissions.[68] While landfills are often a municipal service, provinces such as Ontario and British Columbia have enacted regulations to deal with landfill emissions under their environmental protection legislation.[69] Currently, there is no provincial law nor any municipal bylaw in Alberta that directly regulates limits of all landfill greenhouse gases (LFGGs).[70]

Despite the lack of formal regulation, municipalities in Alberta have begun to enact policies to curtail these emissions. For instance, the City of Edmonton has a landfill gas recovery policy that diverts gases for electricity production,[71] and the City of Calgary recently received a federal grant to "support the expansion of its landfill gas collection systems across three different project sites to responsibly manage and reduce greenhouse gas (GHG) emissions."[72] Professor Arlene Kwasniak explored the possibility of municipal bylaws that prohibit landfill gas emission over certain quantities.[73] The authority to pass bylaws to limit LFGGs would likely fall under section 3(a.1) of the *MGA,* for the "well-being of the environment," or relating to the matters of "climate change adaptation and greenhouse gas emission reduction" and "the protection of biodiversity and habitat" under section 4(2)(i) of the *City Charter Regulations*.[74] Kwasniak also makes the argument that such a bylaw could be passed under section 7(a) of the *MGA* "safety, health and welfare"; or alternatively, under section 7(d) "businesses or business activities" as it relates to the section 3(a.1) municipal purpose.[75]

While the municipality may have authority to enact a bylaw limiting landfill emission, an added issue is whether or not the bylaw is inconsistent with any provincial law, thereby rendering it inoperative under section 13 of the *MGA*. Suppose a new landfill development in Edmonton obtained approval through the standard process under the condition it limit its emissions to no more than X tonnes of LFGGs per year. Also suppose that Edmonton had just passed a new landfill emissions bylaw that required a smaller amount of emission be released every year—that is, Y tonnes of LFGGS. In order to ascertain whether or not the bylaw is able to limit the landfill's emissions to the smaller number (Y), it would have to be determined whether or not the original landfill approval had come under *EPEA.* If it is the former, then the bylaw is valid, given that the *EPEA* approvals do not override municipal bylaws, and the landfill is able to comply with both laws by simply limiting emissions to the smaller number (Y). Sections 619 and 620 of the *MGA* create important municipal limitations. Specifically, that licenses and approvals issued by provincial regulatory agencies prevail over municipal plans and actions, which could render a land-use bylaw targeted at LFGG's invalid if, in accordance with provincial approvals, the landfill is required to simply adhere to the X tonnes of emissions standard.[76]

The current state of the *MGA* is such that it is likely that municipalities, particularly those subject to the *City Charter Regulations*, have the *prima facie* authority to pass a landfill emissions bylaw. As is the case with most shared jurisdictional issues, there are a host of competing considerations, including those detailed above. Ultimately, consideration of such a bylaw is useful in demonstrating how municipalities, which may already have landfill emissions limiting policies in place, can potentially pass stricter standards than the province. After all, this is exactly the style of environmental conservation envisioned by the SCC in *Spraytech*, which gives life to the subsidiarity principle and multi-level environmental governance.

ii. Bylaw Example #2: Environmental Reporting and Disclosure Bylaw

The City of Toronto has developed Canada's first "right to know" environmental bylaw.[77] The *Environmental Reporting and Disclosure Bylaw* requires local businesses to report releases of listed priority chemicals at thresholds that are much lower than the National Pollutant Release Inventory (NPRI) mandated under *CEPA*.[78] The bylaw sets out monetary penalties of $5,000 for the first offence, $25,000 for the second offence, and $100,000 for the third offence.[79] This scheme enables the city to identify and map toxic hotspots, track industry contributions to chemical releases, as well as quantify and rank total chemical releases through annual reporting. The city has also implemented a grant program alongside the bylaw to assist businesses in reducing emissions and preventing pollution.[80]

While this type of bylaw would clearly pass as a valid municipal purpose under s 3(a.1) of the *MGA*, it would appear that non-charter cities may have difficulty upholding the bylaw under section 7. This type of bylaw could potentially fall under section 7(a) "safety, health and welfare of people and the protection of people and property" or section 7(d) "businesses or business activities," with the former, however, being dependent on either sufficient scientific evidence supporting the implementation of thresholds lower than the NPRI. On the other hand, charter cities would very likely be able to uphold the bylaw under subsection (h.1)(ii), (iii) or (iv) of the *City Charter Regulations*, so long as it is possible to comply with both the bylaw and *CEPA* pursuant to section 13 of the *MGA*. As mentioned previously, the fact that the municipal bylaw has lower thresholds, or is more restrictive, than the *CEPA* NPRI does not bar its operability.

Environmental reporting and disclosure are only indirectly connected to biodiversity conservation. Logically, reducing the release of toxic substances will have a general environmental benefit that supports biodiversity conservation efforts. Given that this study is most interested in biodiversity-focused conservation actions, perhaps it is possible to envision a Biodiversity Reporting and Disclosure bylaw that encourages positive action to create or improve habitat and habitat connectivity or to maintain (or improve) ecosystem services.

Annual financial corporate reporting is a common mechanism that instills stakeholder and investor confidence. In certain jurisdictions, mandatory corporate reporting has been expanded to include non-financial indicators to promote responsible corporate citizenship. For example, in France, national legislation has required certain corporations to report on the social and environmental impact of their business activity since 2001; moreover, the implementation requires disclosure of measures taken to limit negative ecological impact and to protect plant and animal species.[81] In 2014, the IUCN produced a report offering guidance on crafting efficient and effective corporate biodiversity reports.[82] More recently, the EU produced a *Non-financial Reporting Directive* that requires large public-interest companies who employ over 500 people, such as listed companies, banks, and insurance companies, to disclose certain non-financial information, including information on environmental protection.[83] The non-binding guidelines that accompany this directive state that "[a] company is expected to disclose relevant information on the actual and potential impacts of its operations on the environment, and on how current and foreseeable environmental matters may affect the company's development, performance or position," including "use and protection of natural resources (e.g. water, land) and related protection of biodiversity."[84] In Canada, there are no mandatory legislative reporting requirements for environmental sustainability per se, although corporate memberships in different associations can require reporting and are becoming increasingly common for publicly traded companies.[85]

The recent *MGA* amendments, and the *City Charter Regulations*, in particular, may open the door to environmental reporting and disclosure in Alberta. An innovative municipality might develop a corporate biodiversity reporting and disclosure program. Such a program could establish voluntary or compulsory reporting and disclosure obligations for corporations to identify actions that reduce their impact on, or increase their contribution to the stewardship and promotion of local biodiversity. This program could offer guidance on the sort of initiatives that would qualify and could include *inter alia*: (1) tree/tree stand protection; (2) naturalization of existing greenspace or creation of additional greenspace; (3) ecosystem service maintenance or enhancement (e.g., pollinator gardens, insect micro-habitat creation, pond/wetland creation, etc.); (4) wildlife corridor connectivity (e.g., wildlife-friendly fencing or purposeful connectivity to adjacent greenspace); (5) reduction in pesticide and herbicide use for greenspace or pest management. Establishing a novel program like this would have to address a number of important

considerations. First, what corporations would be targeted for participation? Would they be selected by size, location, industry, or ecological footprint (i.e., land-use impact)? Second, would the program be voluntary or compulsory? Each option has benefits and shortcomings. Third, how would the reporting or disclosure be monitored or audited by the municipality? Finally, could the city use incentives, such as biodiversity certifications, to increase corporate participation and uptake?

iii. Bylaw Example #3: Green Roof Bylaw

Another tool that allows municipalities to facilitate urban biodiversity conservation and other ecosystem services and benefits is the inclusion of green roofs on buildings. As an alternative to a traditional roof top, a green roof provides for vegetation growth on top of multiple layers of drainage, filtration, and waterproofing materials.[86]

Green roofs promote urban biodiversity by enhancing connectivity. That is, a green roof can provide a habitat in a predominantly urban environment for various kinds of flora and fauna, including birds, mammals, insects, plants, bacteria, and fungi.[87] This is significant for biodiversity conservation given that in many urban environments natural habitats have been lost to development and urbanization. Where a green roof includes grasses and shrubs that are native to the area, the green roof can integrate into the ecological corridor of the area.[88] Given the benefits for conservation, municipal governments have begun to include green roof programs in their biodiversity efforts.[89]

Other notable benefits of green roofs include offsetting the heat absorbed and retained by urban environments, improving air quality, and reducing the energy required to cool and heat buildings.[90] Furthermore, green roofs are an example of urban green infrastructure as they divert rain and storm water away from city sewers.[91] Finally, green roofs provide municipalities with an important climate change adaption tool and have the potential to absorb greenhouse gases.[92]

The substantial benefits provided by green roofs have led some Canadian cities to implement bylaws to regulate and provide incentives for their construction. For example, in 2009, the City of Toronto passed the first green roof bylaw in Canada that requires the installation of green roofs on new developments of a certain size.[93] In Alberta, neither Edmonton nor Calgary have implemented formal bylaws; however, that does not mean that green roofs do not have a place in the province's two largest cities.

In Calgary, the city has a dedicated information page on green roofs on their website and includes green roofs on a list of low impact development best practices.[94] The City of Edmonton also provides information on the benefits of green roofs to their citizens,[95] and, in 2019, partnered with the Miistakis Institute to examine how a green roof initiative could be used as a tool to adapt to climate change.[96] The City of Edmonton also commissioned a jurisdictional review in 2018 to study other municipalities' green roof laws in order to assess the requirements of establishing their own program.[97] Edmonton's current *Zoning Bylaw* does, however, provide both a definition of green roofs in section 6 and highlights the ability of green roofs to be included in specifically designated planning zones.[98] Despite the lack of a dedicated bylaw in either Calgary or Edmonton, there are examples in both cities of green roofs already being installed on hospitals, municipal and other government buildings, as well as privately owned structures.[99] While municipalities in Alberta may have already possessed the authority to establish green roof programs and perhaps even bylaws, the new municipal purpose of fostering the well-being of the environment and the *City Charter Regulations'* powers allowing for biodiversity conservation programs only solidifies this authority as valid municipal jurisdiction.

iv. Bylaw Example #4: Private Tree Protection Bylaw

In 2009, the City of Vancouver enacted the *Protection of Tree By-Law No 9958* with the purpose of maintaining a healthy urban forest.[100] This bylaw establishes a scheme whereby private property owners must apply for a permit from the city if they want to cut down a tree that measures more than 20 centimeters in diameter at 1.4 meters from the ground. A previous bylaw allowed private property owners to cut down a single tree per year without a permit; however, this provision was removed in 2014.[101] The effect of this permitting scheme is that anyone developing or renovating a piece of land is required to keep the existing trees on the property unless approval from the City is granted. In justifying this restriction, the City of Vancouver noted that there had been a drastic decline in the City's urban canopy since the 1990s and that by preserving the urban forest, the City would see benefits in mitigating climate change, maintaining cleaner air, and supporting biodiversity.[102]

Section 4.5 of the bylaw sets out the conditions under which a permit can be granted. This includes trees interfering with, causing damage to, or creating a hazard alongside building envelopes, construction access, drainage and sewer systems, utility infrastructure, and roofs and sidewalks.[103] Furthermore, if a tree is a fire hazard or has been certified as a dead or dying tree, a permit may be granted. In a number of these instances, in order to have a removal permit issued an arborist is required to certify that the tree meets certain criteria.

Similarly, the City of Toronto requires that any private property owner wanting to remove a tree with a diameter greater than 30 centimeters, when measured from 1.4 meters off the ground, is required to apply for a City permit.[104] Toronto's bylaw specifies that permits can be issued in a number of circumstances, including where trees are causing structural damage, where the current location of a tree is deemed "inappropriate" and cannot be maintained, or where the tree is interfering with utility services.[105] In all instances, the City of Toronto stipulates that an arborist report must accompany the application.[106] If the tree is considered healthy, people living within the neighbourhood will be invited to provide comments on the potential removal application.[107]

In Alberta, neither Calgary nor Edmonton have tree protection bylaws that restrict private property owners from removing trees on their property without first obtaining approval from the city.[108] The City of Calgary has, however, enacted a bylaw that protects publicly owned trees, namely those located on boulevards and in parks.[109] Edmonton, conversely, does not have a dedicated public tree protection bylaw, yet there are city policies in place that regulate public tree management.[110] In addition, in 2012, Edmonton released a 10-year urban forest management plan that set out a series of short, medium, and long-term objectives under the collective goal of sustainably managing and enhancing the city's urban forest.[111]

The critical difference between a public tree protection bylaw and the more restrictive bylaws introduced in Vancouver and Toronto is that the majority of trees located within a municipality are privately owned. Vancouver estimated that 62% of their tree canopy is comprised of private trees as compared to 27% and 11% coming from parks and street trees, respectively.[112] Similarly, Toronto estimated its tree canopy is made up of 60% privately owned trees.[113] Given the benefits that urban trees provide for the environment and biodiversity, including the provision of clean air, species habitat, and wildlife migration corridors, a public tree bylaw limits a municipality's management authority to approximately one-third of this valuable biodiversity asset. By instituting a private tree regulation system, cities like Toronto and Vancouver have assumed some degree of control over the entirety of their urban tree population, thereby allowing for a more comprehensive planning approach. This allows for enhanced coordination of tree removal—or

protection—across public spaces, private property, and new developments, and provides a municipality with a more comprehensive understanding of net tree loss and how that can be offset through future planting efforts.

Edmonton's city council appears to have at least considered the issue of implementing a tree removal permit system governing private property when it voted in 2016 to ask the Alberta Government for approval to create such a bylaw.[114] The vote to seek the Province's permission likely stems from the fact that city council did not believe that under the 2016 version of the *MGA* it had the power to enact such a bylaw. Moreover, the consideration of a private tree removal bylaw fits within the objectives set out in Edmonton's *Urban Forest Management Plan,* specifically under objective strategies 1.1 and 1.8, which call for programs that promote an increased tree canopy and investigate best practices for tree management and protection on private lands, respectively.[115] While the ultimate outcome of city council's request to the province is unknown, the additional authority granted to municipalities with respect to the environment in 2017 likely provides Alberta's municipalities with sufficient jurisdiction to enact this sort of tree protection scheme.

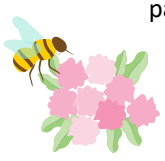
Section 3 of the *MGA* vests municipalities with the authority to implement bylaws for the purpose of improving the environmental well-being of their jurisdictions. The creation of a tree removal permit system would likely be targeted directly at the environmental effects and benefits, thereby falling within the purview of this municipal purpose. Furthermore, given the health benefits associated with an abundant urban tree population, primarily in the area of climate change mitigation and provision of clean air, a bylaw of this nature should also meet the section 7 health of the people and the protection of property provision.[116] Admittedly, it is difficult to definitively determine whether a tree removal bylaw would satisfy the general provisions of the *MGA;* however, it is more likely that the charter cities of Edmonton and Calgary would have the jurisdiction under the *City Charter Regulations*.[117] As introduced above, these regulations add subsection 7(1)(h.1) to the *MGA* for Calgary and Edmonton, the effect of which is to allow these cities to regulate matters regarding climate change adaption, environmental stewardship, and biodiversity and habitat protection.[118] The protection of trees, even on private property, could be justified as addressing any number of the issues listed, which in turn would further ground the charter city's jurisdiction in imposing such a bylaw.

v. Practical Considerations

Pragmatically, due to the expansive nature of both the *MGA* amendments and *City Charter Regulations, c*onsidering the broader implications of the interpretation at hand is important. The authority of charter municipalities to pass biodiversity-related bylaws appears to be distinct due to the fact that non-charter municipalities must pass bylaws pursuant to section 3(a.1) of the *MGA* relating to matters under section 7. In other words, charter cities have the authority to pass bylaws that solely contemplate the environment in accordance with section 4(2) of the *City Charter Regulations* without requiring a connection to a matter under section 7 of the *MGA*. Nonetheless, both charter cities and non-charter cities have clearly received additional authority to pass bylaws in various forms to steward the local environment, and to enhance the conservation of biodiversity. The extent to which Alberta's municipalities act upon this additional authority depends on the challenges and opportunities associated with such action.

Endnotes

[1] *Municipal Government Act*, RSA 2000, c M-26 [*MGA*].
[2] See Bill 8, *An Act to Strengthen Municipal Government*, 3rd Sess, 29th Leg, Alberta, 2017 [*An Act to Strengthen*]; *Modernized Municipal Government Act*, RSA 2016, c 24 [*MMGA*]; *Municipal Government Amendment Act*, 2015, 3rd Sess, 28th Leg, Alberta, 2015.
[3] *City of Edmonton Charter, 2018 Regulation*, Alta Reg 39/2018; *City of Calgary Charter, 2018 Regulation,* Alta Reg 40/2018 [together *City Charter Regulations*].
[4] Cameron Hutchison, *The Fundamentals of Statutory Interpretation*, (Toronto: LexisNexis Canada, 2018) at 3.
[5] *Ibid*. "Interpretation" in this context is interchangeable with the term "construction" due to the fact that the process of statutory interpretation requires that a meaning be construed.
[6] Ruth Sullivan & Elmer A Driedger, *Sullivan and Driedger on the Construction of Statutes*, 4th ed (Markham, Ont: Buttersworths, 2002) at 1. The most commonly cited SCC case endorsing this approach is *Re Rizzo & Rizzo Shoes Ltd*, [1998] 1 SCR 27, [1998] SCJ No 2. This endorsement was adopted by the Court of Appeal of Alberta by Chief Justice Fraser in *Thomas v Edmonton (City)*, 2016 ABCA 57 at paras 19-22, [2016] 6 WWR 669.
[7] Hutchison*, supra* note 4 at 35.
[8] *R v Sharma*, [1993] 1 SCR 650 at 668, [1993] 100 DLR (4th) 167. The SCC affirmed this view in *114957 Canada Ltée (Spraytech, Société D'arrosage) v Hudson (Town),* 2001 SCC 40 [*Spraytech*], holding that municipalities "[…] may exercise only those powers expressly granted to them by the legislation, powers implied by the expressed powers, and powers indispensable to the municipality for it to accomplish its purpose".
[9] *Ibid* at 29 citing Sullivan & Driedger, *supra* note 6 at 21.
[10] Ruth Sullivan, *Statutory Interpretation*, 3rd ed (Toronto: Irwin Law Inc, 2016) at 65.
[11] *Oxford English Dictionary*, online ed, *sub verbo* "foster", online: <www.oed.com/>.
[12] *Oxford English Dictionary*, online ed, *sub verbo* "well-being", online: <www.oed.com/> [emphasis added].
[13] Judy Stewart, "Do Recent Amendments to Alberta's *Municipal Government Act* Enable Management of Water Resources and Air Quality?" (2018) 55:4 Alta L Rev 1009 at 1036.
[14] E Fitch Smith, *Commentaries on Statute and Constitutional Law and Statutory and Constitutional Construction* (Albany: Gould, Banks & Gould, 1848) at 751.
[15] *Environmental Protection and Enforcement Act*, RSA 2000, c E-12 [*EPEA*].
[16] Stewart*, supra* note 13 at 1012. Additionally, the federal *Interpretation Act*, RSC 1985, c I-21, s 15(2)(b), which is applicable to the provinces, affirms that a definition in an Act or regulation is applicable to all other Acts or regulations that relate to the same subject matter.
[17] Stewart*, supra* note 13 at 1012 citing *EPEA, supra* note 15, s 1(t).
[18] *Ibid* at 1012.
[19] Hutchison*, supra* note 4 at 46.
[20] *Ibid* at 30.
[21] *Ibid* at 61.
[22] *Bell ExpressVu Limited Partnership v Rex*, 2002 SCC 42 at para 27, [2002] 2 SCR 559.
[23] *MGA*, *supra* note 1, s 9 [*emphasis added*].
[24] *United Taxi Drivers' Fellowship of Southern Alberta v Calgary (City),* 2004 SCC 19 at paras 6-7, [2004] 1 SCR 485 [*United Taxi*].
[25] *Spraytech, supra* note 8 at para 39.
[26] *MGA, supra* note 1, s 13. Section 1(1)(j) of the *MGA* defines "enactment" as a "provincial or federal statute and subordinate legislation" and expressly excludes "bylaw[s] made by a council".
[27] *R v KP*, 2011 ABCA 233 at para 15. In *R v KP*, the ABCA was examining section 13 of the MGA and used The Supreme Court's analysis in *Spraytech*, *supra* note 8, at 38-39, in support of this conclusion. In *Spraytech*, the Supreme Court is examining dual compliance under the Multiple Access test, however, the ABCA imports the analysis for the purposes of examining section 13.
[28] *Spraytech*, supra note 8 at para 39. See also *Passutto Hotels (1984) Ltd v Red Deer (City of)*, 2006 ABQB 641 at para 47 [*Passutto*].



[29] *Spraytech*, *supra* note 8 at para 37. *Passutto*, *supra* note 28 at para 65.
[30] *MGA, supra* note 1, s 12.
[31] *Ibid*, s 12(a).
[32] Stewart, *supra* note 13 at 1013.
[33] *MGA, supra* note 1, s 12(b). As stated previously, section 1(1)(j) of the *MGA* defines "enactment" as a "provincial or federal statute and subordinate legislation" and expressly excludes "bylaw[s] made by a council".
[34] Hutchison, *supra* note 4 at 62.
[35] *United Taxi, supra* note 24.
[36] *Catalyst Paper Corp. v. North Cowichan (District),* 2012 SCC 2.
[37] Although land-use policies fall outside the scope of this paper, it is important to note that municipal bylaws will also be subject to section 622 of the *MGA*, *supra* note 1, see Appendix I.
[38] Hutchison, *supra* note 4 at 91.
[39] *Ibid.*
[40] *Ibid* at 92.
[41] *Ibid*.
[42] *Spraytech, supra* note 8 at para 3, citing *R v Hydro-Quebec*, [1997] 3 SCR 213, 151 DLR (4th) 32 [emphasis in original].
[43] Sara Jaremko, "Legislative Frameworks for Urban Biodiversity, Ecosystems and Wildlife in Alberta" (2018) Canadian Institute of Resources Law Occasional Paper 65 at 1 citing Government of Canada, *Canadian Biodiversity Strategy* (1995) at "Executive Summary", online: <www.biodivcanada.ca/default.asp?lang=En&n=560ED58E-1>.
[44] Alberta Environment & Parks, *Land-use Framework* (December 2008) at 12, online (pdf): *Government of Alberta* <landuse.alberta.ca/LandUse%20Documents/Land-use%20Framework%20-%202008-12.pdf>.
[45] *Interpretation Act*, *supra* note 16, s 13.
[46] Hutchison, *supra* note 4 at 92.
[47] *MGA*, *supra* note 1, Preamble [emphasis added].
[48] *An Act to Strengthen*, supra note 2 at 999 (Robert Turner) [emphasis added].
[49] Hutchison, *supra* note 4 at 97.
[50] *MGA*, *supra* note 1, s 141.2.
[51] *Ibid,* s 141.5(1).
[52] *Ibid*, s 141.5(3).
[53] *Ibid,* s 141.6.
[54] *City Charter Regulations, supra* note 3 [emphasis added].
[55] *Ibid.*
[56] Stewart*, supra* note 13 at 1012.
[57] *Canadian Environmental Protection Act, 1999,* SC 1999, c 33, s 3(1) [*CEPA*].
[58] *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, 31 ILM 818 (entered into force 29 December 1993), at art 2 [*CBD*].
[59] *Species at Risk Act*, SC 2002, c 29, s 2 "habitat".
[60] *Oxford English Dictionary*, online ed, *sub verbo* "protection", online: <www.oed.com/>.
[61] *MGA*, *supra* note 1 at s 2(h.1) [emphasis added].
[62] *Oxford English Dictionary*, online ed, *sub verbo* "program", online: *Oxford English Dictionary* <www.oed.com/>.
[63] *City Charter Regulations*, *supra* note 3.
[64] Statistics Canada, *Calgary [Population centre], Alberta and Alberta [Province] (table). Census Profile*. *2016 Census,* Catalogue no 98-316-X2016001 (Ottawa: Statistics Canada, 2017) <www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>; Statistics Canada, *Edmonton [Population centre], Alberta and Alberta [Province]* (table). *Census Profile*. *2016 Census*, Catalogue no 98-316-X2016001 (Ottawa, Statistics Canada, 2017) <www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>.
[65] See Alison Amith & Zachary Spicer, "The Local Autonomy of Canada's Largest Cities" (2016) 54 Urban Affairs Rev 931.

[66] John Kostyack & Dan Rohlf, "Conserving Endangered Species in an Era of Global Warming" (2008) 38 ELR 10203 as cited in Meinhard Doelle & Chris Tollefson, *Environmental Law: Cases and Materials,* 2nd ed (Toronto: Carswell, 2013) at 819.
[67] *Ibid.*
[68] "Municipal solid waste and greenhouse gases" (2017), online: *Government of Canada* <www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/municipal-solid/greenhouse-gases.html>.
[69] See *Landfilling Sites*, O Reg 232/98; *Landfill Gas Management Regulation*, BC Reg 391/2008.
[70] Arlene J Kwasniak, "Municipalities and the Regulation and Management of GHGs" (Paper delivered at the *Symposium on Environment in the Courtroom: Enforcing Canadian GHG Emissions Laws,* Université Laval, Quebec City, 25 & 26 October 2018), online (pdf): *Canadian Institute of Resources Law* <cirl.ca/files/cirl/municipalities-and-the-regulation-and-management-of-ghgs.docx1_.pdf> at 7-8 stating:

> Neither Alberta's *Waste Control Regulation* under the *Environmental Protection and Enhancement Act* (EPEA) or the *Code of Practice for Landfills* speaks to GHG emissions. Alberta's carbon levy under the *Climate Leadership Act*, applies to fuels (not LFG[G]s). The *Climate Change and Emissions Management Act*, regulates emissions under the *Carbon Competitiveness Incentive Regulation* (CCIR). The CCIR does not apply to biomass CO2 emissions, which includes some elements of LFG[G]. Although biomass methane emissions could be regulated under the CCIR, that regulation aims at large emitters (100,000 tonnes + of regulated emissions a year) thus leaving room for municipal regulation of LFG[G] under that threshold.

[71] "Landfill Gas Recovery," online: *City of Edmonton* <www.edmonton.ca/programs_services/garbage_waste/landfill-gas-recovery.aspx>.
[72] "City of Calgary receives federal funding to reduce landfill gas emissions" (11 March 2019), online: *City of Calgary* <newsroom.calgary.ca/city-of-calgary-receives-federal-funding-to-reduce-landfill-gas-emissions/>.
[73] Kwasniak, *supra* note 70.
[74] *City Charter Regulations*, *supra* note 3.
[75] Kwasniak, *supra* note 70 at 7.
[76] *Northland Material Handling Inc v Parkland (County)*, 2012 ABQB 407, 100 MPLR (4th) 277. For a more fulsome discussion of this landfill greenhouse gas bylaw exercise and the required approvals, see Kwasniak, *supra* note 70.
[77] Andhra Azevedo, David Richard Boyd & Alaya Boisvert, "Guide 3: Non-Toxic Environment" (2017) at 4, online (pdf): *Blue Dot* <bluedot.ca/wp-content/uploads/2017/07/Municipal-Toolkit-Guide-3-2.pdf> [Blue Dot Municipal Toolkit].
[78] City of Toronto, bylaw No 1293-2008 (Municipal Code c 423), *Environmental Reporting and Disclosure* (3 December 2008), online (pdf): <www.toronto.ca/legdocs/municode/1184_423.pdf>.
[79] *Ibid*, art v.
[80] Blue Dot Municipal Toolkit, *supra* note 77 at 4.
[81] Code de Commerce, arts R225-102-1 and R225-105-01. For a discussion of these provisions see IUCN French Committee, *Corporate Biodiversity Reporting and Indicators: Situation Analysis and Recommendations* (Paris, 2014) at 25-28, online (pdf): <portals.iucn.org/library/sites/library/files/documents/2014-032.pdf> [IUCN French Committee].
[82] IUCN French Committee, *supra* note 81.
[83] EC, *Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups*, [2014] OJ, L 330/1. See also EC, "Non-financial reporting" online: *EC* <ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/non-financial-reporting_en#relatedlinks>.
[84] EC, *Communication from the Commission — Guidelines on non-financial reporting: Supplement on reporting climate-related information,* [2019] OJ, C 209/1.
[85] See Sally Crane, "Canada 2030: the Future of Sustainability Reporting" (August 2018), online (pdf): *Jarislowsky Fraser Global Investment Management* <file:///C:/Users/Owner/Downloads/Canada_2030_-_Part_3_-_Future-

Sustainable-Reporting_HR.pdf>; World Business Council for Sustainable Development, "The Reporting Exchange: Corporate Reporting in the United States and Canada" (2018), online (pdf): *World Business Council for Sustainable Development* <www.wbcsd.org/Programs/Redefining-Value/External-Disclosure/The-Reporting-Exchange/Resources/Corporate-reporting-in-the-United-States-and-Canada>.

[86] "Factsheet: Green Roofs" (2016), online (pdf): *City of Edmonton* <www.edmonton.ca/city_government/documents/LID_Green_Roofs_Factsheet.pdf> [Green Roofs Factsheet].

[87] JA Colin Bergeron et al, "Carabid and Spider Population Dynamics on Urban Green Roofs" (2018) 12 Zoosymposia 69 at 69.

[88] Rhona McAdam, "Green Roofs: The Opportunity Right Above our Heads" (1 June 2016), online: *Alberta Views* <albertaviews.ca/green-roofs/>.

[89] See Bergeron et al, *supra* note 87 at 69.

[90] Anika Terton, "Building a Climate-Resilient City: Urban ecosystems" at 3, online (pdf): *City of Edmonton* <www.edmonton.ca/city_government/documents/PDF/Paper3-pcc-brief-climate-resilient-city-urban-ecosystems.pdf>.

[91] *Ibid* at 6. The City of Toronto noted that green roofs have diverted almost 11 million litres of water away from its sewers over the period of 2009 to 2016.

[92] The City of Edmonton has begun to develop a green roof initiative with the Miistakis Institute for this purpose. See "Edmonton Ecoroof Initiative for Climate Change Resiliency: Ecoroof Function Research" online (pdf): *Miistakis Institute* <www.rockies.ca/files/reports/Function_Research_FINAL.pdf> [Miistakis Institute]. The City of Toronto has seen an avoidance of 200 tonnes of greenhouses over a 7 period (Terton, *supra* note 90 at 6).

[93] City of Toronto, revised bylaw No 583-2009 (Municipal Code c 492), *Green Roofs* (27 May 2009), art 492-2, online (pdf): *City of Toronto* <www.toronto.ca/legdocs/municode/1184_492.pdf>; see also "City of Toronto Green Roof Bylaw", online: *City of Toronto* <www.toronto.ca/city-government/planning-development/official-plan-guidelines/green-roofs/green-roof-bylaw/>.

[94] See "Green Roofs" online: *City of Calgary* <www.calgary.ca/UEP/Water/Pages/Watersheds-and-rivers/Erosion-and-sediment-control/Green-Roofs.aspx>; and "Low Impact Development" online: *City of Calgary* <www.calgary.ca/UEP/Water/Pages/Watersheds-and-rivers/Erosion-and-sediment-control/Low-Impact-Development.aspx>.

[95] Green Roofs Factsheet, s*upra* note 86.

[96] Miistakis Institute, s*upra* note 92.

[97] Miistakis Institute, *The Edmonton Ecoroof and Climate Change Resiliency Initiative Jurisdictional Review* (23 April 2018), online (pdf): *Miistakis Institute* <www.rockies.ca/files/reports/jurisdiction_review.pdf>.

[98] City of Edmonton, revised bylaw No 12800, *Zoning Bylaw* (May 2017), ss 6-49, 574.5, 860 Appendix V, 910.6, online (pdf): *City of Edmonton* <www.edmonton.ca/documents/PDF/current_Zoning_Bylaw.pdf>.

[99] See McAdam, *supra* note 88; "Green Roofs" online: *City of Edmonton* <www.edmonton.ca/city_government/environmental_stewardship/green-roof.aspx>.

[100] "Protection of Trees Bylaw 9958", online: *City of Vancouver* <vancouver.ca/your-government/protection-of-trees-bylaw.aspx>.

[101] *Ibid*.

[102] "Tree cutting now requires special Vancouver permit" (16 April 2014), online: *CBC News* <www.cbc.ca/news/canada/british-columbia/tree-cutting-now-requires-special-vancouver-permit-1.2612960>. See also City of Vancouver, *Urban Forest Strategy* (15 April 2014), online (pdf): *Vancouver City Council* <council.vancouver.ca/20140415/documents/rr1presentation.pdf> [*Vancouver Urban Forest Strategy*].

[103] City of Vancouver, bylaw 9958, *Protection of Trees Bylaw*, s 4.59(a)-(e).

[104] City of Toronto, Municipal Code, Chapter 813-12.

[105] *Ibid*, Chapter 813-18.

[106] *Ibid*, Chapter 813-14(A).

[107] "Permits – removing or injuring tress on private property – private tree bylaw," online: *City of Toronto* <www.toronto.ca/311/knowledgebase/kb/docs/articles/parks,-forestry-and-recreation/urban-forestry/permits-removing-or-injuring-trees-on-private-property-private-tree-bylaw.html>.

[108] "Tree Protection Bylaws," online: *City of Calgary* <www.calgary.ca/CSPS/Parks/Pages/Planning-and-Operations/Tree-Management/Tree-protection-bylaws.aspx>; "More mature trees saved under City of Edmonton's new policy" (24 November 2017), online: *CBC News* <www.cbc.ca/news/canada/edmonton/urban-trees-edmonton-protection-mature-neighbourhoods-1.4417283>.
[109] City of Calgary, bylaw 23M2002, *Being a Bylaw of the City of Calgary to Protect Public Trees*.
[110] "Corporate Tree Management Policy," online (pdf): *City of Edmonton* <www.edmonton.ca/residential_neighbourhoods/PoliciesDirectives/C456B.pdf>; see also "Tree Regulations online: *City of Edmonton* <www.edmonton.ca/city_government/bylaws/tree-regulations.aspx>.
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[112] *Vancouver Urban Forest Strategy*, *supra* note 102 at 11.
[113] City of Toronto, *Sustaining and Expanding the Urban Forest: Toronto's Strategic Forest Management Plan 2012-2022* (2013), online (pdf): *City of Toronto* <www.toronto.ca/wp-content/uploads/2017/12/8e0e-Strategic-Forest-Management-Plan-2012_22.pdf>.
[114] Karen Bartko, "Edmonton city council seeks power to control tree removal on private properties" (13 July 2016), online: *Global News* <https://globalnews.ca/news/2821809/edmonton-city-council-seeks-power-to-control-tree-removal-on-private-properties/>.
[115] *Urban Forest Management Plan, supra* note 111 at 8.
[116] For an expanded look at the environmental, health, economic, and social benefits of a health urban canopy see Edmonton's *Urban Forest Management Plan*, *ibid* at 14-16.
[117] *MGA*, *supra* note 1, s 4(2).
[118] *Ibid.*

PART V: CHALLENGES AND OPPORTUNITIES FOR BIODIVERSITY CONSERVATION AT A MUNICIPAL LEVEL

This exploration of biodiversity protection at the local level has identified both challenges and opportunities for municipal biodiversity conservation. A working baseline from which to measure changes to local biodiversity is critical to ensure municipalities can evaluate the impacts of their conservation efforts; however, improved financing to determine both the initial baseline measurements and ongoing conservation work is needed. The current model of devolving environmental responsibility from the provincial to the local level without attaching additional funds or assistance will not be sustainable in the long run. Additionally, engaging citizens through monitoring and conservation activities is essential to build support and provide long-term protection for critical habitats that will safeguard species into the future and enhance local environmental governance. Each of these challenges and opportunities is examined below in more detail and these discussions help frame recommendations for Alberta's municipalities in their effort to preserve biodiversity for their communities.

ENVIRONMENTAL GOVERNANCE

The *CBD* is one avenue through which Canada has worked to achieve internationally negotiated biodiversity conservation goals. The main objectives of the *CBD* are "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources."[1] At the tenth meeting of the Conference of the Parties in 2010, States endorsed an updated *Strategic Plan for Biodiversity* that produced the Aichi Biodiversity Targets (Aichi Targets) for the period of 2011–2020.[2] The Aichi Targets provide an overarching framework on biodiversity conservation and are intended to guide the development of policy and practices relating to matters of biodiversity conservation at the national level.

Today's large scale and multidimensional environmental challenges cannot be addressed solely through traditional state-centered regulatory action. Rather they must be met with integrated problem-solving measures that cut across the jurisdictional limits of government authority to also engage citizens, industry, NGOs, and local and regional partnerships. Given the need for coordinated governance to achieve these ambitious goals, municipal action clearly has a role in supporting Canada's pursuit of its Aichi Targets.

i. Canada and the Aichi Targets: An Exploration of Governance and Biodiversity Conservation

The Aichi Targets are internationally agreed-upon, cooperative actions to combat biodiversity loss. The Canadian commitment to the *CBD* and the Aichi Targets is the product of federal executive action; thus, implementation occurs predominately at the federal level. To this end, Canada has developed national and regional targets in *2020 Biodiversity Goals and Targets for Canada*, using the *CBD Strategic Plan* and Aichi Targets as a flexible framework for action, while also committing to monitor and review national targets and report on its progress back to the international authority.[3] The federal government recognizes that achieving the Aichi Targets requires more than a simple top-down approach and must also engage subnational governments, Indigenous communities, and NGOs, such as land trusts.

Aichi Target 11 speaks to the need to more effectively protect habitat—both terrestrial and aquatic—for the purposes of preserving biodiversity and seeks to achieve the following:

> By 2020, at least 17 per cent of terrestrial areas and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Canada has prioritized Aichi Target 11 as "Canada Target 1."[4] The federal government and the provinces have developed a co-led initiative called "Pathway to Target 1," which works to harmonize provincial-federal efforts to reach Aichi Target 11.[5] This joint provincial-federal project is supported by various committees, including the Local Government Advisory Group (LGAG). In 2017, the LGAG opined that:

> With Indigenous governments, local governments create the foundation for a new approach to the establishment and management of parks and protected areas in Canada. Through shared decision-making across jurisdictions, including private landowners, nature conservancies, and land trusts, local governments are positioned to build the processes required to achieve local support for more, connected, parks and protected areas.[6]

Building upon this position, the LGAG also produced a series of recommendations, which included the expansion of the federal green infrastructure program to include municipal parks and also the need to recognize the significant cost of land and offer additional financial assistance to local governments to establish or grow land acquisition strategies.[7] The legitimacy of the municipal contribution to Aichi Target 11 is gaining traction; in April, 2019, the International Union for the Conservation of Nature's *Draft Guidelines for Recognizing and Reporting Other Effective Area-based Conservation Measures* identified that "urban or municipal parks managed primarily for public recreation but which are large enough and sufficiently natural to also effectively achieve the *in-situ* conservation of biodiversity (e.g. wild grassland, wetlands) and which are managed to maintain these biodiversity values" can qualify for international reporting purposes.[8] While the groundwork has been laid in Alberta to recognize municipally protected land that meets these criteria, additional work is needed to formalize this approach.[9]

In addition to Target 11, the Aichi Biodiversity Targets include 19 other specific targets that are organized under five strategic goals (A–E). The proceeding section will focus on Strategic Goal A, which aims to *"*address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society*,"* its associated targets,[10] and the role of municipally-oriented action.

Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. [11]

Increasing awareness about the importance of biodiversity and the steps that can be taken to conserve and use it sustainably is foundational to the Aichi Targets. Implementing Target 1 requires effective and efficient public education awareness devices.[12] These devices can take a number of forms including formal learning in places such as schools or informal learning in places such as museums, parks, television or through social media.[13]

Canada's federal government has identified school curricula and biocultural initiatives to help meet this target. Indicators of success include increased citizen action to protect biodiversity, increased participation in "citizen-science monitoring programs," increased visitation to parks and conservation areas, and increased use of parks and other green spaces.[14] Local and national co-governance programs are an important element in the cooperative efforts to bring Canada in line with Aichi Targets. They demonstrate how active citizens can serve as environmental stewards and the important role they play in biodiversity conservation efforts.

Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.[15]

Target 4 speaks directly to the importance of hybrid environmental governance models in helping to maintain environmental systems within ecological limits.[16] Progress toward Aichi Target 4 is contingent on the implementation of effective governance models and the development of collaborative pathways. Traditional institutions such as municipalities have a key role to play in the capacity of governance models to address environmental challenges and are well-positioned to engage with civil society to help mediate the collective action of individuals and other organizations.[17] The effectiveness of institutional action, however, depends on the development of effective governance strategies. At present, federal and provincial governments produce the majority of policy and formal action aimed at achieving Aichi Targets.[18] There is considerable room for municipal governments to develop governance strategies that coordinate with community-based action and encourage the participation of corporations, NGOs, and citizen initiatives.[19]

The following case illustrates an instance where cooperative governance was successfully encouraged and implemented for conservation purposes and is an example of how a hybrid environmental governance model could be put to work to help achieve the Aichi Targets.

Case study: Adaptive Co-Management of a Wetlands Ecosystem in Sweden

Adaptive co-management of ecosystems is a form of governance that fosters resilient social-ecological systems.[20] In the environmental governance context, resilience is "the degree to which a social-ecological system is capable of self-organization, and the degree to which the system can build and increase the capacity for learning and adaptation."[21] This ability is important in the context of ecosystem conservation, and consequently in achieving biodiversity conservation goals. Adaptive co-management has been characterized as "the combination and operationalization of adaptive management and adaptive governance," with a focus on "functional feedback loops between social and ecological systems."[22] Co-management is premised on the cooperation between diverse sets of actors at different levels; when derived from local sources, this includes citizen groups, organizations, corporations, and municipal governments. Adaptive co-management depends on sharing power and authority among these actors in a manner that facilitates the flow of knowledge and learning.

Ecology scholars Olsson et al. have documented the emergence of an adaptive co-management conservation structure in the Kristianstads Vattenrike (KV) wetlands of Sweden. The KV surrounds the city of Kristianstad in southern Sweden and is an area with significant ecological, historical, and cultural significance. It is a source of rich biodiversity, critical habitat for wildlife, and important ecological services. The KV also has strong anthropocentric value as both a recreational site and a cultural centre.

The development of an adaptive co-management governance system for the KV occurred in three phases. Phase 1 started with building knowledge about the ecological and cultural value of the area, developing strong social networks founded on trust, and establishing clear goals in an adaptable framework.[23] This step was largely realized due to the efforts of an individual citizen concerned with environmental stewardship in the KV.

Phase 2, "seizing a window of opportunity,"[24] was key to changing the trajectory of conservation efforts in the region and built upon the progress made in the first phase. Phase 2 resulted in the development of a new municipal organization called the Ecomuseum Kristianstads Vattenrike (EKV). As a municipal organization, the EKV reported to the municipality board but lacked formal rulemaking authority. The EKV functioned as a "facilitator and coordinator in local collaboration processes," and helped develop policies, produce management plans, engage in reporting and project planning, and acted as a buffer in the instance of conflict between different parties.[25]

Central to the EVK's efforts to create an adaptive co-management system was the development of inventories through collaborative relationships. For example, the relationship between EVK and farmers generated knowledge about agricultural pressures on biodiversity in the protected wetlands. The continuous participation of diverse actors in knowledge generation created a larger pool of resources and information and also feedback loops to help assess the effectiveness of conservation actions.[26]

Phase 2 successfully created the preconditions necessary to establish an adaptive co-management system. The focus in Phase 3 shifted to system resilience. The development of a resilient system relied heavily on the foundation created in Phases 1 and 2. Olsson et al. described a number of social-ecological processes that contribute to the development of resilience, including maintaining relationships between actors, building trust and cooperation between different levels of actors, mobilizing funds, fostering the co-production of knowledge, and developing collaborative goals.

The adaptive co-management conservation structure in place for the KV wetlands is an example of how innovative governance models can be established to achieve desired conservation outcomes. The governance structure was initiated at the individual level, subsequently evolved through different social networks, and led to the creation of a municipal organization that provided an institutional structure to mobilize and coordinate conservation efforts.

ii. Environmental Governance for the Future

Multilevel governance models that challenge the notion that the state is the only actor capable of addressing biodiversity conservation issues are also associated with increased reliance on market-oriented policy devices and the diffusion of power from traditional state agencies.[27] The emergence of multilevel governance models creates both an upward power transfer to international actors and organizations, and a downward transfer of power to local actors.[28] This phenomenon, sometimes described as a "hollowing out"[29] of state power, can work to privatize governance[30] and the "viability of any [non-state market-driven] governance system will be largely determined by whether it can achieve 'legitimacy' to operate."[31] Devolution of power and an increased reliance on market-oriented policy instruments create issues of power, legitimacy, and accountability.[32]

There are a number of key issues that arise in the context of innovations in environmental governance. Foremost is that the introduction of new governance models can lead to buck-passing, avoidance, and a lack of accountability.[33] When actors, drawn from government and non-government sources, converge in complex networks that have blurred boundaries, it can be difficult to ensure accountability. Further, the decentralization of government control and shift of power to non-government actors can potentially lead to uncertain outcomes, especially in novel contexts such as biodiversity conservation.[34] In addition, the stability inherent to traditional institutions has the potential to conflict with the requirement that new governance structures be flexible, adaptive, and iterative.[35]

While linking actors at different levels and from various sources can lead to "greater capacity for monitoring, understanding ecosystem feedback, and fostering appropriate incentives," the same linkages can also raise problems of spatial and temporal fit.[36] Spatial fit relates to the match between institutions and environmental problems. For example, what jurisdiction and capacity do actors have to address conservation issues that transcend traditional boundaries? Temporal fit relates to the match between institutional actions and pervasive and acute conservation issues: How effectively can decision-makers respond to conservation issues in a timely manner, especially in the context of environmental timescales? Due to these issues of fit, hybrid governance models necessitate "strong horizontal and vertical linkages among scientists, managers, resource users/industry, and civic society."[37]

The operationalization and integration of conservation components into municipal planning also requires effective structuring within the municipal organization. In other words, should a discrete branch be created or assigned to address conservation efforts or, instead, should an environmental lens be applied to all planning and regulatory undertakings? Analogously, this approach has been considered in the context of climate change where Canadian cities report "a lack of fiscal, technical and staffing capacity to create and implement" effective mitigation responses.[38] This limitation is likely salient in the implementation and development of biodiversity conservation policies as well, and the structure of conservation efforts within municipalities will largely be influenced by the existing organization of a municipality's bureaucracy and controlled by resource availability.[39] In response, Richardson proposes that municipal organizations might have dedicated staff assigned to departments with broader responsibilities who are tasked with addressing environmental issues.[40] In this model, these staff would act as stewards who are personally committed to achieving conservation outcomes while being fully integrated within existing departments.[41]

Alternatively, a distinct environmental branch might be an effective method of meeting environmental targets.[42] This form of organization was advanced in Vancouver, BC to arrange a municipal climate change program. Specifically, a dedicated "Sustainability Group" was developed to support other departments within the municipality with "incorporat[ing] climate change considerations" into all aspect of municipal activity.[43] The Sustainability Group developed "big picture climate change goals and policy development,"[44] but its success can also be attributed to two key attributes: (1) the Sustainability Group's practice of integrating its staff into other municipal departments. For example, a member of the Engineering Department could be formally organized under the Sustainability Group and provide leadership to achieve climate goals.[45] This practice helped create integration between departments within the municipality; and (2) the Sustainability Group was "well-staffed,"[46] which allowed them to provide support to all other municipal departments while also focusing on achieving their own objectives.

Regardless of the model that is employed, a common thread across successful models is the presence of strong conservation values within organizations, supported by key individuals committed to achieving meaningful outcomes.[47] Local actors and institutions have considerable potential to serve as leaders in

biodiversity conservation to link local action to provincial, national, and even international initiatives. Considering innovations in local governance and the corresponding organizational structures for municipal actors are necessary preconditions to achieving successful biodiversity conservation outcomes.

MEASURING BIODIVERSITY

As municipalities continue to address decreasing biodiversity within their boundaries, the need for measurements marking progress arises; however, selection of appropriate and measurable indicators can be challenging. The Organisation for Economic Co-operation and Development (OECD) defines an environmental indicator as "a parameter, or a value derived from parameters, that points to, provides information about and/or describes the state of the environment, and has a significance extending beyond that directly associated with any given parametric value."[48]

Biodiversity indicators have predominantly included measurements such as patch size, corridor connectivity, density of small patches, and boundary length.[49] However, it is argued that any indicator based on land cover data alone will only provide a rough estimate of biodiversity. Additional information on species richness as well as functional and genetic diversity may also be needed to ensure accurate measurements.[50] Conservation scholars Ulrich Heink and Ingo Kowarik suggest a two-step process in selecting indicators: first, an indicator must be chosen that adequately reflects the aspects of biodiversity that are of interest; second, the indicators should be tested, using sound science, to ensure they meet outlined criteria, moving beyond merely biological criteria but criteria from environmental policy as well as social criteria (e.g., stakeholder perceptions).[51] It is also critical that indicators be associated with a policy target in order to observe its effectiveness.[52] Ecology researchers Nilon et al. conducted a review of city-scale biodiversity initiatives and found that measurable targets for biodiversity and ecosystem services only occurred in a small number of plans, and that specific biodiversity goals were not correlated with specific targets.[53] Experimentation by decision makers and stakeholders may be required in order to achieve effective indicators.[54]

Internationally, the Biodiversity Indicators Partnership (BIP) established 42 indicators to measure national and international progress on the Aichi Targets.[55] The Group on Earth Observations Biodiversity Observation Network has also proposed a list of Essential Biodiversity Variables (EBVs).[56] The list of variables is broken into six groups: Genetic Composition, Species Populations, Species Traits, Community Composition, Ecosystem Structure, and Ecosystem Function. These indicators have also been mapped to the Aichi Biodiversity Targets and the Sustainable Development Goals. Ecology scholars Geijzendorffer et al. suggest that the EBVs and BIP indicators are complementary to improved policy reporting given that the EBVs are a theory-driven approach, whereas the BIP indicator set is more data driven.[57]

Data availability has constrained much of the work in indicator development. However, proponents argue that in order to ensure that biodiversity indicators achieve their goals, it is necessary that there is close cooperation between scientists and policy-makers and that stakeholder values are considered in the development process.[58] A single biodiversity indicator will not work for the wide variety of urban areas, the differing availability of data, and values that are of importance to each individual community.

Urban Primary Land and Vegetation Inventory

In order to manage the extensive natural areas within Edmonton's ecological network, the city recognized that information was needed on land-uses in the region. A primary land and vegetation

inventory was established as a baseline to measure and evaluate land-use change over time. The inventory is air photo-based and spatially referenced. Details on the inventory can be found at: https://data.edmonton.ca/stories/s/What-is-the-uPLVI-/jbuz-8rgn/.

THE VALUE AND COST OF BIODIVERSITY

In Alberta, the new obligations for municipalities to manage their environment in a sustainable manner require a thorough understanding of the economic, cultural, and ecological costs and benefits of the urban and natural environment.[59] Cities depend on the ecosystem services provided by natural infrastructure both within urban areas and beyond urban borders to sustain a high quality of life for their citizens.[60] Historically, cities were often established along riparian areas, ecological transition zones, or other species-rich regions.[61] Access to waterways made for ease of transportation but also led to greater conversion of important ecosystems. Cities continue to struggle to find an appropriate balance between urban biodiversity and complex competing interests.

Ecosystem services are valued because of the benefits they provide to the human population. Trees help cool the urban environment, reducing the heat island effect, while also helping to clean the air and absorb carbon dioxide. Soils, trees, and other plant life provide water regulation services, reducing pressure on built drainage systems, and decreasing the risk of surface water flooding. In addition, urban ecosystems create habitats have been shown to have positive health effects and provide cultural services.[62] A spin-off of protecting ecosystem services for human well-being is that in doing so, opportunities for maintenance, and perhaps even growth, of biodiversity are also created. The challenge lies in how to measure and account for the appropriate economic "value" of biodiversity (along with those of other ecosystem services).

i. Valuing Nature

There are two opposing views on the valuation of nature. Some believe that nature should be valued intrinsically, while others feel the value of nature should be monetized so that it can be included in land-use decisions as well as into calculations of national wealth. When properly managed, ecosystem services may continue to provide services in perpetuity; however, when these services are replaced by built or grey infrastructure, there is a depreciation of the physical infrastructure as it ages and requires updates or renewal. Historically, economic accounting has neglected to include the cost of replacing ecosystem services once they are lost or degraded. Costs of ecosystem decline are also generally not included in municipal budgets, and can thus result in the undesirable conversion of urban ecosystems into built infrastructure.[63] Without the benefits of ecosystem services, municipal costs can rise due to increases in air pollution or noise, for example.[64] In addition, the loss of ecosystem services increases the vulnerability of municipalities in the face of environmental and climactic events and can result in decreased resilience-related insurance values.[65]

Economists use a variety of methods to calculate benefits derived from ecological goods and services. These include replacement cost, avoided cost, stated preference, travel cost, and hedonic pricing models. A brief description of these models is included below for explanatory purposes.

A replacement cost model considers how much it would cost to replace an environmental good with a product sold in the marketplace, whereas an avoided cost model considers the cost avoided of having to purchase a market product due to the presence of an environmental good or service. Avoided or

replacement cost models are often used to value regulating services, such as water level regulation by wetlands or air purification by trees.[66]

Hedonic pricing and travel cost models are types of revealed preference models—models where consumers reveal their preferences through actions they undertake. Hedonic pricing models use real estate transaction data, including the variation among properties with respect to particular environmental characteristics, to isolate the amount of the total sale price of a property that is attributable to that characteristic.[67] Travel cost models operate on the basis that consumers travel to and spend money while consuming environmental goods and, as such, an estimate for the public's willingness-to-pay for such a good represents its value.[68] For instance, there are costs associated with visiting a national park, including the costs of transportation, park entry, accommodations, and even the opportunity cost of time. Using these observable costs, economists can then estimate the value the public associates with having a national park to visit. The downside to a travel cost approach is that it can only be used when there is market information available, which will exclude the estimation of non-use values.[69]

Stated preference methods have been the most frequently used methods to value ecosystem services because they allow for the estimation of non-use values.[70] Unlike revealed preference models, stated preferences are not based on actual market data; instead, they estimate either willingness-to-pay or -accept based on questions answered by the public.[71] Surveys are often used in stated preference models, which can lead to bias and error issues but allow for flexibility in value estimations.[72] However, it can be difficult to translate these studies, which by necessity can only ask participants to evaluate a finite number of items, to reality where people are faced with a myriad of choices daily.

The choice of valuation method can have a significant impact on the estimated value of the ecosystem service. For example, contingent valuation, a type of stated preference model, tends to generate higher statistically significant values than many of the other methods.[73] Other factors can also impact the validity and variety of estimated values; for example, it can be difficult to separate bundles of services and thus double counting may occur.

Environmental scientists De Groot et al. advocate for the use of local information to produce estimates of monetary values for ecosystem services, explaining that population, income levels, changes in the scarcity of the resource, and the marginal values of climate change mitigation can all impact demand or scarcity of the services.[74] This aligns with the geographical differences found in studies of biocultural diversity. A meta-analysis of ecosystem service valuation studies found that the services provided by inland wetlands, freshwater (rivers/lakes), woodlands, and grasslands generated an estimated value of $25,682, $4,267, $1,588, and $2,871 (international $/ha/year), respectively.[75] However, a review of the individual studies used in the meta-analysis shows a wide range of calculated values, illustrating the importance of using local data to generate values. While advocates for monetary valuation of natural resources have been increasingly vocal in the last two decades, it is recognized that monetary values for ecosystem services should be but one tool in a decision-maker's kit. Economic values of biodiversity can add clarity to conversations about the trade-offs between competing land- and resource-use decisions.

While biodiversity and the habitat that supports it are obviously of importance to urban environments, the lack of funding for biodiversity conservation is an impediment to future generations. A report by McKinsey and Company estimated that USD$300–400 billion per year will be required to keep pace with species and habitat loss globally.[76] Provincially, interviews have illustrated a gap between new legislation that requires municipalities to promote environmental sustainability and stewardship and a lack of new funding to promote conservation. To address this gap, cities have been looking for greater provincial and

federal financial support, but municipalities may need to think creatively and look beyond their traditional sources of funding to ensure they can meet their conservation goals.[77]

ii. Financing Municipal Biodiversity Conservation

Governments are currently providing the vast majority of biodiversity conservation funding. In fact, 90 percent of worldwide conservation funding has been sourced to governments.[78] A state-central approach comes with its share of challenges. Citing a Canadian Federation of Municipalities infrastructure report, economic development specialist Andrew Kemp and environmental scholar Amelia Clark explain that in the 20 years leading up to 2011, there has been a consistent offloading of responsibilities by the federal and provincial governments to municipalities, which has been unaccompanied by any additional funding and in fact is often perversely followed by transfer payment reductions.[79]

While the revised *MGA* provides additional authority to Alberta's municipalities enabling them to undertake new types of conservation projects, how are these efforts going to be funded? Without adequate funding or meaningful measures to raise revenues, this expansive delegation of power will be under-utilized. The jurisdictional authority to implement legislation, or in this case bylaws, is meaningless in the absence of the ability to finance exercises of that authority.

There are several options currently available to finance municipal biodiversity conservation, some more traditional, others more innovative. Taxes and subsidies continue to be used as deterrents and supports while a quick search of the literature reveals a growing body of work on conservation investing, a small but expanding segment of the financial world. In addition, an increasing number of provinces and municipalities have begun to issue green bonds. These have been met with high demand from investors; globally, green bonds hit a record $41.8 billion in 2015.[80] Consumers are also demanding greater environmental responsibility; putting pressure on corporations and farmers. These market and citizen demands may create greater opportunities for partnerships between local governments and NGOs and companies who wish to be viewed sustainably.

iii. Taxes and Subsidies

Taxes, charges, and other user fees are a common and relatively straightforward mechanism to raise revenues in support of environmental goals.[81] Taxes are a common instrument used to influence market behaviour because they directly impact the price of a good or service, and in doing so, send a price signal as to what the optimal consumption rate of a good should be. The implementation of a tax could have the dual benefit of discouraging a particular biodiversity-harming behaviour, while simultaneously raising new government revenues. Taxes are also a flexible instrument such that the money raised can be earmarked for further biodiversity conservation funding or the tax could be revenue neutral, in which case the presence of the tax is being used to affect consumer behaviour, but the impact to the consumer is offset through other means.[82] Taxes can also have a re-distributive effect in shifting preferences or funding from one program to another. However, it should be noted that taxes can have disproportional effects on different segments of society and can be seen as both politically and socially undesirable.

In terms of biodiversity-related taxes, a common example is taxes on pesticides and other harmful pollutants.[83] In all of these instances, taxation should limit the use or behaviour that is having a negative impact on biodiversity. By discouraging behaviour that negatively impacts biodiversity, there should be a corresponding increase in biodiversity conservation. Furthermore, if the revenues raised from the taxation

of pesticide use, for example, are then allocated to preservation of biologically sensitive municipal lands, the conservation efforts will be compounded.

The South Okanagan-Similkameen Conservation Program (SOSCP) is an example of an innovative tax instrument that has been implemented in British Columbia on a local level.[84] The SOSCP created a conservation fund that can be accessed by local governments in the Southern Okanagan region for water, habitat, and biodiversity projects. A bylaw enabled the establishment of the fund, and the first tax requisition was in 2017. Local governments are able to "requisition funds through an annual property tax, local area service or fees."[85] Governments are able to opt in to the plan that is administered by the larger regional district. To date, five municipalities have participated, and within the first year $400,000 was paid out from the fund towards conservation projects.

Biodiversity conservation can also be financed through the elimination of biologically harmful subsidies. Similar to the relationship between taxes and tax relief, the elimination of biologically harmful subsidies can be used as a source of revenue that can, in turn, be directed towards programs that promote biodiversity. The OECD has identified six industries where the removal of biologically harmful subsidies could result in positive outcomes for biodiversity: agriculture, water and irrigation, energy, transportation, fisheries, and forestry.[86] For example, "[b]etween 1981 and 1994 Norway reduced subsidies to fisheries by 80%, from USD 150 million to USD 30 million, relieving pressure on marine ecosystems and reducing the burden on government coffers."[87] In addition, Indonesia eliminated pesticides subsidies and three years later saw "record levels of rice production and boasted savings of over USD 100 million."[88] However, the application of this financing instrument within a municipal context may be limited because municipalities are generally not the level of government providing industry-focused subsidies.

iv. Offsets and Mitigation Banking

Biodiversity offsets and mitigation banking have the potential to create markets where a system resembling tradable property rights are used to finance and conserve biodiversity credits.[89] The concept behind biodiversity offsets is that development should be managed in such a way so that there is, at a minimum, no net loss of biodiversity.[90] To achieve this, any actor that wishes to undertake an activity that has a harmful effect on the environment could be required to offset that activity so that there is no resulting decrease in biodiversity at the relevant ecosystem scale. Conversely, under a credit banking system, if an actor positively contributes to biodiversity conservation, credit for that gain can be banked or sold. In this way, biodiversity assets can be seen as something similar to property. If a development will negatively impact the environment, the developer will, in essence, purchase the right to cause damage via an offset credit. Currently offsets markets are not enabled in Alberta, though provisions for doing so are contained within the *Alberta Land Stewardship Act*. The provincial government will likely need to take initiative to establish a regulating body for offsets to be traded successfully within a market setting.[91]

v. Conservation Finance

Conservation investing is defined as "an investment intended to return principal or generate profit while also driving a positive impact on natural resources and ecosystems."[92] In the 2004–2013 period, private investment in conservation more than doubled, while private investment in habitation mitigation banking quadrupled.[93] However, there are several challenges to expanding the conservation investment market including the ability to clearly define conservation benefits and the difficulty in assigning monetary values to said benefits. These challenges can limit incentives for investors. Proponents of conservation finance

have identified several steps to augment this segment of the market, including connecting markets for conservation, creating an enabling environment, clear governance, establishing trusted monitoring and evaluation institutions, and ensuring transparency.[94]

If the government is a partner in the conservation effort, then the return on investment might be produced through savings in another area such as health or education,[95] but opponents of conservation investment claim it is a form of "greenwashing."[96] Professor of Geography Kelly Kay notes that the North American conservation finance industry is made up of a number of small firms that focus on farmland, ranchland, or timberland—all landscapes with easily quantified resources.[97] The firms then break these parcels into various revenue streams and gain profits through one of three major sources:

- Real estate sales and revaluations;
- Public money, paid for things like conservation easements or federally funded soil and water restoration programs, tax deductions, etc.; and
- The sale of the natural resources (crops, wood products, beef).[98]

It is argued that returns generated from these "conservation investments" are simply the redistribution of public funds or are being produced through continued resource extraction.[99] In addition, private equity firms are not required to pay full market value for the land and other interests, a legal and financial limitation for NGOs and government.[100]

vi. Corporate Responsibility

Consumer demand of environmental sustainability is growing and corporations have been responding. Corporations have two main motivations for participating in environmental programs: to promote their environmental image and to ensure the longevity of their resource supply chain.[101] As an example, global corporations are now examining their sources of palm oil, a cost competitive and versatile vegetable oil that is used widely in products ranging from food to cosmetics. The negative public outcry over the loss of native rainforest habitat in Indonesia and Malaysia because of the creation of monoculture palm plantations led to the creation of a certification mechanism for responsibly sourced palm oil. Nestlé has established a responsible sourcing standard and is now working to ensure all palm oil used in their products is responsibly sourced and results in no deforestation by 2020.[102]

As witnessed in the organic or "natural" marketplace, products with ecological claims can also command a price premium, thus differentiating the market for producers. Private-public partnerships for biodiversity conservation are a possibility for local companies hoping to improve their environmental image. However, if there are no regulations requiring sustainable production, there are no assurances of conservation beyond what the market demands.

vii. Green Bonds

Green bonds are "bonds intended to encourage sustainability and to support climate-related or other types of special environmental projects."[103] Green bonds are used to fund projects with specific environmental benefits. The Government of Ontario is the largest issuer of green bonds in Canada and considers projects in the categories of clean transportation, energy efficiency and conservation, clean energy and technology, forestry, agriculture and land management, and climate adaptation and resilience to be eligible for green bond status. Green bond yields are typically similar to conventional bonds of

comparable term and similar size. Within Ontario, the Auditor General is responsible for verifying that the amounts raised are used for the selected projects. The list of Canadian green bond issuers is small but growing; Export Development Canada, the provinces of Ontario and Quebec, and the cities of Ottawa, Toronto, and Vancouver have all issued green bonds.[104] The City of Ottawa issued approximately $100 million in green bonds in 2017 and was the first municipality in Canada to do so.[105]

There is the potential for green bonds to be used in the conservation realm. To date they have predominantly been targeted towards renewable energy and energy efficiency projects, but there is a small portion of bonds termed "conservation bonds" that address sustainable land-use and biodiversity conservation.[106] Alberta has yet to issue any green bonds, but given the oversubscription of bonds in other jurisdictions, there is the potential to augment this section of the market.

viii. Development Fees and Levies

An additional tool of interest is the use of development fees for improvement of natural areas. There is at least one such example in Canada; the Town of Gibsons, British Columbia mandated that collected development fees can be put towards improvements to natural areas that support service delivery.[107] Within Alberta, there are two primary types of levies that are available to municipalities under the *MGA*. First, sections 647 and 648 describe the use of development levies and off-site levies, respectively, to raise revenues in support of infrastructure-related projects.[108] Alta Reg 187/2017 *Off-Site Levies Regulation* dictates how municipalities administer and calculate levies. It specifies that levies can be used for sewers, water, drainage, and roads, as well as for lands for firehalls, recreation centres, police station facilities, and libraries. The *MGA* also specifies that redevelopment levies can be used for land for a park or land for school buildings.[109] A need exists for greater exploration of this tool to meet municipalities' conservation goals; however, excessive levies could have the unwanted effect of halting development or adding additional costs for homebuyers.

Much like Alberta's *MGA*, British Columbia's *Local Government Act*[110] allows municipalities to impose development cost charges to offset the cost of having to provide infrastructure within a new development. Given that the charges are available to fund sewage, water, draining, and parkland acquisition and improvement, the Town of Gibsons amended their bylaws so that charges could be imposed for "the capital costs of new projects for some drainage natural assets that directly or indirectly service the development for which the charge is being imposed. The Town now collects charges for improvements to natural areas."[111]

While the approach taken by the Town of Gibsons focuses on the provision of municipal services by natural assets, it is reasonable to expect a corresponding biodiversity benefit. Preserving ponds or other natural wetlands that are connected throughout the city such that they function as stormwater storage would also effectively preserve the native habitat for the species that use this land-type as habitat.

The second and potentially more flexible levy mechanism that is available to Alberta's municipalities by way of the *MGA* is the community revitalization levy (CRL).[112] The general purpose of this levy is provided in section 381.2(2):

> (2) A community revitalization levy bylaw authorizes the council to impose a levy in respect of the incremental assessed value of property in a community revitalization levy area to raise revenue to be used toward the payment of infrastructure and other costs

> associated with the redevelopment of property in the community revitalization levy area.[113]

In simpler terms, the CRL grants municipalities the ability to "borrow against future property tax revenues to help pay for infrastructure required to spur new development in specific areas."[114]

In 2007, the City of Calgary enacted a CRL known as the Calgary Rivers District CRL with the broad objective that "this new financing mechanism is designed to provide up to 20 years of stable funding, which is necessary to achieve economic, social and environmental objectives for the Rivers District."[115]

More recently, the City of Edmonton approved a CRL targeted at the downtown core.[116] While the motivation for the CRL may have been to construct a new arena and revitalize the surrounding areas, there are some environmental components to the project. Specifically, the CRL includes creating a "[g]reen and walkable downtown," extending the trail system within the City's river valley, and creating a central park.[117]

Both Calgary and Edmonton have already alluded to environmental benefits within their respective CRLs, and the Government of Alberta, which must ultimately approve CRLs, notes that remediating environmental damage and improving environmental conditions through building practices are benefits of the CRL.[118]

ix. Looking Forward

While the "green" financial market is growing, there is a need to clarify how it will function to both support conservation while generating a return for investors. Due to its government backed rates, the green bond market shows great promise as a conservation tool, but there may be other means to meet the conservation goals of municipalities—be it through public-private partnership or changes to legislation that dictate how levies can be used.

As the Town of Gibsons example demonstrates, an effective financing plan for biodiversity may first require an accounting or valuation of the biodiversity assets within the municipality's jurisdiction. From there, it is open to the municipalities to assess whether a tax or other direct charge should be implemented or whether the establishment of a conservation market or property rights regime will be more effective. Biodiversity offset programs are becoming more common place, and there may yet be undiscovered potential for development levies, including the use of the CRL, to play a role in biodiversity financing.

While there are challenges for municipalities in adequately financing biodiversity conservation, there are examples of municipalities both in Canada, and around the world, using innovative financing mechanisms to achieve biodiversity conservation objectives. While local governments will play a key role in preserving biodiversity, externality issues and large funding requirements mean that all three levels of government, as well as the general public and private organizations will have to bear some responsibility. Biodiversity conservation is an issue that requires practical, innovative solutions and a collective financing approach because in the end "conservation without money is just conversation."[119]

CITIZEN ENGAGEMENT

Engaged citizens who understand the importance of biodiversity and support biodiversity programs initiated by municipalities are necessary to achieve the transformational change required to combat biodiversity loss in Alberta. An electorate who values the natural world and is interested in taking positive steps to preserve it will take more interest in land-use decision-making and the preservation of habitat. The importance of an engaged population is recognized in global efforts to counter biodiversity loss; the first strategic objective of the Aichi Targets is to "[a]ddress the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society" and the objective of associated Aichi Target 1 is to make sure that "people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably." Without local engagement, achieving national and global biodiversity goals becomes more challenging. In addition, citizens who are engaged locally will likely be concerned about global biodiversity and will demand greater political and corporate responsibility and tolerance of innovative action.

Canada's increasingly urbanized population increases pressure on urban greenspaces that exist at municipal boundaries and within cities. These greenspaces connect habitat and provide ecosystem services, including cultural services and the documented health benefits that are associated with spending time in nature. Conservation groups and municipalities have begun encouraging urban dwellers to improve backyard biodiversity by planting native species, creating habitats for local wildlife (e.g., frogs, bees, and bats), and reducing the use of pesticides and herbicides to create a hospitable environment. Imagine a city where individual yards provide necessary links with wild green spaces to increase habitat connectivity and boost biodiversity. Appendix II provides examples of ways that urban property owners can connect their yard to urban biodiversity conservation.

All levels of government and non-governmental organizations across the province are engaging with citizens to increase awareness about the important role that biodiversity plays in creating healthy, happy urban and rural spaces with the hope that these citizens will value and fight to preserve the remaining wild spaces in Alberta. A few of the numerous programs are featured below to illustrate their wide reach and variety. These programs provide examples of three means by which municipalities can engage citizens to preserve biodiversity: Urban Green Infrastructure; Environmental Education and Literacy; and Citizen Scientist and Stakeholder Initiatives.

Battle River Watershed Alliance: Make your Map Project[120]

Participants in this two-day program created maps to identify special places in the watershed. They considered the values—social, ecological, economic and cultural—and experiences that made certain locations significant to them. The result was individual maps highlighting special areas of the Battle River Watershed and a collaborative map that included areas of personal but also community significance. Citizens develop place attachment to areas of special importance for a variety of reasons, and studies have found a direct correlation between place attachment and a person's willingness to protect or preserve places.

i. Urban Green Infrastructure

Investments in Urban Green Infrastructure (UGI) are one way that cities around the world have been promoting municipal environmental engagement and stewardship. UGI refers to "an interconnected

network of green and blue spaces, which together deliver ecosystem benefits to society."[121] UGI focuses on strategic development that encompasses connectivity and green-grey integration. One example of UGI is the incorporation of additional high-quality green spaces into future development projects to avoid the creation of fragmented natural areas within a municipality. UGI encourages human-nature interaction, providing health benefits to citizens and promoting community appreciation and respect for the environment.

Green space development began to emerge as a priority for Canadian municipal governments in the 1960s and 1970s. Municipal administrative structures responsible for green space management were significantly changed during that time. For example, the now-common partnership of "parks and recreation" functions in municipal government is a relatively new phenomenon. These two concerns were generally separate branches before WWII.[122] Today, municipal green space continues to serve ecological, recreational, and infrastructural purposes.

In addition to the many ecologic and cultural benefits UGI provides to residents, it is also contributing to Canada's *CBD* targets. Urban or municipal parks can be considered as "other effective area-based conservation measures" as defined by the International Union for Conservation of Nature under the secondary conservation division:

> Urban or municipal parks managed primarily for public recreation but which are large enough and sufficiently natural to also effectively achieve the in-situ conservation of biodiversity and which are managed to maintain these biodiversity values.[123]

In order to meet Canada's national biodiversity goals, recognition of the important role UGI plays in biodiversity conservation will be critical.

ii. Environmental Education and Literacy

A second way municipalities can engage with citizens is through increased environmental education and literacy. There are numerous school programs that engage with youth, while city-run programs such as the internationally-recognized Master Naturalist Program focus on engaging adults.[124] The Master Naturalist Program was lauded for its innovative model and focus on urban biodiversity. The program offered training to Edmontonians who were interested in learning about ecology and naturalization and who wanted to be involved in stewardship of local natural areas. All Master Naturalists completed 35 hours of training and were required to complete 35 volunteer hours. Unfortunately, this program is no longer offered by the City of Edmonton due to shifts in funding priorities.

Red Deer Pollinator Parks

Pollinator species play an important role in ecosystem health. Pollen sticks to the legs and bodies of pollinators such as bees, beetles, butterflies, and moths, who then spread the pollen to other plants when they land on them. Cross-pollination is essential for plant reproduction and fruit formation.

Globally, the decline of pollinator species, specifically bees, has become an alarming trend. Red Deer offers one example to encourage the involvement of the local community. The City of Red Deer has devoted four city parks as "Pollinator Parks". These include Bower Ponds Park, City Hall Park, Snell Gardens, and Maskepetoon Park.

Proper planning and management are crucial to developing successful environments for pollinators. Pollinator parks provide habitat, food, and nesting sites. Both indigenous and non-indigenous plant species are chosen to ensure a consistent supply of food and nectar throughout spring, summer, and fall. For example, woody, berry-producing plants that bloom in the early spring months are balanced out with late summer blooming patches of Aster flowers. Access to areas of dead wood, rock piles, and open soil provide nesting sites. In these dedicated parks, the city does not use pesticides, grass is left unmown, and weeds are hand-picked.

Pollinator parks and corridors are a great way for municipal parks to showcase plant species that homeowners can use in their own gardens and backyards to help local pollinator population. Providing plant species and habitat facts on signage in parks as well as lists of plants on the municipal government or parks department websites are an opportunity to spread educational information about local biodiversity conservation.

Calgary: Bioengineering Demonstration and Education Project

The City of Calgary has partnered with Alberta Environment and Parks to improve fish habitat and stabilize slopes between Pearce Estate Park and the Inglewood Bird Sanctuary. Using bioengineering to re-contour the shore, the project hopes to control erosion, create fish and wildlife habitat, improve water quality, and increase resiliency in the face of future flood and drought. The project will increase knowledge of bioengineering techniques while investigating benefits to the wider watershed.

iii. Citizen Science and Local Stakeholder Engagement

A key hindrance impeding local environmental stewardship globally is the gap "between science and policy, local government access to research findings, and communication of research to stakeholders."[125] To address this, local stakeholders such as ecologists, developers, citizens, and students—each with distinct interests—should be encouraged to "join in collaborative networks to share data, engage in interdisciplinary research" and explore novel environmental management strategies.[126]

Citizen science (CS) programs are a unique opportunity for municipalities to utilize the localized efforts of citizens in environmental and conservation initiatives. CS initiatives are a cost-effective way of gathering environmental and species data; "[t]he involvement of non-professionals in scientific research and

environmental monitoring… has now become a mainstream approach for collecting data on earth processes, ecosystems, and biodiversity."[127]

CS programs have the potential to expand the scale of both data collection and stewardship activities at the municipal level on both a spatial and temporal scale.

> Most biodiversity-oriented CS programs aim to record the location and abundance of species through time. These observations are used to monitor population trends and geographic range dynamics […]. Most of these programs contribute largely to collaborative projects, rely on high participation rates to reduce data errors, and in many cases, there is little or no formal training required for participation.[128]

A variety of citizen science programs are in operation across the province. The NatureLynx Program is a new citizen scientist app produced by the Alberta Biodiversity Monitoring Institute. The public uploads biodiversity sightings, including both flora and fauna, have the data verified by experts, and participate in "missions" to learn about the natural world. Calgary Captured recruits citizen scientists to identify wildlife captured by motion activated remote cameras to better understand local biodiversity and where wildlife occurs in the city. The information gathered through the online tool will help the city meet commitments outlined in its BiodiverCity strategy and the Municipal Development Plan. Bioblitzes are also growing in popularity. A Bioblitz is a short period of coordinated observation by large groups of citizens. Bioblitzes cover the whole gamut of living species; however, there are also short- and long-term monitoring programs as well as one day counts for specific types of flora or fauna such as the long-standing Christmas Day bird count.

Okotoks Wildflower Mission

The Town of Okotoks partnered with NatureLynx to undertake a wildflower mission. The mission asked community members to help them identify native wildflowers in their town by sharing photos taken between June 24 and July 31, 2019. The information gathered will help the town gain a better understanding of the native biodiversity that exists in the areas as well as the flowering times of these species.

Frequently, the discussion around what can be done at the municipal level to enhance biodiversity and environmental stewardship gets stalled at the point of funding. Implementing educational programs or building green infrastructure requires money. Through the amended municipal purpose, the provincial government is transferring additional responsibility to municipalities, while failing to provide either (a) an increase in funding to accomplish this purpose, or (b) a mechanism through which municipalities can generate their own revenue streams to finance such initiatives.

The role of the modern municipality is constantly evolving. By virtue of their close connection to the community, municipalities are uniquely positioned to contribute to the conservation and stewardship of the environment and biodiversity. Actions such as innovative bylaws, UGI development, and CS programs are all mechanisms that can be utilized at the municipal level. Engaged citizens will favour biodiversity-friendly municipal plans and initiatives and will help ensure that the natural environment is protected and cared for in their region.

Endnotes

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[121] Joachim Maes et al, "More green infrastructure is required to maintain ecosystem services under current trends in land-use change in Europe" (2014) 30:3 Landscape Ecology 517 at 518.
Green infrastructure is defined as "an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations" M.A. Benedict and E.T. McMahon, "Green infrastructure: Smart conservation for the 21st century" (2002) 20 Renewable Resources Journal at 12.
The concept of blue infrastructure builds on this definition to include water-based infrastructure including ponds, wetlands, pools, etc.

[122] Lois Lindsay, "Green Space Acquisition and Stewardship in Canada's Urban Municipalities: Results of a Nation-wide Survey" (2004), online (pdf): *Evergreen* <www.evergreen.ca/downloads/pdfs/Green-Space-Canada-Survey.pdf> at 3-4; Canada Parks & Recreation Association, *Guidelines for Urban Open Space Planning: A Report to the Ministry of State for Urban Affairs and the Steering Committee*, by TL Burton, JB Ellis & HPM Homenuck (1977).

[123] IUCN & WCPA, *Guidelines for Recognizing and Reporting Other Effective Area-Based Conservation Measures* (2019) at 27-28, online (pdf): *IUCN* <www.iucn.org/sites/dev/files/content/documents/guidelines_for_recognising_and_reporting_oecms_-_january_2018.pdf>.

[124] See Maya Filipovic, "Connecting with Nature Thorough the Master Naturalist Program" (27 March 2015), online: *Transforming Edmonton* <transformingedmonton.ca/connecting-with-nature-through-the-master-naturalist-program/>.

[125] Myla FJ Aronson et al, "Biodiversity in the city: key challenges for urban green space management" (2017) 15:4 Frontiers in Ecology & the Environment 189 at 195.

[126] *Ibid.*

[127] Mark Chandler et al, "Involving Citizen Scientists in Biodiversity Observation" in Michele Walters & Robert J Scholes, *supra* note 56, 211 at 212.

[128] *Ibid* at 214.

KEY FINDINGS AND RECOMMENDATIONS

The proposition that local governments are well positioned and indeed sometimes best positioned to address environmental issues, including the protection of biodiversity, is gaining traction in Canada. The principle of subsidiarity, as interpreted and applied by the Supreme Court of Canada, provides an evolving legal backdrop for enhanced local biodiversity conservation action that complements and possibly exceeds provincial and federal initiatives. Moreover, the recent changes to Alberta's *Municipal Government Act* and accompanying *City Charter Regulations* provide the legal authority to occupy a prominent position in innovative biodiversity conservation efforts.

Through its participation in the *CBD*, Canada's federal government has committed to the Aichi Biodiversity Targets and has implemented these objectives domestically. Nevertheless, the federal government recognizes that it needs to enlist the participation of subnational governments and also citizens if it is to reach its targets. Municipalities and Indigenous communities, in particular, have been identified as essential partners to help guide and support the federal government's efforts to achieve its biodiversity goals.

Inherent to the principle of subsidiarity and reinforced by the increasing devolution of power to local levels is the concept of local biocultural diversity. Humanity's impact on the environment is undeniable. Human relationships with the natural world, both individually and collectively, are molded by our surroundings, our experience, and our cultural and social constructs. Recognizing this, implicitly or explicitly, governments and organizations continue to work to build relationships between people and the local environment through school programs, citizen science programs, and the expansion and integration of green and blue spaces in urban areas.

Municipalities can play a key role in maintaining and enhancing biodiversity through a variety of means including reducing the ecosystem impact of urban sprawl through densification; ensuring connected natural areas; crafting bylaws to support green roofs, urban agriculture, and vegetative cover; and identifying the advantages of green and blue infrastructure and valuing it appropriately. Municipalities also face a number of challenges to biodiversity conservation, such as the struggle to find financial resources for conservation and a lack of political will to make land-use decisions that conserve habitat effectively. Improvements to and augmentation of funding, governance, and citizen engagement are critical to support the long-term viability of native habitats.

In sum, it is essential that Alberta's municipalities continue work to identify and safeguard key ecological areas by "promoting biodiversity mainstreaming through stakeholder engagement and integrative planning."[1] Municipalities are recognized contributors to biodiversity conservation and great strides have been made to increase habitat connectivity. These efforts should be augmented with additional measures and innovative governance models should be created to harness local power and initiative.

RECOMMENDATIONS

This study supports seven recommendations for action or future study:

1. Municipalities conduct a quantitative biodiversity survey to establish a baseline for the status of the local environment. Ideally, this survey should be iterative and on-going to maintain an up-to-

date portfolio. Furthermore, this survey should be completed with the assistance of existing organizations and institutes to capitalize on local expertise and to build relationships.

2. Municipalities carry out a thorough evaluation of green and blue infrastructure in urban areas and any supporting infrastructure with neighbouring communities. Properly accounting for ecosystem services will ensure that they are valued appropriately and considered by decision-makers. Specifically, this will make certain that natural areas of high importance are identified for protection.

3. Municipalities explore the policies and economic tools that impact biodiversity conservation, and highlight those that are most harmful to biodiversity. Other pertinent areas of exploration include using property taxes to encourage biodiversity conservation, as well as the elimination of tax breaks for entities who may be engaged in activities detrimental to biodiversity.

4. Municipalities create, maintain, or re-instate biodiversity-related municipal citizen-engagement programs (e.g., Edmonton's Master Naturalist program). Increased collaborations between municipalities and local non-governmental organizations should be pursued to enhance citizen engagement through education, workshops, or stand-alone events. A related research project could examine the outcomes of these programs on biodiversity management and land-use decision-making.

5. The provincial and federal levels of government develop funding programs that provide access to funds for a variety of local or regional biodiversity projects at different financial or geographical scales. This could be coupled with an investigation of financing mechanisms used in other jurisdictions (e.g., the use of development levies to support natural ecosystems providing key services to an urban area).

6. Municipalities create additional municipal biodiversity conservation-focused bylaws and programs that capitalize on the expanded regulatory authority over environmental issues created by the recent amendments to the *Municipal Government Act*. These additional actions should focus on initiatives that complement existing bylaws and policies. Future research should examine the efficacy and legality of these bylaws and programs as they are created.

7. Municipalities and researchers examine concrete and measurable ways that biodiversity conservation can be incorporated into cooperative regional and municipal planning processes. The IPBES *Global Assessment Report on Biodiversity and Ecosystem Services* advocates for the inclusion of "biodiversity protection, biodiversity offsetting, river basin protection and ecological restoration in regional planning."[2] The *South Saskatchewan Regional Plan* has described a "Biodiversity Management Framework," but the framework has yet to come to fruition despite the plan being finalized in 2014.

Canada—and Alberta—are not immune from the current biodiversity crisis. The clock continues to tick for the remaining natural areas and the habitat it constitutes within Alberta's municipal borders. A growing and increasingly urbanized population threatens what remains of these important wild spaces. The provincial legal framework is generally supportive of the value of local environment decisions, and in fact, with the 2017 amendments, now requires municipalities to play a role in sustaining habitats and biodiversity, yet the lack of financial resources to accompany these new powers limits their effectiveness. The major urban centres in Alberta may be better positioned financially to conserve lands than their rural

counterparts, but the long-term sustainability of this transfer of power is questionable; its success is reliant on municipalities envisioning innovative funding mechanisms to support urban biodiversity and having the drive to enact them. Despite these limitations, it is incumbent upon local governments to build upon existing conservation measures in innovative ways.

Endnotes

[1] Sandra Díaz et al, "Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services" (2019) at 34, online (pdf): *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* <www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf>.
[2] *Ibid* at 34-35.

APPENDIX I

IMPORTANT LEGISLATIVE PROVISIONS

***Municipal Government Act,* RSA 2000, c M-26**

7(1) A council may pass bylaws for municipal purposes respecting the following matters:

(h.1) the well-being of the environment, including bylaws providing for the creation, implementation and management of programs respecting any or all of the following:

(i) Contaminated, vacant, derelict or under-utilized sites;
(ii) Climate change adaptation and greenhouse gas emission reduction;
(iii) Environmental conservation and stewardship
(iv) The protection of biodiversity and habitat
(v) The conservation and efficient use of energy
(vi) Waste reduction, diversion, recycling and management

617(b) To maintain and improve the quality of the physical environment within which patterns of human settlement are situated within the boundaries of the City, including the promotion of environmental sustainability and stewardship.

622(1) Every statutory plan, land use bylaw and action undertaken pursuant to this Part by a municipality […] must be consistent with the land use policies established under subsection (2) and any former land use policy.

(2) The Lieutenant Governor in Council, on the recommendation of the Minister, may by regulation establish land use policies and rescind former land use policies.

(3) If there is a conflict between a land use policy established under subsection (2) and an ALSA regional plan, the ALSA regional plan prevails.

(4) Former land use policies do not apply in any planning region within the meaning of the Alberta Land Stewardship Act in respect of which there is an ALSA regional plan.

(5) In this section, "former land use policy" means a land use policy that was established under section 622 as it read before the coming into force of this subsection and that has not been rescinded under subsection (2).

664(1) Subject to section 663, a subdivision authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide part of that parcel of land as environmental reserve if it consists of

(a) a swamp, gully, ravine, coulee or natural drainage course,
(b) land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or
(c) a strip of land, not less than 6 metres in width, abutting the bed and shore of any lake, river, stream or other body of water for the purpose of
    (i) preventing pollution, or
    (ii) providing public access to and beside the bed and shore.

(2) If the owner of a parcel of land that is the subject of a proposed subdivision and the municipality agree that any or all of the land that is to be taken as environmental reserve is instead to be the subject of an environmental reserve easement for the protection and enhancement of the environment, an easement may be registered against the land in favour of the municipality at a land titles office.

664.2(1) A subdivision authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide part of that parcel of land to the municipality as Conservation Reserve if

(a) In the opinion of the subdivision authority, the land has environmentally significant features,

(b) The land is not land that could be required to be provided as Environmental Reserve,
(c) The purpose of taking the Conservation Reserve is to enable the municipality to protect and conserve the land, and
(d) The taking of the land as Conservation Reserve is consistent with the municipality's municipal development plan.

(2) Within 30 days after the Registrar issues a new certificate of title under section 665(2) for a Conservation Reserve, the municipality must pay compensation to the landowner in an amount equal to the market value of the land at the time the application for subdivision approval was received by the subdivision authority.

(3) If the municipality and the landowner disagree on the market value of the land, the matter must be determined by the Land Compensation Board

City Charter Regulations, Alta Reg 40/2018 & Alta Reg 39/2018

615.5(1) In this section,
(a) "exposure" means the extent to which a system is exposed to significant climatic variations or other effects of climate change
(b) "risk" means the combination of the probability of an effect of climate change and the severity of its possible consequences
(c) "systems" includes human, animal and plant life, environmental ecosystems and resources, roadways, buildings and other infrastructure, human livelihoods, services and economic, social and cultural activities
(d) "vulnerability" means the degree to which a system is susceptible to, and would be unable to cope with, climatic variations or other effects of climate change

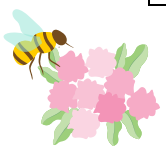
(2) The City must, in accordance with this section, establish a plan for adapting to effects of climate change

(3) A CCAP must:
(a) be based on an assessment of the exposure, risk and vulnerability of systems within the City to effects of climate change over the short, medium and long term
(b) set out or summarize the assessment referred to in clause (a), and
(c) identify actions that will be taken to address the effects referred to in clause (a)

(4) Actions identified under subsection (3)(c) may include actions to be taken respecting:
(a) asset management,
(b) use of climate-resilient infrastructure,
(c) stormwater management,
(d) flood preparedness,
(e) City-owned and City-operated energy and utility cables
(f) water and sanitation
(g) public safety
(h) health and social resilience
(i) biodiversity management
(j) invasive species, or
(k) any other matter the council considers appropriate

***Public Lands Act,* RSA 2000, c P-40**

3(1) Subject to subsection (2) but notwithstanding any other law, the title to the beds and shore of
(a) All permanent and naturally occurring bodies of water, and
(b) All naturally occurring rivers, streams, watercourses and lakes,
Is vested in the Crown in right of Alberta and a grant or certificate of title made or issued before, on or after May 31, 1984 does not convey title to those beds or shores.



Appendix II


BIODIVERSITY?
Biodiversity is the variety of life around us. It can refer to genetic diversity, species diversity and ecosystem diversity.
WHY IS IT IMPORTANT?
We benefit greatly from nature. Wetlands buffer against floods. Bees help grow food. Trees clean the air. Even in urban areas nature is still critical to our well-being.
URBAN HABITAT
Your yard is one piece of habitat that is connected to the broader urban ecosystem.
URBAN BIODIVERSITY?
YOUR LOCAL GOVERNMENT...
Has a legal responsibility to foster the well-being of the environment.
Is working to engage citizens in biodiversity conservation.
Understands the importance of trees to health and well-being.
Is working to maintain and create greenspace through land acquisitions and reserves.
YOUR URBAN BACKYARD
Can provide habitat for animals, birds and insects
Can be an oasis of native species
Can be pesticide and fertilizer free
Can contribute to the urban forest canopy
Can meaningfully impact urban biodiversity
WHAT CAN I DO?
There are many ways you can help enhance biodiversity in your own backyard and get involved with biodiversity conservation in your community.
NATURESCAPING
Embrace naturescaping over landscaping – plant native species and build habitat for birds, insects, reptiles or amphibians.
GET INVOLVED
Get involved in a citizen science program (e.g. Naturelynx or an annual bird count).
EDUCATE YOURSELF
Learn more about nature through local conservation organizations.
GO OUTSIDE
Go on a hike and immerse yourself in nature.
INSPIRE OTHERS
Spread the word, tell your friends and write to your local politician.