From Urban Forests to Neighbourhood Treescapes: An Examination of Power, Actors and Processes in Champlain Park, Ottawa

by

Alexander I. Copp

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial fulfillment of the requirement for the degree of

Master of Arts

in

Geography

Carleton University
Ottawa, Ontario

© 2016

Alexander I. Copp

From Urban Forests to Neighbourhood Treescapes: An Examination of Power, Actors and Processes in Champlain Park, Ottawa

by

Alexander I. Copp

Master of Arts

Department of Geography and Environmental Studies

Carleton University

2016

Abstract

This research examines the asymmetries of power that exist between a variety of actors when addressing issues of Ottawa's urban forest. Champlain Park, a mature neighbourhood within Ottawa, was identified as a case study because of persistent infill development pressures and the presence of bur oak, a unique tree to the region. Through semi-structured interviews and supporting secondary materials, a discourse analysis was used to reveal key perspectives of the various actors involved in shaping the neighbourhood treescape of Champlain Park. This research highlights how dominant discourses supporting the neoliberal compact city privilege developers in decision making over the urban forest at the expense of community residents. It also reveals an inherent tension within the municipal government between its Forestry Services and the Planning Department. This research argues that a neighbourhood or community scale, the scale of the treescape, is also an important scale - but often neglected - for the management of the urban forest. This work argues that the urban forest should therefore be re-imagined as a mosaic of treescapes.

Acknowledgements

I would like to extend a deep thanks to my advisor Jill Wagle of the Department of Geography and Environmental Studies at Carleton University, and committee member Joanna Dean of the Department of History at Carleton University. I am appreciative of their time, patience and commitment in advising me throughout the research process. I would like to give special thanks to John Milton for acting as a mentor throughout this process and for his continued support in pushing me when times got tough. I thank all the participants in this research whose input in this project allowed it to be possible. A special thanks to Daniel Buckles and Heather Pearl for providing such insight and useful resources toward the case of Champlain Park and the bur oak. Finally, I would like to thank my parents and brother for supporting me throughout the duration of my graduate studies.

Table of Contents

Title page	i
Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Tables	viii
List of Figures	ix
List of Appendices.....	xi
Chapter 1. Introduction	1
1.1 The Focus of the Thesis	2
1.2 The Bur Oaks of Champlain Park.....	3
1.3 Organization of the Thesis.....	5
Chapter 2. Literature: The Shaping of the Urban Forest	7
2.1 Beautification and Urban Planning	8
2.2 Urban Ecology: The Emergence of the Urban Forest and Ecosystem Services Through Ecological Thought.....	12
2.2.1 Dutch Elm Disease: A Pest Sparking a Focus on Urban Trees	13
2.2.2 Urbanizing the Field of Ecology.....	14
2.2.3 Ecosystem Services: Popularizing Urban Nature and the Urban Forest	18
2.3 Social Nature, Sustainable Development and the Urban Forest	22
2.3.1 Critical Urban Political Ecology and the Production of Nature	26
2.3.2 Framing Sustainable Development and the Urban Forest	30

2.3.3 The Neoliberal Urban Forest.....	39
2.4 Summary	43
Chapter 3. Research Approach and Design	45
3.1 Research Questions.....	46
3.2 Methodology: A Qualitative Case Study	47
3.2.1 Case Study Research	50
3.3 Research Methods.....	51
3.3.1 Interviews	51
3.3.1.1 Interview Design and Questions	54
3.3.1.2 Recording and Transcribing the Interviews.....	55
3.3.2 Secondary Literature.....	56
3.3.3 Organization and Analysis of Source Material.....	57
3.3.4 Site Visits and Observation	59
3.4 Ethics	59
3.5 Limitations of Research	59
3.6 Summary	60
Chapter 4. The Struggle over Urban Space: Managing the Urban Forest and Urban Planning.....	61
4.1 Seeing the Trees and the Forest : Ottawa’s Urban Forest and Champlain Park’s Treescape.....	61
4.1.1 Ottawa’s Urban Forest	63
4.1.2 Champlain Park and the Bur Oak Case Study.....	68
4.1.3 History of Champlain Park	70

4.2 Lot Sizes and Infill Development.....	76
4.2.1 Space for Trees versus Space for Development.....	83
4.3 Summary	86
Chapter 5. Findings and Analysis: The Case of Champlain Park	88
5.1 The Key Actors in Shaping Champlain Park’s Treescape.....	88
5.1.1 The Key Actors of Champlain Park: Who Matters?	90
5.2 How Champlain Park’s Treescape is Perceived.....	92
5.2.1 The Perspective of the Resident and the Community.....	94
5.2.2 The Position of the Developer.....	96
5.2.3 The Perspective of the Municipality	99
5.2.4 The Perspective of the NGOs	102
5.2.5 Summary of Perspectives and Positions.....	106
5.3 Influence over the Treescape.....	107
5.3.1 The Process of Infilling in Champlain Park	110
5.3.2 Rules of the Game Through Regulations and Enforcement: Are Trees Being Protected?	115
5.3.3 Power over the Urban Forest in a Neoliberal City	126
5.3.4 Conflicting Visions of Sustainable Communities: How Do Different Discourses of Sustainable Development Affect the Treescape of Champlain Park?	130
5.4 Summary: Asymmetries of Power.....	138
Chapter 6. Conclusion	144
6.1 Research Findings and Insights	147
6.2 Future Research	151

6.3 Summary	153
Works Cited	154

List of Tables

Table 2.1 Examples of ecosystem services and their descriptions	21
Table 2.2 The contribution of the compact city to urban sustainability.....	33
Table 3.1 List of key questions to interview participants.....	55
Table 4.1 Urban Forest Management plan: key management practices.....	66
Table 4.2 Urban Forest Management Plan: key initiatives	66
Table 4.3 Infill I and Infill II implications and outcomes	80
Table 4.4 Infill II adjustments	80
Table 4.5 Three major by-laws directly and indirectly impacting urban trees and the urban forest.....	81
Table 4.6 Defining significant tree size based on property size.....	82
Table 4.7 Tree and root protection guidelines	82
Table 5.1 Key actors of Champlain Park	91
Table 5.2 The perspective of actors on the urban forest and associated scale.....	93
Table 5.3 Degree of influence of different actors over Champlain Park’s treescape.....	109
Table 5.4 Five major concerns identified by interview participants regarding the Champlain Park treescape.....	142

List of Figures

Figure 3.1 Conceptual web of snowball sampling method	52
Figure 3.2 Initial identification of actors	53
Figure 4.1 Geographic location of Champlain Park	69
Figure 4.2 Champlain Park neighbourhood boundaries	69
Figure 4.3 Historical timeline of the development of Champlain Park	71
Figure 4.4 An aerial photo of the case study area in 1946	74
Figure 4.5 An illustration representing the location of the remaining bur oaks in Champlain Park and the surrounding neighbourhoods	76
Figure 4.6 Illustration of a tree's root system	84
Figure 5.1 Champlain Park community perspective web	94
Figure 5.2 Developer position web	96
Figure 5.3 City of Ottawa perspective web	99
Figure 5.4 Kitchissippi ward councillor perspective web	101
Figure 5.5 NGO perspective web	103
Figure 5.6 The components of governance of the urban forest	107
Figure 5.7 - 5.10 Images of infilling in Champlain Park	112
Figure 5.11 The first documented sign posted by Forestry Services for tree protection.....	116
Figure 5.12 - 5.15 Images of developers not complying with CRZ regulations.....	118
Figure 5.16 Image of resident unknowingly harming trees	119
Figure 5.17 - 5.18 Images of excavation damaging tree roots	121
Figure 5.19 Visual example of a hypothetical infill development impacting the treescape.....	125

Figure 5.20 Vision of scale and focuses of the urban forest between the developer, municipality and community	138

List of Appendices

Appendix A Growing region and distribution of the bur oak in North America as of 1971....	173
Appendix B Interview participants.....	174
Appendix C Initial contact email: research information letter	175
Appendix D Newspaper summary	177
Appendix E Consent form	178
Appendix F Ottawa’s urban growth boundary (Greenbelt).....	180
Appendix G Detailed historical timeline of Champlain Park	181
Appendix H Zoning provisions for infill development.....	184

Chapter 1. Introduction

The urban forest today is an integral part of the modern cityscape and urban design, recognized for its aesthetics, ecological services and social value. However, its nature, structure and, perhaps most importantly, its management remain contested and problematic. This is due to the complex landscape of competing interests in which decisions and actions are made and taken regarding the urban forest. It is within this landscape that a diversity of actors, including residents, developers, experts, community organizers and municipal officials, each with divergent viewpoints of the urban forest, engage.

The purpose of this research is to examine the asymmetries of power that exist between actors involved in the shaping of the urban forest, with specific attention given to the dynamics of infill development. This thesis focuses on a single case study, Champlain Park in Ottawa, a mature neighbourhood that is currently undergoing significant infilling. In so doing, this thesis introduces issues of scale and the role discourse plays in privileging certain actors when addressing questions concerning the urban forest. Not only is the character of the built form of this neighbourhood changing due to the processes of infilling, but also its natural landscape is drastically changing. What makes Champlain Park unique from an ecological perspective is the presence of bur oak (*Quercus macrocarpa*), a remnant of pre-settlement forest and a unique tree to Ottawa's urban area (Buckles, 2014a). This case highlights how processes of densification in contemporary cities, such as infilling, impact urban trees. Introducing the concept of the treescape, this research utilizes an understanding of the urban forest from a community scale. Applying this scale re-imagines the urban forest as a mosaic of treescapes.

The use of the term treescape is not widely used in urban forest literature. In the context of this research, treescape is being used as an extension of the understanding of the term '*landscape*,' which has been identified as the shape (sape) of specific features that together create the totality of a land-form in a given area (Haber, 2004). Thus, an urban treescape is being defined as the constitution, shape, or form, of urban trees in a given area, in this case the neighbourhood. The difference is based on the definable scale of each term - the urban forest is constituted by all trees within and around the City of Ottawa, whereas treescapes represent the trees of a specific urban landscape within Ottawa. As such, the concept of the treescape introduces scale as an important consideration in the discussion.

1.1 The Socio-ecological Complexities of the Urban Forest

The current definition and understanding of the urban forest has evolved over the past 150 years into a complex concept that includes individual trees, groves and clusters of trees, and the wooded areas in and around urban centres. As such, the urban forest as it is understood today is both complex spatially and in terms of its composition. It is also important to recognize that the structure of the urban forest differs dramatically between inner city neighbourhoods and the periurban areas immediately surrounding the urban centre. The composition of the urban forest also differs as a result of land owners planting exotic and ornamental species which are not indigenous to a region. These points highlight that the urban forest is produced through interconnected social, political, economic, and ecological processes, an important dimension that I take up in this thesis.

Management of the urban forest has similarly become increasingly complex, involving a range of actors. The resulting management environment of the urban forest is further

complicated by the juxtaposition of public and private properties and associated rights. Central to this thesis is the recognition that influence over the form and composition of the urban forest is not shared equally between these actors. Using Foucaultian discourse analysis, this research examines the basic question: *Who are the principal actors engaged with the urban forest and how much influence (power) do these actors have regarding decisions concerning the urban forest?* In this work, it is argued that the degree of influence, or of power, that a specific actor possesses is linked in part to two variables: the scale at which the actor operates, and the actor's vision of urban sustainability. I use my case study community to investigate the complex story of one part of the urban forest in the City of Ottawa, exploring the differential power and varied interests of the different actors involved, as well as how these actors draw upon different narratives of urban sustainability to influence its management.

1.2 The Bur Oaks of Champlain Park, Ottawa

Current policies in urban design and planning champion more compact cities characterized by mixed use and higher residential densities. This urban form is seen as supporting greater sustainability. As part of this trend, established or mature urban neighbourhoods have been undergoing densification through infilling. While promoted as sustainable urban design, this process can be detrimental to the urban forest in ways not yet fully explored in the planning policy and research literature. Through infilling, larger residential lots are sub-divided into two or more lots for single or multiple residences. In many instances, this results in existing mature trees and other vegetation being cleared on the smaller lots in order to permit buildings with large footprints to be constructed. This is prevalent in the case of downtown Ottawa. As described under "Building a Livable Ottawa 2031," a vision document related to the updating of

Ottawa's Official Plan (2015a), densification or densification stands as one of the principal strategies supporting what is seen to be sustainable urban development in Ottawa's urban core (City of Ottawa, 2015a). However, the combination of both smaller lots and larger houses results in less space available for trees and trees cannot simply adapt to this smaller space. A tree needs a minimum amount of area for its roots in order to survive. If, through the processes of infilling, that minimum space is lost, the tree will die; maybe not immediately or in a few years, but it will eventually die. This issue reveals a conflict over space for nature and space for built forms, drawing on the complexities that exist within socio-ecological systems such as the urban forest.

Infilling is dramatically changing the treescapes of many downtown neighbourhoods. By examining the Champlain Park community, a clearer understanding of the consequences of infill development on the urban forest will be illustrated. Champlain Park is located on the west side of Ottawa's urban core. Champlain Park is a mature neighbourhood that is undergoing densification through incremental infilling. Led by the developers, the infilling of mature neighbourhoods in Ottawa's urban core is threatening the urban forest, and in the case of Champlain Park, infilling threatens the survival of the bur oak.

The bur oak possess the genetic traits of trees commonly recognized by the Ancient Tree Archive Project as a global priority for the propagation and conservation of the genetics of what have been termed "champion trees" (Buckles, 2014).¹ The Champlain Park community has reached out to the Ancient Tree Archive Project to help with the propagation of the oldest bur oaks in their community. Their intent is to preserve the genetic code of the hardy mature bur oaks

---

¹ Although the bur oaks of Champlain Park are not yet acknowledged as champion trees, they possess the genetic characteristics that are recognized as important genetics for propagation and conservation. They can live up to 400 years and commonly grow up to a height of 40 metres and a diameter of 2.6 metres. (Gucker, 2011).

of their community for the enjoyment of future generations (Huron, 2012). Further, the bur oak is native to the deciduous forest zone of eastern and midwestern North America, one of the major Alvar Plant Associations (Catling et al., 2012; Farrar, 1995). Ottawa is located near the northern edge of the bur oak's growing zone (see Appendix A). Experts in Canada have considered the bur oak as a conservation priority in the northern growing region due to a decrease in its abundance (Beardmore et al., 2006; Gucker, 2011). The presence of the bur oak in this area bordering the Ottawa River is partially related to the area's unique natural history dating back to pre-settlement (Buckles, 2014). There are currently 82 mature bur oaks mapped in Champlain Park.

With Ottawa's densification initiative in the urban core, mature neighbourhoods, such as this one, are being subject to infill development projects. These new infill developments are threatening the mature bur oaks in Champlain Park. Although by-laws exist to protect significant urban trees, such as the bur oak, a lack of enforcement of existing municipal regulations creates an uneven division of power that favours the developers – and their interests in infill development and tree removal – at the expense of the community and its bur oak population.

1.3 Organization of the Thesis

This thesis is organized as follows. Following this introductory chapter, I present in chapter 2 an overview of how our understanding of the urban forest has evolved over the past 150 years and what actors have played a primary role in its definition, planning and maintenance. Chapter 3 provides an elaboration of the research methodology and methods used in this study. Chapter 4 introduces the case study, provides background on Champlain Park, and places Champlain Park in the broader context of the City of Ottawa and its urban forest. It then provides a summary of both the historic and current regulatory environment that affects the urban forest, including both

the city's urban forest management and its historic and current zoning by-laws concerning lot sizes and infill development. In chapter 5, I present both the findings of the study and a discussion of these findings and their significance. Chapter 5 also discusses the tensions between urban forest management and current urban planning policy trends by examining how urban densification and the complex power relations associated with urban development impact upon the urban forest. Finally, in chapter 6, I elaborate upon the findings and insights derived from the case study by returning to a broader discussion concerning urban forest management. The final chapter also provides some concluding remarks on the significance of this research and how it can be applied to further a critical understanding of urban forests and urban forest research.

Chapter 2. Literature: The Shaping of the Urban Forest

There has always existed a strong bond between the city and the forest, and according to Miller, Hauer and Wermer (2015), “trees have probably been a part of cities since their first development” (p.44). Certainly history provides evidence of this. The early Egyptians transplanted trees in balls of soil more than 4,000 years ago (Chadwick, 1971). Greek temples included gardens and wooded glades (Lawrence, 1993). Kublai Khan decreed that trees be planted along all major public roads in and around Beijing during the thirteenth century (Profous, 1992). Trees and forests played important roles in the landscapes of the towns and cities of the Middle Ages and the Renaissance in Europe, valued for their shade and aesthetics as well as for their resources (Lawrence, 1993).

This chapter outlines the literature and the evolution of thought shaping the way in which the urban forest is now commonly understood. This account of the urban forest will be modest, beginning with early efforts to incorporate nature into urban planning and design during the mid-nineteenth century. Its purpose is threefold. First, it will examine how our understanding of the urban forest and its benefits to urban residents has evolved. This will be done by providing a brief genealogy detailing the incorporation of nature in cities and urban design up to the emerging concept of social nature. Second, it will identify what have been, and currently are, the primary forces that create and maintain the urban forest. Finally, it identifies the principal actors associated with the urban forest. As such, this chapter helps to set the essential background for this research and the case study analysis that follows.

2.1 Beautification and Urban Planning

During the mid-nineteenth century, cities in both Europe and North America were undergoing dramatic change. The European city was being transformed based upon Paris' radical redesign led by Napoleon III and his chief civic planner, Georges-Eugène Haussman (Lawrence, 1993). Narrow streets and claustrophobic buildings were being replaced by wide tree-lined boulevards, and squares, monuments, public parks and gardens. The "Paris model" was to spread both throughout Europe and, through colonization, globally (Lawrence, 1993; Zube, 1971). In North America, new spaces for nature in the city were emerging during the same period in the form of public parks, first through the city park movement of the mid-nineteenth century and subsequently the City Beautiful Movement of the late nineteenth and early twentieth centuries (Jordan, 1994; Wall & Waterman, 2010; Yocom & Rottle, 2011).

Public parks were championed by social reformers on both continents as a response to the appalling living conditions of over-crowded late industrial cities (Creese, 1966; Hall, 1992, Hobsbawn, 1963; Mumford, 1961; Relph, 1987; Vance, 1990). Parks offered all of the city's residents, but the poor in particular, an easily accessible refuge from the built city. As one of the city park movement's leading proponents of city parks, Frederick Law Olmsted Sr., wrote "parks were designed so as to counteract the artificiality of the city and the stress of urban life, offering a wide range of public recreation facilities for all residents in a city; the scenic reservation, protecting areas of special scenic beauty from destruction and commercial exploitation" (NAOP, 2016). Advocates argued that parks also improved public health and promoted civic virtue (Jacobs, 1961). Olmsted Sr. drew specific attention to the connection between nature and the health, both physical and mental, of people:

It is a scientific fact that the occasional contemplation of natural scenes of an impressive character, particularly if this contemplation occurs in connection with relief from ordinary cares, change of air and change of habits, is favourable to the health and vigour of men and especially to the health and vigour of their intellect beyond any conditions which can be offered them... The want of such occasional recreation where men and women are habitually pressed by their business or household cares often results in a class of disorders the characteristic quality of which is mental disability, sometimes taking the severe forms of softening of the brain, paralysis, palsy, monomania, or insanity, but more frequently of mental and nervous excitability, moroseness, melancholy, or irascibility, incapacitating the subject for the proper exercise of the intellectual and moral forces (cited in Grusin, 2004, p. 40).

The practice of park creation accelerated with the City Beautiful Movement during which time they acquired a “processional” character designed to inspire and enhance civic pride (Hines, 2005). Frederick Law Olmsted Jr. shared his father’s view that the industrial city was a barren, nature-deficient landscape (Gandy, 2006). To rectify this state, he and other planners in the City Beautiful Movement used both nature and monuments to produce grand urban landscapes. Two prominent examples were Washington, D.C.’s *The Mall* and Daniel Burnham and Edward H. Bennett’s *1909 Plan of Chicago*, both of which were inspired by Haussman’s plan of the Champs Elysees of the 1860s (cf. Burnham & Bennett, 1996). In Canada, Frederick Todd, an Olmsted protege, designed numerous parks including Shaughnessy Heights in Vancouver and Mount Royal in Montreal, and wrote the first landscape plan for Ottawa (1903). By the closing decades of the nineteenth century, parks had become important measures of civic virtue both for wealthy residents who funded their creation and for cities themselves. As Jordan (1994) wrote:

The public park movement, which started in the 1830s, sprang mainly out of a desire to improve health in the over-crowded conditions of the rapidly growing industrial towns. By the end of the Victorian era the need for public open space had become widely appreciated. Increasingly, parks additionally became symbols of civic pride, providing inhabitants and visitors alike with attractive

surroundings in which to enjoy their leisure time. In the minds of their promoters they also assumed a social role as places of betterment for the lower levels of society. To encourage their use more attractions were provided: music, sports facilities, and horticultural displays, and the park was frequently coupled to a museum, art gallery or library. As it became clear that open space within a town brought many benefits, so more councils actively sought to secure parks and recreation grounds, changes in legislation from central government aiding their efforts. The height of the parks movement coincided with a fashion for magnificent philanthropic gestures, and the gift of a park from a wealthy citizen became a common occurrence. Those less well-off frequently did their bit too, and much open space was secured by public subscription. More public parks were opened between 1885 and 1914 than either before or after this period (p. 85).

With accelerated urbanization in the early twentieth century, neighbourhoods became recognized as foundational units in urban planning. As Girling and Kellet (2005) write, “even very large cities grow in small increments and parks were important design elements of these new neighbourhoods. The term ‘neighbourhood’ is frequently used to describe the urban ‘building blocks’ of contemporary land uses, transportation networks, services and amenities” (p. 11). Two designs of note were those of Clarence Stein and Henry Wright, and of Clarence Perry. Stein and Wright are best known for their Radburn, N.J. neighbourhood design. The Radburn Model was hierarchical in design. Its base unit was that of the enclave consisting of cul-de-sacs of clusters of six to eight property lots. Several of these enclaves were then grouped together into blocks bounded by through roads. A superblock (neighbourhood) consisted of four to six blocks bounded by natural features or a major road. Traffic was directed around the superblocks although Stein and Wright clearly acknowledged that their design was for “a town for the automobile age” (Patricios, 2002, p. 24). Greenspace was used to frame the blocks creating lattices of public space through new neighbourhoods. Perry’s proposed neighbourhood included a central park and smaller parks/recreational areas that together would make up 10 percent of the

total area of the neighbourhood. Perry's concepts are important because these became the national neighbourhood planning standards in the United States, and other countries including Canada, under the U.S. Federal Housing Administration that subsequently influenced subdivision design in the United States from the 1930s up to the 1960s, a period of rapid urban growth.

In addition to the creation of public parks as the primary greenspaces in urban settings, trees also found important space along streets. As was the case for park design, the inclusion of trees in streetscapes can be traced through European urban history, in this instance to the villas of the Italian Renaissance and the creation of what were called *allées* (Lawrence, 1993). Initially part of Baroque garden design (Zube, 1971), *allées* were created solely for the entertainment of aristocrats. However, the adoption of tree-lined roadways became part of the urban setting. In Italy, roadways leading into Rome were lined with trees in a fashion reminiscent of Kublai Khan's tree-lined roads entering Beijing. In Amsterdam, *allées* of trees framed canals. Also in Amsterdam, it became required to plant a tree for each standard building width during the seventeenth century. Parks and promenades replaced obsolete city walls and other fortifications of the medieval town and city (Lawrence, 1993).

The principal actors influencing the structure of the nascent urban forest were landscape architects, city planners and officials, and wealthy patrons. Homeowners certainly planted trees on their properties. However, the design of public urban green spaces was either left to the experts, landscape architects and city planners, or other actors on an ad hoc basis. Arborists, known as city foresters, city arborists, municipal foresters, municipal arborists and tree wardens (Harris et al., 2004; Jorgensen, 1986) were also important actors, responsible for the maintenance of urban trees. However, the principal focus of the time was on trees and their use as a design

element in parks and along boulevards for ornamental design and for the provision of shade.

Management of the urban trees was effectively left to arborists.

Trees found their way back into urban space in several ways, through the actions of individual property owners as well as city planning. Nevertheless, the incorporation of parks into urban design was particularly important for several reasons. First, parks created an essential space for nature within urban settings. In the case of new neighbourhoods, greenspace was an important design element both in the design of the neighbourhood itself and as a boundary between neighbourhoods. However, the character of this greenspace reflected formal principles of managed landscapes, incorporating community activities to enhance community identity, rather than nature *per se*. Second, parks were public spaces and not private property, organized and maintained by public institutions and practices for the benefit of all citizens. Finally, the selection of trees used in both parks and streetscapes was to become a foundational element of the urban forest.

2.2 Urban Ecology: The Emergence of the Urban Forest and Ecosystem Services Through Ecological Thought

When exactly did the urban forest *become* a forest? In the earliest framings of beautification, the urban forest did not exist as an idea or concept. Rather, as argued in the previous section, the focus was on trees as a design element, incorporated into parks and along boulevards. It was only beginning in the 1960s, with the emerging environmental movement and growing ecological awareness, that the urban forest was recognized as a forest. By expanding the identity beyond the “tree,” the conceptualization of the urban forest broadened to include an understanding of its ecological connections to a larger natural world thereby placing nature in the city (Dean, 2011).

By extending the understanding of trees to the ecological concept of an urban forest, the placement of ‘nature in cities’ became a topic of importance. Further, it is largely recognized that urban trees, and other forms of urban nature, provide important connections to the formation and articulations of ‘sense of place’ (Jones, 2015). This extension of nature as part of a city provides insights into socio-natural processes and the social production of nature and the urban forest, as discussed below.

This shift away from a focus on individual trees to a focus on more complex natural systems that included trees, shrubs and bushes and ground covers, was influenced by three factors: the Dutch elm disease that ravaged North American cities from the 1930s to the 1960s; the emergence of ecological thinking during the 1940s and 1950s; and the growth of the environmental movement during the 1960s and 1970s. I explore each of these factors and their impact on ecological thought and on our understanding of the urban forest in further detail below.

2.2.1 Dutch Elm Disease: A Pest Sparking a Focus on Urban Trees

The first factor that led to the articulation of the urban forest specifically was a historic one: the Dutch elm disease (DED). The accidental introduction of DED to North America from Europe can be traced back to 1931 when a furniture company in Cleveland, Ohio imported logs from France that were infected. DED is caused by a fungus. This fungus was accidentally introduced to Europe from Asia at the beginning of the twentieth century. The elms in Europe had no natural defence to this fungus and began dying off in great numbers. The fungus was transmitted from one tree to the next by the European elm bark beetle, another invasive species accidentally introduced to North America at the beginning of the 1930s. Like the European elm,

the North American elm had no natural resistance to the disease and the elm began dying in vast numbers. The disease spread across North America, devastating urban landscapes since elm had been one of the tree species selected by landscape architects for its shade and stateliness lining many urban streetscapes (Campanella, 2003). Many of these elms were 50 years and older.

The devastation caused by the DED raised fundamental questions concerning the nature and management of the urban forest (Campanella, 2003). It was the occurrence of DED that sparked Eric Jorgensen, a professor in the Faculty of Forestry at the University of Toronto, to examine urban trees and the urban forest (Dean, 2009). From this emerged urban forestry both as an area of study and as a profession (Jones et al., 2013; Wolf, 2003). The emergence of these new concepts, the urban forest and urban forestry, were therefore triggered by an invasive pest but their acceptance was dependent upon an evolving sub-discipline of ecology - urban ecology.

2.2.2 Urbanizing the Field of Ecology

Considering the emergence of ecological thinking, scholars have traced ideas pertaining to urban ecology to the late 1940s and early 1950s in Europe, North America and Asia (Alberti, 2008; Marzluff et al., 2008; McDonnell et al., 2009; McDonnell, 2011; McDonnell & Pickett, 1993), although there is also evidence dating back to the 1920s of the Chicago School of Sociologists using the term as a way to describe their work (McDonnell, 2011). Despite urban ecological thought being discussed during the mid-1900s, many ecologists did not initially embrace this field of study. According to McDonnell (2011) this was in part due to the “deep-seated prejudice in the field of ecology that human-dominated ecosystems were not legitimate subjects of ecological study” (p.8). Although increasingly understood as an interdisciplinary field, academic

inquiry into urban ecology remained highly fragmented at first. McDonnell (2011) argued that ecologists, engineers and planners, and social scientists all had (and still have) different foci:

Natural scientists would define urban ecology in a similar manner to the definition of ecology... but would limit their studies to urban and urbanizing landscapes[...] Thus, ecologists focus their work on the distribution and abundance of organisms (i.e. bio-diversity) as well as the flow of nutrients and energy in urban ecosystems (i.e. ecosystem services)[...] Engineers and planners focus on designing facilities and services in urban environments with the goal of reducing environmental impact and creating sustainable cities. Social scientists focus primarily on social structure and the social allotment of natural and institutional resources [...and] are exploring how to create greener and more healthy and sustainable cities (p.9).

This fragmented approach to urban ecology began to change in the 1960s and early 1970s due to growing concerns of environmental degradation, population growth, and urbanization and increasing awareness of urban footprints. Urban ecology during these decades became a more recognized discipline. This was further supported by two developments. First, in the early 1970s the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere Program (MAB) integrated the natural sciences, engineering/planning and the humanities (social sciences) together as the foundation for the discipline of urban ecology (Deelstra, 1998). Second, in 1975, the journal, *Urban Ecology*, was first published. This publication by the International Association for Ecology (INTECOL) focused on the ecology of urban areas (McDonnell, 2011). As stated in its first issue, this journal sought to “facilitate the exchange of ideas between the ecological science community and the practitioners of urban planning and design” (ibid. p. 11; LaNier, 1975). In 1986, *Landscape and Urban Planning* acquired *Urban Ecology* and incorporated it into their journal. *Landscape and Urban Planning* remains one of the most highly regarded journals in the field today. With the integration of

Urban Ecology into *Landscape and Urban Planning*, the academic foundation for a more interdisciplinary approach to urban ecology was established. Finally, with the emergence of this “green” sensibility in the 1960s, nature was accorded new and greater importance in urban planning and design. This was due, in part, to the nascent environmental movement inspired by Rachel Carson’s *Silent Spring* (1962) (cf. Helliwell, 1969; King, 1966; Odum & Odum, 1972), a growing critique of the post-World War II city by such authors as Jane Jacobs (1961), and to the emergence of integrated planning and landscape architecture inspired by Ian McHarg’s *Design with Nature* (1969). This inquiry increasingly incorporated a more scientific perspective in urban design and urban nature.

The combination of urban ecological thought and environmentalism during the 1960s and 1970s resulted in a further shift away from the management of individual trees as the foci of urban forestry to management of the urban forest as an ecosystem. Moeller (1977) provided one of the first comprehensive definitions of the urban forest as follows:

The urban forest is a flexible concept that encompasses rows of street trees and clusters of trees in city parks, green belts between cities, and eventually forests that are more remote from the inner city. The urban forest occupies that part of the urban ecosystem made up of vegetation and related resources found in urban, suburban, and adjacent lands, regardless of ownership. As we move across the urban-rural gradient, the mix of benefits provided by the urban forest changes. The limits of the urban forest cannot be defined by a line on a map. More importantly, the urban forest provides a conceptual framework within which to organize a research program to maximize the benefits that forests can contribute to improving urban environments (in Miller et al., 2015, p. 5).

This conceptualization of the urban forest was utilized to expand the understanding of urban planning and the relationship between urban nature and built form. By the late 1970s, the profession of urban forestry in the United States and Canada started to fully realize that trees and

forms of urban nature provided more than aesthetic benefits and basic social amenities. During this time, trees came to be viewed as providing environmental and economic benefits through the provision of ecosystem services (Carreiro, 2008; Konjinendijk et al., 2006).

Miller (1997) provided a more succinct definition of the urban forest as “the sum of all woody and associated plant vegetation in and around dense human settlements, ranging from small communities in rural settings to metropolitan areas” (p.27). Konjinendijk et al. (2006) provided two definitions of the urban forest from European research: a ‘narrow’ definition he attributes to urban woodland or forestry in or near urban areas which drew upon the medieval tradition of town forestry, and a second, ‘broader’ definition the “includes not only woodland, but also tree groups and individual trees, i.e., the tree-dominated part of greenspaces” (p. 98).

Urban forestry as a discipline also came to be defined in the late 1960s and early 1970s although, as it has been already noted, the practices associated with the establishment and maintenance of trees in urban settings can be traced to the late nineteenth century and even earlier, to town forestry. It was Jorgensen (1986) who first used the term “urban forestry” in 1965 and drafted its first working definition in 1970 as being:

a specialized branch of forestry and has as its objectives the cultivation and management of trees for their present and future contribution to the physiological, sociological and economic well-being of urban society. These contributions include the over-all ameliorating effect of trees on their environment, as well as their recreational and general amenity value (p.173).

This definition was further elaborated upon by the Society of American Foresters in 1972 which defined urban forestry as:

a specialized branch of forestry that has as its objective the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic well-being of urban society. Inherent

in this function is a comprehensive program designed to educate the urban populace on the role of trees and related plants in the urban environment. In its broadest sense, urban forestry embraces a multi-managerial system that includes municipal watersheds, wildlife habitats, outdoor recreational opportunities, landscape design, recycling of municipal waters, tree care in general and the future production of wood fibre as raw material (Society of American Foresters in: Miller et al. 2015, p. 8).

Further, the U.S. Cooperative Forestry Act of 1978 defined urban forestry as “... the planning, establishment, protection and management of trees and associated plants, individually, in small groups, or under forest conditions within cities, their suburbs, and towns” (Konijnendijk, et al., 2006, p. 95).

Konijnendijk et al. (2006) provided a European definition of urban forestry as:

... a multi-disciplinary activity that encompasses the design, planning, establishment and management of trees, woodlands and associated flora and open space, which is in or near built-up areas. It serves a range of multi-purpose functions, but it is primarily for amenity and the promotion of human well-being (p. 98).

The influences of emerging ecological thought and the environmental movement in both North America and Europe are evident in these conceptualizations of the urban forest as part of an urban ecosystem, as well as the perceived benefits of such an integrated ecosystem. These definitions provided the foundation for the emerging profession of urban forestry. It fosters important social and ecological principles in a singular definition alluding to the socio-ecological framing of urban nature and the city.

2.2.3 Ecosystem Services: Popularizing Urban Nature and the Urban Forest

Although parks remained the central feature of nature in urban design, the process for identifying green spaces for protection was enlarged and additional areas of the city came to be identified for designation as green space useful for producing ecosystem services, such as water management,

micro-climate regulation and habitat maintenance. Naturalization efforts, shoreline restoration and protection, and unique natural sites increasingly were identified and protected within cityscapes and urban plans. In these developments, it is possible to see how the valuation of nature through the analysis of ecosystem services reinforced not only the importance of incorporating nature into the cityscape, but also its protection and restoration within urban settings (Zari, 2015).

During this period, science emerged as providing the underlying rationale for the incorporation of nature into urban design. Nature was increasingly recognized for its provision of many services to urban residents, both direct and indirect, the value of which could be quantified. This was to become the “ecosystem services” framing of nature. The ecosystem services concept was subsequently refined in the following decades (cf. de Costanza, et al., 1997; Daily et al., 2000; Gómez-Baggethun et al., 2008; Gómez-Baggethun & Ruiz-Pérez, 2011; Groot, 1992, 1994; Holl & Aide 2011; Kronenberg, 2015; Limburg & Folke, 1999; Pearce, 1993; Turner, 1993; Zari, 2015). The growth of urban populations and increased reliance on these ecosystem services has since become a major theme in urban studies, planning and research (McPherson et al., 1997; McPherson, 2011; Nowak & Dwyer, 2000). Within the last decade, the study of ecosystem services has become one of the most popular concepts in urban ecology unifying economics and conservation biology (McDonald & Marcotullio, 2011), and by the end of the last decade, scholars increasingly viewed the city as an ecosystem in itself (cf. Grimm et al., 2008). The study of ecosystem services thereby helped link social and ecological components to further understand cities as complex urban ecologies.

The framing of urban nature by the services it provides changed the way urban nature in general and the urban forest specifically was perceived. The concept of the urban ecosystem, while drawing on the broad definition of services provided by ecosystems, was seen as particularly important “in providing services with direct impact on human health and security such as air purification, noise reduction, urban cooling, and run-off mitigation” in urban settings (Gómez-Baggethun et al., 2013, p.178). These services were anthropocentrically-oriented. As described by Elmqvist (2011, p.191), “ecosystem services are the conditions and processes through which natural ecosystems and the species that make them up, sustain and fulfill human life and are often defined as ‘the benefits human populations derive, directly or indirectly, from ecosystems’” (cf. TEEB, 2010). De Groot et al. (2002) present an integrated framework for ecosystem services in which they defined ecosystem functions as “the capacity of natural processes and components to provide goods and services that satisfy human needs, directly and indirectly” (p. 394). Elmqvist et al. (2015) provide a summary of the various services provided by urban ecosystems and their associated value, reinforcing the scientific and quantitative approach to the ecosystem services theme. These services included micro-climate regulation, water regulation, pollution reduction, health effects, habitat conservation, and cultural services (see also Gómez-Baggethun et al., 2013). As such, these functions are seen as a sub-set of the total spectrum of natural processes which are the result of the interplay between biotic and abiotic components. Noted as one of the most discussed concepts in ecology, ecosystem services provided an inherent rationale for the consideration of urban ecosystems and nature in the city (McDonald & Marcotullio, 2011).

Similarly, the urban forest became increasingly cared for, managed, and understood in the realm of urban planning based on its ecosystem services. Under the ecosystem services' framing of utilization, trees were recognized for their contribution to the urban environment (Table 2.1).

Table 2.1 Examples of ecosystem services and their descriptions (Thomas & Geller 2013, p.1).

Ecosystem Services	Description
Sequestering Carbon	Contributes to climate change mitigation
Reducing air pollution	Direct deposition of pollutants through cooling effects that reduce the formation of ozone
Shading of trees	Lowers energy demand for air conditioning
Reduction of urban heat island (UHI)	Lowers albedo reducing the amount of radiation bouncing back into the atmosphere
Interception of water runoff	Buffers local waterways from pollution and helps to control stormwater overflow problems
Habitat for wildlife	Provides vital habitat for wildlife increasing bio-diversity in urban areas
Access to nature	Increases access to nature in urban areas which has been linked to physical and mental health

There were three important outcomes of this way of understanding the urban forest. First, the space for nature in general and the urban forest specifically was enlarged based upon the framing provided by ecosystem services. Second, the urban forest included trees and associated vegetation on both public lands and private property. Estimates of urban trees on private property range between 60% and 90% (Clark et al., 1997). Third, an outcome of the second, is that the urban forest is influenced by the actions (or lack of actions) of private land owners as well as by public agencies. Thus, new actors were recognized in the creation and maintenance of the urban forest, most important of whom was the private property owner. This property owner could be a

resident or a developer. In addition to the private property owner, there were other new actors engaged in the maintenance of the urban forest, including (but not limited to) specialists such as hydrologists, botanists, and biologists.

2.3 Social Nature, Sustainable Development and the Urban Forest

Research in geography, sociology, and landscape architecture during the 1980s and 1990s led to a greater understanding of the relationship between people and their surroundings (Taylor, 1998). These works affirmed earlier critiques of modernist (or rationalist) urban design in terms of failing to meet social needs (Jacobs, 1961). Similarly, critiques of the ecosystem services approach were raised at this time, citing two principal issues, its quantitative nature and its understanding of ecosystems as service components rather than a holistic understanding of the ecosystem.

This literature and scholarship raised the idea of social nature and its importance in understanding urban ecologies. Social nature is concerned with ideas of nature and the social construction of nature, or how humans understand and construct nature. The discipline of geography has utilized James Bryce's early characterizations of the discipline as "a meeting point between the sciences of nature and the sciences of man" (1886, p. 426) to define itself. This definition implies that geography is uniquely situated to critique human relations with nature. Later, Henri Lefebvre's (1976) theory of *second nature* provided a platform for the discussions of socially produced urban environments. However, it was not until the late twentieth century that ideas of social-nature relationships were examined in depth (Castree, 2001, p.1). The concept of social nature has largely emerged over the last decade through the work of influential scholars such as Noel Castree, Arturo Escobar, Paul Robbins, and Harold Perkins and through the

discipline of political ecology. Ideas presented by these scholars provide an approach to help eliminate the urban-nature dichotomy that persisted throughout early urban development. Prior to discussions of social nature, ‘nature’ and ‘the city’ were conceived as two very separate entities and systems. Through social nature, these are now seen as an integrated system or what Swyngedouw (1999) termed “socionature” (cf. Castree 2001, p.13).

The concept of social nature has two important implications for this research. First, as Castree (2001) writes, “knowledge is invariably inflected with the biases of the knower(s). This is the same as saying that there’s no singular, objective knowledge of nature, only particular, socially constituted knowledges, in the plural” (p. 10). To know nature, therefore, one knows nature in a particular context or way. Second, this in turn has implications on how we engage with nature. Again, turning to Castree (2001), he describes nature as social by explaining that it,

is not at all a denial of the material reality of those things we routinely call natural – be they trees, rivers, animals, or anything else. Rather, it’s an insistence that the physical opportunities and constraints nature presents societies with can only be defined relative to specific sets of economic, cultural and technical relations and capacities. In other words, the same ‘chunk’ of nature – say the Amazon rainforest – will have different physical attributes and implications for societies, depending on how those societies use it. In this sense, the physical characteristics of nature are contingent upon social practices: they are not fixed (p.13).

With this shift towards embracing the concept of social nature, there has been an increasing acknowledgement of the interconnectedness of nature and humans, and the recognition of the social and cultural values provided by trees (Thomas & Gellner, 2013; Mincey, et al., 2013). As Thomas and Gellner (2013) write:

[...] recognition that exposure to trees and green spaces provides many important socio-economic and mental health benefits including: enhanced

social cohesion; increase in real estate values; improved health and recreational opportunities; and cultural and spiritual values. In fact, one distinction between rural/wild-land ecosystem and urban ecosystem services is that in urban areas there is potential daily contact by thousands of people within any single nature element, including trees, parks and green spaces, resulting in a range of possible psycho-social and health benefits (p. 2).

By the end of the twentieth century there was a general consensus concerning the definition of the urban forest, its geographic reach, and the scope of urban forestry. Nearly 25 years after the first definition of the urban forest, Miller et al. (2015) today define the urban forest as:

the sum of all woody and associated in and around dense human settlements, ranging from small communities in rural settings to metropolitan regions. More specifically, the urban forest is the sum of street trees, residential trees, park trees and greenbelt vegetation. It includes trees on unused public land, trees in transportation and utility corridors, and forests on watershed lands. Some of these trees and forests were willfully planted and are carefully managed by their owners, while others are accidents of land use decisions, economics, topography and neglect (p. 4).

Within this definition of the urban forest, there is a greater emphasis on the social components of the term. Konijnendijk et al. (2006, p. 93) provide an additional aspect of urban forestry describing the discipline as “the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, economic and aesthetic benefits trees provide society.” This definition of the discipline of urban forestry also embraces a multi-disciplinary approach.

By this time, the focus has shifted away from efforts to define the emerging concepts of the urban forest and urban forestry, and the services provided by the urban forest, to greater attention on the underlying processes involved in the creation and management of the urban forest. This interest raises questions of “social nature.” As a concept, social nature offers two key dimensions concerning the urban forest. First, it recognizes that humans are the principal force behind the

urban forest's structure, composition and maintenance. Urban forests are essentially human creations. Without the interaction of humans, urban forests would look dramatically different in most modern cities. As Perkins (2015) writes:

People intervene in the process of urban forest dynamics in ways that produce a forest that would otherwise look much different if left to its own devices. Proof of our ability to create new forest ecologies according to our social capacities is everywhere present. Most urban trees are explicitly planted by someone. This means then that much of the forest exist by human design (p. 21).

Second, the concept of social nature acknowledges that different peoples, cultures, and actors have different and evolving understandings of what constitutes a forest (Randrup et al. 2005). This means that different actors can, and do, have different (and often conflicting) understandings of the urban forest, its importance and its value. Finally, the involvement of a diverse set of actors points to the importance of political processes within the urban setting when addressing questions concerning the urban forest.

This rejection of the conventional human/nature dichotomy, and its geography of separation, was to be extremely important for urban forest research. As Perkins (2015) argues, in order to understand the production of urban forests, one must first be willing to recognize the existence of an urban forest, and reject the notion that 'forests' exist only outside of the urban setting. The concept of social nature derives from political ecology which tries to break down the human/nature dichotomy by presenting the human-environmental linkages that exist between the relationships of economics, politics, and nature (Robbins, 2012).

2.3.1 Critical Urban Political Ecology and the Production of Nature

With the concept of social nature, urban political ecology (UPE) considers how biophysical processes are, in reality, interlinked with human actions. Perkins (2015) states:

UPE wants us to reconsider urban trees and forests as a produced ‘social nature’ where human behaviour affects biological processes in profound ways... humans harness the process of photosynthesis and tree growth according to our needs and wants...people are constantly in the process of co-producing urban ecologies with the trees in their neighbourhood, therefore, making human activity fundamentally ecological (p. 21).

Similarly, Conway et al. (2011) acknowledge urban forests as a socio-ecological system whereby “the configuration and composition of urban forests is a result of complex interactions between biophysical and social factors” (p.322). A socially constructed urban forest therefore necessarily integrates the natural and the social, and efforts to create a more sustainable urban forest need to take these factors into consideration.

It was the Marxist geographer Neil Smith (1984) who first wrote of ‘the production of nature.’² Until then nature was generally viewed as something occurring outside of the human realm, to be interacted with, interfered with, or manipulated, and not as something produced by humans (Castree, 2001). Smith argued that “modern, industrial capitalism was, quite literally ‘producing nature’ in the narrow interests of profitability... [the] reconceptualization of nature, as something shaped by society rather than existing outside of it, grow out of and transform a long tradition of geographic learning” (ibid. pp. 15, 71). Further, this phrase helps situate the

---

²*The Dictionary of Human Geography* identifies the social of nature through the influence by Lefebvre’s understanding of the production of space, explaining, that Neil Smith “conveys this phrase that nature is socially produced and, more specifically, that nature is increasingly an artefact of capitalism in the contemporary world” (p. 589).

interconnections between ‘social’ and ‘natural’ as a means to diminish the false dichotomy separating the two. As stated by Smith (1984):

What jars us so much about this idea of the production of nature is that it defies the conventional, sacrosanct separation of nature and society ... We are used to conceiving of nature as external to society, pristine and pre-human... But [our] concepts have not caught up with reality. It is capitalism which ardently defies the inherited separation of nature and society, and with pride rather than shame (Smith, 1984, p. xiv).

Through the scholarships of political ecology (PE), the idea of a socially produced nature has become more common and understood in literature, social theory and social practice. The inherent social and political construction of various ‘natural’ environments is now well established in academic literature through the development of a variety of political ecology perspectives (Escobar, 1999; Keil, 2003; Neumann, 2011; Robbins, 2012; Sandberg et al., 2015; Swyngedouw, 2006; Zimmer, 2010).

Political ecology emerged with a focus around rural lands and the political, economic, and environmental tensions of third world countries and the global south. Urban Political Ecology (UPE) has emerged through a variety of political ecology perspectives within academic and popular literature as a way of re-naturing urban theory (Heynen et al., 2006; Keil, 2003; Swyngedouw & Heynen, 2003). Urban nature has become an increasingly familiar concept (Castree, 2001), substituting the nature/human dichotomy with understanding that urban areas have natural components and are inherently part of ‘an ecology.’ Harvey (1996) argues that humans are embedded within nature. Lefebvre differentiates between ‘pristine’ and ‘second’ nature (1976) where his ‘second’ nature defines urban environments as “necessarily socially

produced and thus paves the way to understand the complex mix of political, economic and social processes that shape and reshape urban landscapes” (Heynen et al., 2006, p. 4).

Building on these concepts of Harvey and Lefebvre, UPE establishes an argument that helps reject the dichotomy that ‘nature’ is separate from ‘the city’ or displaced by it. UPE moves toward the idea that ‘nature’ exists within ‘the city’, and ‘the city’ is inherently part of nature. This ‘urbanizing’ of political ecology has allowed for a more critical examination of the neoliberal trends driving urban development, and allows for the investigation of the political, economic and social dynamics of power that influence the ways in which urban nature is managed (Gulsrud & Ooi 2015; Harvey, 1996; Heynen et al., 2006). As Gulsrud and Ooi (2015) observe, how urban environments are created “embody and reflect positions of social power. In this sense, urban political ecology takes to task the nature - society dichotomy logic suggesting that there is nothing unnatural about human produced environments because cities are specific historical results of socio-environmental processes” (p. 80; citing Davis, 1996; Harvey, 1996; Heynen et al., 2006; Wachsmuth, 2012).

UPE is heavily influenced by Marxist theory and how capitalist urban development creates uneven social, natural, economic and political relations in the cityscape, and how cities reflect these processes (Heynen et al. 2007; Short, 2014). A significant contribution of UPE is its attempt “to tease out who gains from and who pays for, who benefits from and who suffers from particular processes of socio-environmental change” in an urban setting (Swygnedouw & Heynen, 2003, p. 910). UPE seeks to disentangle socio-natural relationships that manifest

between individuals and social groups and how these, in turn, are reflected in the processes of ecological change and social power relations. Swyngedouw and Heynen (2003) write how

particular attention is paid to social power relations - whether material or discursive, economic, political and/or cultural through which socio-environmental processes take place and the networked connection that link change in one place to socio-ecological transformation in, often, many other places. It is this nexus of power and the social actors carrying it that ultimately decide who will have access to or control over and who will be excluded from access to or control over resources or other components of the environment. In turn, these power geometries shape the social and political configurations and the urban environments in which we live (p. 911).

This raises the question of who possesses the power and who does not when considering urban nature in general, and the urban forest specifically. As Swyngedouw and Heynen (2003) write:

Marxist UPE more explicitly recognizes that the material conditions that comprise urban environments are controlled and manipulated and serve the interest of the elite at the expense of marginalized populations. These conditions, in turn, are not independent of social, political and economic processes and form cultural constructions of what constitutes the 'urban' or the 'naturals' (p. 902).

These dynamics of power is central to this thesis. Throughout this research, the case presents a struggle of power over a particular urban treescape through a number of competing interests, leading to a better understanding of the contested governance of the urban forest. The important relationship between social action and ecological understandings necessarily leads one to a consideration of the dynamics of decision-making within society and the social factors and processes that shape the urban forest. This, in turn, raises important questions, the most fundamental being: How are these decisions reached?

2.3.2 Framing Sustainable Development and the Urban Forest

The political processes, and specifically the dynamics of negotiation, that apply to the urban forest operate within broader societal framings. The urban forest is a component of urban nature which is, in turn, a component of urban planning and design. However, trees and the urban forest differ from other components of urban nature. These differences are essential to acknowledge if one is to apply the concept of sustainability towards the urban forest. For example, Clark et al. (1997) describe four principals they believe must be recognized in a model of urban forest sustainability: (1) Sustainability is a broad, general goal; (2) Urban forests primarily provide services rather than goods; (3) Sustainable urban forests require human intervention; and (4) Trees growing on private lands compose the majority of urban forests. This fourth principal is of particular importance to this thesis. As Clark et al. (1997) argue:

While publicly-owned trees (primarily in parks and along streets and other rights-of-way) have been the long-standing focus of urban forestry, they comprise only a portion of the urban forest. An estimated 60 – 90% of trees in urban forests in the United States are found on privately owned land. Therefore, sustainable urban forests depend to a large degree on sustainable private forests (pp. 20-21).

The fact that the majority of the urban forest is located on privately-owned lands makes its management even more challenging as it necessarily involves a broad spectrum of actors, each with their own knowledges and positions on the role of the urban forest and how it is to be managed. Paradoxically, however, as urban development shifts towards the compact city, the focus of nature seems to be shifting back towards public space. As Coolen and Meester (2011) observe:

In urban areas the contrast between the compact-city concept and the demand for more space and green environments leads to a gap between government

policy and consumer housing preferences. Developers and planners are looking for new dwelling concepts that might be implemented in relatively high density but also respond to the growing demand for space... in these concepts, private green space is often substituted by public green space, such as a communal garden or neighbourhood park (p.50).

Current trajectories of urban planning and design reflect current discourses of “sustainability” and “green ethics.” However, these terms are vague and pliable. As detailed by Kambites (2014), through the work of Kirkby et al. (1995), “[s]ustainable development’ has always been a ‘flexible’ concept interpreted in many different ways. At least 70 definitions of ‘sustainable development’ or ‘sustainability’ have been identified” (p. 337). Within the multiple approaches to the use of the term ‘sustainable’ and ‘sustainable development’ there are many contested approaches, and as asserted by Chatterton and Style (2001), “one of the few agreements within the sustainable development debate is that there is no clear agreement on what the term means” (p.447). One advantage to the ‘flexibility’ of the term(s) is that it has been easy for concepts of sustainability and sustainable development to be adaptive to changing ideas and circumstances (Fischer & Black, 1995; Kambites, 2014; Myerson & Rydin, 1996). The framing provided by sustainability has yielded different visions of urban planning and design. Two of note are the “biophilic city” and the “compact city.”

Considering first the biophilic city, Wilson (1993) describes biophilia as “the innately emotional affiliation of human beings to other living organisms” (p. 31). A biophilic city embraces this understanding. In an interview in *cityscope*, published on January 23, 2015, Beatley describes the biophilic city as “a nature-full city. It puts nature at the core of its design and planning, not as an afterthought or an ornament” (Swope, 2015). The philosophy behind the

biophilic city is more than park-based. Beatley (2011) explains the underlying philosophy of a biophilic city as follows:

A biophilic city is at its heart a biodiverse city, a city full of nature; a place where in the normal course of work and play and life residents feel, see and experience rich nature – from plants, trees, animals. The nature is both large and small – from tree-top lichens, invertebrates, even microorganisms, to large natural features and ecosystems that define a city and give it character and feel. Biophilic cities cherish what already exists in and near cities ... but also work hard to restore and repair what has been lost or degraded, and to integrate new forms of nature into the design of every new structure or built project. We need contact with nature, and that nature can also take the form of shapes and images, integrated into building designs as we will see (p.45).

Nature in this vision is given a central position in planning. In the biophilic city, strategies for integrating nature into the city significantly extend beyond parks and green spaces to issues of citizen values and the architectural design of buildings themselves. This point will become more relevant through the discussion of the case study.

A second vision of the sustainable city is that of the compact city. Even as urban sprawl continues to create automobile-reliant cities, planners and developers have begun advocating for a more compact urban form. However, this is proving to be problematic. As Coolen and Misters (2011) explain, “the increasing tension between the idea of compact, sustainable urban areas, on the one hand, and the increasing demand for space in and around the dwelling, on the other, places planners and developers in a difficult situation” (p.65).

Nevertheless, the compact city is seen as offering significant environmental, social and economic benefits (see Table 2.2). Advocates of the compact city argue that these create dynamic city centres surrounded by high-density development consisting of mixed-used zoning capable of supporting the provision of essential services and facilities. It seeks to

Table 2.2. The contribution of the compact city to urban sustainability (OECD, 2012, p. 57).

Sub-characteristics of the compact city	Contribution to urban sustainability		
	Environmental benefits	Social benefits	Economic benefits
Shorter intra-urban travel distances	Fewer CO ₂ emissions; less pollution from automobiles	Greater accessibility due to lower cost	Higher productivity due to shorter travel time for workers
Less automobile dependency	Fewer CO ₂ emissions; less pollution from automobiles	Lower transport cost; Higher mobility for people without access to car; improved human health due to more cycling and walking	Development of green jobs/technologies
More district-wide energy utilization and local energy generation	Less energy consumption per capita; fewer CO ₂ emissions	N/A	Development of green jobs/ technologies; more energy independence
Optimum use of land resources and more opportunity for urban-rural linkage	Conservation of farmlands and natural biodiversity; fewer CO ₂ Emissions due to shorter food travel milage	Higher quality of life due to more recreational activities	Rural economic development (urban agriculture, renewable energy, etc.)
More effective public service delivery	N/A	Public service level for social welfare maintained by improved efficiency	Lower infrastructure investments and cost of maintenance
Better access to a diversity of local services and jobs	N/A	Higher quality of life due to access to local services (shops, hospitals, etc.)	Skilled labour force attracted by high quality of life; greater productivity due to more diversity, vitality, innovation and creativity

create a community-based society based on proximity, a rich urban landscape that is easily accessible, and a design that reduces energy use and recycles waste (Katz, 1994). At first, the arguments supporting the compact city seem sound. Higher densities of people living in an urban setting means that the cost of building and maintain infrastructure is less on a per capita basis. Higher densities of residents provide for required thresholds for a wide range of commercial and cultural activities (from restaurants and bars to large specialty outlets and stores) that advocates argue fosters a strong, diverse urban social, cultural and economic

foundation. Higher densities of residents also provide the critical numbers for the provision of essential public transportation services as well as other social services and infrastructure. Finally, higher densities of residents provide for a larger tax base for the municipality (Beatley, 2000; Burchell et al., 2002).

In an effort to create more a compact city, many cities have sought to increase the density of established neighbourhoods through several strategies including infill development. While increasing density and mixed use, two key tenets of sustainable urban development, these strategies have also led to higher housing prices and displacement of certain classes of citizens from central city areas. In addition, infill densification projects have been resisted in existing neighbourhoods. One component of infill development seen in cities is the densification of mature neighbourhoods which were designed with single detached houses. As infill development comes into these neighbourhoods, the single detached houses are replaced with semi-detached houses often based upon the splitting an existing lot into two or three parcels. This component of sustainable design, via infilling, is central to the case study of this research and positions the developer as a key actor.

Another critical question raised however is: Where is the place for nature in a compact city? Where is the space for a forest or for a single tree? Trees require adequate soil space for their roots to extend for nutrients, water and stability. This space is fundamental. Day et al. (2010) note that typical estimates of the reach of a tree's root system is as much as three times the tree's canopy spread although this is highly species dependent. The tree's trunk diameter can also be used to estimate the reach of a root system and this has been found to be a more accurate means compared to the canopy. Day et al. (2010) estimate that the root-

system-reach to trunk-diameter ratio is 38:1, meaning that for every one centimetre of trunk diameter, the tree's root system extends 38 centimetres although, here again, this is species dependent. If a large proportion of the root system is destroyed, a tree will eventually die. While this may take several years, the tree will still die as a result of the destruction of its root system. Infill development, and corresponding smaller property units, for single family dwellings reduces the essential space for nature and for trees. Whereas different forms of infill can reconcile sustainability and higher densities (such as low rise apartment complexes surrounded by greenspace), this reconciliation might not be possible for infill development featuring single family dwellings.

There is also a growing body of literature that challenges the notion that the compact city is a sustainable city. Neuman (2005) provides a particularly comprehensive critique of the compact city. From the outset, the irony of today's debates over the appropriate form of a sustainable city is not lost on Neuman who writes: "the problems of urban sprawl have long been recognized. The classic response to sprawl has been compact settlements of one form or another. Yet the [planning] profession's modern origins stem from responses to overcrowding. Relieving crowding by letting in more light and air led to less compact urban form" (2005, p.11). He goes on to state:

The paradox of the compact city refers to the inverse relationship of the sustainability of cities and their livability. For a city to be sustainable, the argument goes, functions and population must be concentrated at higher densities. Yet for a city to be livable, functions and population must be dispersed at lower densities. (ibid, p.16)

Yet, despite these critiques, the compact city is seen by many municipalities as the answer to many of the significant issues facing urban humanity. This is seen, in part, due to the subsuming

of the idea of sustainable development by larger framings provided by neoliberalism in today's society. According to Kambites (2014), the flexibility embodied in the terms 'sustainability' and 'sustainable development' has allowed development policies to take advantage of the use of sustainable development, employing discursive techniques to tailor the use and understanding of these terms in a way that fits with market-led imperatives. Drawing on literature from Hall (2003), Hay (2004), and Massey (2010), he explains that "[a]rguably the most significant development in global politics of the late 20th century was the spread of the ideology of neoliberalism"³ (Kambites, 2014, p. 337). The discourse of sustainable development has been influenced by the neoliberal narrative that privileges economic gain over the other two dimensions of sustainability, social and environmental prosperity (Raco, 2005; Haque, 2000). This has also resulted in a vision of economic-driven sustainable development. As expressed by Leis and Viola (1995), "[o]nce the focus is put solely on the economic growth question, it legitimates the dominant positions of economics in our society. This, in turn, works against the emergence of any policy that might tend to produce an alternative" (p. 39). Such an alternative could be that which is suggested by a biophilic understanding of sustainability and sustainable development.

According to van Zeijl-Rozema et al. (2008), the idea of sustainable development "entails a normative choice: a choice for giving priority to either ecological concerns or to societal concerns" (p. 412). However, as argued by Kambites (2014) this choice has most often prioritized the neoliberal economy. To Hull (2008), "it is the economic criteria that enjoy

---

³ Neoliberalism can be defined as "as doctrine, loosely conceived, that argues for the desirability of a society organized around self-regulating markets, and free, to the extent possible, from social and political intervention" (Cypher & Dietz, 1997, p. 222).

primacy where conflicts of interest arise: the casting vote is that of the market mechanisms, since their proper functioning is taken to ensure economic growth” (p. 77). This raises a critical question for this research: Can an economically driven or neoliberal city support a healthy and abundant urban forest?

Further evidence of this is seen in Banerjee (2003), who writes that “current development patterns (even those touted as ‘sustainable’) disrupt social system and ecosystem relations rather than ensuring that natural resource use by local communities meets their basic needs at a level of comfort that is satisfactory as assessed by those same communities” (p. 174). Moreover, the process of intensifying urban areas bolsters ideas of transforming open urban spaces to built spaces, which subsequently negatively impacts ecosystem processes and the ability to have natural spaces (Pauleit & Breuste, 2011; Paulette et al., 2005). As such, the neoliberal narrative towards sustainable development “refers to the politics and processes whereby a relative handful of private interests are permitted to control as much as possible of social life in order to maximize their personal profit” (McChesney, 1999, p.7; cf. Raco, 2005). This is taking part through processes such as infilling, as examined in greater detail in the case study.

The manifestation of the dominant understanding of *sustainable development* is seen through the powerful narrative of neoliberal forces. Sustainable development frameworks operating in coherence with the neoliberal narrative often counteract the goals of other urban actors to increase tree cover for ecological or social benefits. At the same time, however, Heynen and Perkins (2005) write of “an increasingly neoliberal political economy that requires inter-urban competition for capital investment, which, in turn, necessitates the need to reforest the city in order to increase the quality of life for prospective employers and employees” (p.100).

Accordingly, there can be room for the urban forest in the neoliberal narrative, although, the focus would still remain on the economic benefits of trees to property-led development over that of social and environmental benefits.

Banerjee (2003) describes this approach as reflecting the corporate discourse of sustainability:

Sustainable development is to be managed in the same way development was managed: through ethnocentric, capitalist notions of managerial efficiency that simply reproduce earlier articulations of decentralized capitalism in the guise of ‘sustainable capitalism’. The macroeconomic criteria of sustainable development have now become corporatized: *development is sustainable only if it is profitable, it is sustainable only if it can be transacted through the market*. This notion of sustainable development packaged and sold by international agencies, governments, and transnational corporations needs to be unpacked and deconstructed (ibid, p.173: emphasis added)

This corporate discourse moves away from what is understood to be the true essence of sustainability which encourages a mix of economic, social, and environmental integrity to one that emphasizes development solely on its economic merits - this is seen in this research through forms of urban densification and favouring of processes of development over urban trees.

Continuing the discussion on sustainable development, Banerjee (2003) explains some obvious tensions within the term. He states that, “sustainable development attempts to reconcile these opposing interests and aims to maximize economic and environmental benefits simultaneously. This is a contradiction in terms, because sustainability and development are based on very different and often incompatible assumptions” (p. 158). Although definitions of *sustainable development* include environmental concerns, the emphasis of the neoliberal model of sustainable development is its market-oriented focus. Further exposing some of the tensions residing in sustainable development, Hague (2000) explains that, “despite its environmental

concern, the sustainable development model is constrained by its continuity with the agenda for economic growth as found in the conservative tradition of development thinking that often causes harm to the environment itself” (pp.12-13). This is seen in cases of infilling such as the one that will be presented in this research. This understanding of sustainability and sustainable development is rooted in the modern neoliberal city and thus a major contributing factor toward the management and shaping of the urban forest and a neoliberal urban forest.

2.3.3 The Neoliberal Urban Forest

Urban trees and the urban forest have been defined through recent history by their utility. Under the beautification movements, this was the provision of shade and their aesthetics. Later, urban forest value was measured by ecosystem services and a more quantifiable approach. Quantifying the services promotes urban forestry as “a market-based practice justified on the assignment of prices to separate aspects of the ecosystem services trees provide to the city... The pricing of ecosystem services through urban forestry is really an ecological modernist approach to regulate the relationships between people, the economy, and the environment” (Perkins, 2011, p. 558). Neoliberalism takes this valuation one step further. The stricter regulation and the neoliberal shift of urban forest management changes the shape of the treescape. Harvey (1995, 2005) discusses how policy shifts became profit-oriented and supported by the elite. Further, the political elite had “the goals of mobilizing nature in order to divert ever-greater portions of the total product towards capital” (Perkins, 2011, p. 560). The economic-driven approach to the urban forest shapes urban forest policies and management practices.

From the mid-1920s to the early 1940s, the dominant perspective of control emerged in urban forest management. This took shape in multiple ways through the densification of street

tree pruning, tree species selection, and municipal control over the newly introduced street trees lining the boulevards of Ottawa. This is perhaps the first evidence of a neoliberal agenda towards nature in an urban setting. Trees were managed and perceived as if they were objects of the built form - no different than a park bench. Trees were primarily being utilized for their shade qualities and aesthetics. It was not evident that considerations of a larger ecological system were prescribed to trees within the city, for early perspectives of ecological studies looked at natural environments and 'the city' is far from natural. The distancing of 'the city' and nature is seen throughout the history of Ottawa and its role in urban forest management. Joanna Dean, a historian who studies the history of Ottawa's urban forest, provides a detailed account of this.⁴

During the early development of Ottawa, new attitudes adopting stricter street tree management emerged. A notable trend during this time is the first major shift in the role of the homeowners. Prior to by-law 5641, passed in 1923, homeowners had the right to plant trees along the street of their property⁵ with the consent of an inspector (Dean, 2005). This new by-law limited their ability to plant, allowing the inspector to deny planting of trees if it did not meet certain requirements stating that "if by reason of the nature of the pavements, walks, sewers, and other works thereon... or in consequence of the extent and nature of traffic thereof... the planting of trees thereon would be impracticable, or dangerous to traffic, or constituted a nuisance upon such street" (ibid. p. 35). This statement provides insight into the placement of trees versus other utilities, where power lines, sidewalks, streets, and other utilities were given the right-of-way over that of new trees. Furthermore, recommendations from the Ottawa Horticultural Society

---

⁴ See: Dean, J. 2005. "Said tree is a veritable nuisance": Ottawa's Street Trees 1869-1939. *Urban History Review*. 46- 57

⁵ Although this was city property, homeowners during this time could plant trees along the street in-front of their property.

(OHS) established that trees should be planted nine metres apart, and provided a long list of fruit-, nut- and cone-bearing trees that were to be prohibited. Finally, the focus on symmetry required that streets being planted should be planted with the same species and variety as the trees that currently exist (ibid). This shift in urban forest management increased the desire of symmetry among street trees and tree planting techniques with a focus on the trees on public property and further limiting the homeowner's ability to plant street trees.

The outcome of designing symmetry among streetscapes in urban design consequently lead to a transformed treescape. Many North American cities, including Ottawa, were planted with high percentages of elm. Developers, foresters and city planners of the time responded to DED by replenishing the urban forest with a streetscape dominated by the ash. For example, the Alta Vista neighbourhood in Ottawa had 50% ash, which in recent years has been attacked by the emerald ash borer (EAB). The consequence of how the urban forest was understood is witnessed in these dramatic outbreaks.

As past decisions shaped the urban forest we see today, there is an obligation to understand how social pressures influence the world around us so that we can produce a more robust system for the future. Concepts of neoliberalism are seen in most disciplines in the 21st century. As capitalism continues to influence today's increasingly urbanized world, it is important to discuss its effects on urban development, design and thus urban nature and the urban forest. Important questions are raised about how the neoliberal political economy shapes our beliefs and understandings of the world around us, including both built form and natural elements. Furthermore, it is imperative to understand how the neoliberal narrative influences the production of social natures such as the urban forest. As Heynen and Perkins (2005) argue:

because urban forests as well as other forms of nature are socially produced, urban political economy increasingly dictates that they are produced in accordance with market forces that operate at various scales... in an increasingly neoliberalized environment, the only people able to address the city's ecological needs are those wealthy enough to own their houses. We suggest that greater neoliberalization will likely lead to an increasingly uneven urban ecology (pp. 107-111).

As seen in this quote above, the discussion of the neoliberal urban forest fosters ideas of uneven urban ecologies through built form and power. Further, this discussion presents itself as a backdrop of the case study presented in this thesis and to a discussion on how neoliberal discourses have manifested themselves in the understandings and practices of sustainable development, many of which operating against and are in a contrarian manner to urban forest initiatives. This alludes to the discussion of the asymmetries of power that exist within this research.

Looking at the complex structures of power and the ways in which different actors and institutions perceive, know and use the urban forest, an important discussion of scale is needed to help understand possible solutions. One of the main differences presented through the case study is understanding the urban forest from a top-down approach verses a bottom-up approach. A top-down approach embodies the economically driven neoliberal narrative of the forest. Seeing the urban forest from this perspective hides the importance of scale. As Konijnendijk (2015) explains, the neoliberal climate of today's urban forests produces an important economic and political narrative through their ecosystem services and their monetary values, however, it "does not give a lot of attention to the cultural ecosystem services⁶ of urban forests... it will be

---

⁶ Cultural ecosystem services has been defined by The Millennium Ecosystem Assessment as "the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences" (Sarukhan & Whyte, 2005, p.40).

important to find better ways to involve local communities” (p. 43). This highlights issues of scale. The neoliberal narrative focuses on the monetary economic value of the urban forest at the scale of the city, ignoring the cultural values at a local level, or how local communities interact with, perceive and benefit from trees in other ways. The case presented in this research highlights an intimate connection between a community and their treescape and its related benefits.

2.5 Summary

The purpose of this chapter has been twofold. First, it examined how our understanding of urban nature and the urban forest has evolved. Second, it presented who have been, and currently are, the primary actors involved in the creation and maintenance of the urban forest. How urban nature in general, and the urban forest specifically, is perceived and incorporated into urban design in history reflects the different ideas and discourses of the times. The initial provision of essential space for nature through parks, with its framings of beautification, health and civic virtue, reflected the discourse of social reform. The enlargement of the space provided to nature, as well as the articulation of the urban forest as a forest beginning in the 1960s, reflected emergent ecological and environmental discourses related to urban ecology and acknowledgement of the value of ecological services. By the close of the twentieth century, interest shifted from defining the urban forest and urban forestry to an understanding of the processes through which the urban forest is created, understood and maintained. Urban forests are at their essence social creations. Everyone sees trees and has their own personal beliefs about the nature around them.

As most decisions within society are the outcome of negotiations between interested parties or actors, this raises the basic question: How are decisions negotiated between differing actors with differing interests? Different actors have been privileged at different times. The principal actors involved in the creation and maintenance of the urban forest have increased in numbers and diversity over time resulting in greater complexities over decision making. These actors include landscape architects, urban planners and city officials, wealthy patrons, private property owners, developers, and a wide arrange of public and private experts. How do these actors resolve questions associated with the urban forests? How do decisions, such the selection of a species of trees to plant, or the removal of a mature tree, impact the urban forest? What are the underlying social forces that influence the shape and management of the urban forest? These are some of the key questions concerning the urban forest today – that I discuss in subsequent chapters – with a particular focus on the effects of infill development towards the treescape of a mature neighbourhood in Ottawa’s urban core.

Chapter 3. Research Approach and Design

A critical research approach to urban forest research seeks to reveal the social dynamics of what is currently understood as an overly scientifically-focused discipline. The purpose of this chapter is to outline the methodological approach of the research and the related research methods that I have used to answer my primary research question (as posed in the introduction), namely: Who are the principal actors engaged with the urban forest and how much influence (power) do these actors have regarding decisions concerning the urban forest? The research approach deploys tools derived from urban political ecology to analyze social aspects of the urban forest in Ottawa. Specifically, I draw on Foucaultian discourse analysis to reveal the complexities of power relations and how power impacts the social production of the urban forest. This is done to help understand how different actors, operating at different scales, have power over the urban forest.

Following the explanation of my research approach, subsequent sections of this chapter will discuss the specific research methods used. This qualitative research uses a case study approach, and includes multiple research methods, such as: semi-structured interviews, academic literature, grey literature, and policy and municipal documents. Interviews were the the main point of departure for much of my primary research. I have used my selected research methods to excavate how Ottawa's urban forest is socially produced and to show how it is the product of complex socio-ecological interactions. After outlining the overall research approach, this chapter will identify and discuss the specific methods used to answer the research question. Finally, this chapter will highlight some of the research limitations that were encountered during the research process.

3.1 Research Questions

As discussed in chapter 2, urban forests are, at both the discursive and material levels, socially produced environments. Different actors draw upon different narratives to construct and give meaning to the urban forest. By using critical discourse analysis to investigate a particular case study of infilling in a mature neighbourhood and its impact on the community's trees, this research seeks to build greater understanding of:

1. the varying perspectives of the urban forest held by different actors in the case study community, tracing how these came to be, how these perspectives may influence decision making and how different knowledges intersect with power;
2. the often conflicting rules and regulations of urban tree management and protection and those of urban densification and infilling, and;
3. the different discourses of urban sustainability that influence current urban processes such as densification and infill development and how they affect urban treescapes, with a focus on my case study community.

The case study approach follows a set of supporting questions that focus on the different dynamics of power influencing the shape and management of a particular treescape. The sub-questions are: 1) Who are the key actors influencing the treescape? 2) What discourses of urban sustainability do these different actors draw upon 3) What process(s) is/are impacting the treescape, and how? and 4) What are the implications of this and why does it matter? The methodological approach and specific methods used in this research were selected to answer these questions regarding the case study and to better understand the social dynamics of Ottawa's urban forest.

3.2 Methodology: A Qualitative Case Study

As argued, our understanding of the urban forest needs to go beyond a scientific or quantitative understanding. Providing a qualitative approach can provide important insights. However, Castree (2001, 2003) makes an important point in emphasizing the intellectual presence of Marxism in the discipline of political ecology while raising the possibility that a purely Marxian focus on social nature can be limiting. In introducing the discursive focus provided by Foucault, Castree (2001) discusses how knowledge and language are the tools we use to make sense of a natural world that is both different from us and yet one that we are a part of. He continues to explain that:

[t]hese discourses do not reveal or hide the truth of nature, but, rather, create their own truths. Whose discourse is accepted as being truthful is a question of social struggle and power politics... knowledges of nature (even scientific ones) frequently express social power relations [and] these knowledges have material effects, insofar as people may believe and act according to them. Deconstructing these knowledges is show[ing] them to be social products arising in particular contexts and serving specific social or ecological ends that ought to be questioned (2001, p. 13).

This research will focus on Foucault's understanding of discourse, or, "how particular knowledge systems convince people about what exists in the world (meanings) and determines what they say (attitudes) and do (practices)" (Waitt, 2010, p.218). It is important to recognize that critical discourse analysis extends beyond simple words and phrases. Nevertheless, as van Dijk (2003) writes in discussing critical discourse analysis, "critical analysis of conversation is very different from an analysis of news reports in the press or of lessons and teaching at school. Yet, given the common perspective and the general aims of critical discourse analysis (CDA), we may also find conceptual and theoretical frameworks that are closely related" (p.353). Similarly, Whisnant

(2012, p. 4) states that the discourse a person adopts tells “us something about the person speaking the language, the culture that that person is part of, the network of social institutions that the person is caught up in, and even frequently the most basic assumptions that the person holds.” He goes on to state that discourse also reflects “very specific patterns of language.” In this sense, words do matter. These patterns of language become evident among the differing actors presented in the case study. Patterns of language reveal how different actors perceive the urban forest and its management.

According to Foucault, discourse operates in four basic ways (Whisnant, 2012). First, discourses create worlds, evolving historically and culturally, providing the intellectual framing of the world through which one engages with others and understands the world. Second, discourse constructs knowledge and in so doing, truth. To Foucault, knowledge does not exist independently of language. Knowledge is expressed and organized through language. Third, discourse reflects the people who speak it and vice versa. Different people and organizations use different discourses to reinforce their authority or interests. The same is true when analyzing language or the terms and phrases that individuals use. Finally, discourse is related to power.

The third way discourse operates is central to this work. Not all individuals or groups subscribe to a single discourse. Within any society there exist competing discourses. Some discourses are seen as “dominant” while others are seen as “alternative” discourses. A dominant discourse is the one which the majority of members of a society accept as being true – discourses with more power (Whisnat, 2012). Alternative discourses offer different interpretations of a specific topic that challenge the dominant discourse. In many instances, different discourses are in opposition yet still operate simultaneously. Competing discourses are present in the case study

adopted by this research. Examples of these competing discourses become evident through the case study. For example, “economic” discourses of sustainable development that favour the compact city conflict with many of the “green” regulations and initiatives aimed at preserving and protecting urban trees.

As stated earlier, this research seeks to explore the social production of a particular treescape (e.g. the case study community), tracing the asymmetries of power that exist between the different actors operating in Champlain Park. Discourse does not end with revealing who is saying what; it seeks to reveal the dynamics of power involved. According to Foucault, truth, knowledge and power are inextricably linked through discourse (van Dijk, 2003). As argued by van Dijk (2003):

A central notion in most critical work on discourse is that of power, and more specifically the social power of groups or institutions. Summarizing a complex philosophical and social analysis, we will define social power in terms of control. Thus, groups have (more or less) power if they are able to (more or less) control the acts and minds of (members of) other groups. This ability presupposes a power base of privileged access to scarce social resources, such as force, money, status, fame, knowledge, information, ‘culture,’ or indeed various forms of public discourse and communication (p.354).

Drawing upon Gramsci, van Dijk (2003) goes on to acknowledge that “the power of the dominant group may be integrated in laws, rules, norms, habits, and even a quite general consensus, and thus take the form of what Gramsci called ‘hegemony’” (p.355). This, then, raises the question of what discourse is the dominant discourse associated with urban development and how it creates the framework in which decisions concerning infilling and the urban forest are negotiated and reached.

3.2.1 Case Study Research

This research embraces an instrumental case study approach (Luck et al., 2006). An instrumental case study can be described as one with “an interest in a particular case with a view to the examination of an issue for insight. The specific case is important because it uncovers knowledge about the phenomena of interest” (ibid, p.106). An instrumental case study provides the ability for the researcher to focus on specific concerns illustrated via the case. Using a case study approach future results will be transferable in the application of other similar phenomena that are in question – for example, how social processes of urban development affect and shape an urban forest.

This research involves a single case to help understand some of the conflicts related to the shaping of Ottawa’s urban forest. Although a singular case study approach has limitations, the single case explored in this research examines a variety of issues related to a significant contemporary urbanization trend, namely urban densification. This methodological approach is valuable in that it will help to “understand the concrete and practical aspects of a phenomenon or place... Case studies [are] used to understand and solve practical problems relating to the case alone, and they may be used to generate explanatory theoretical concepts” (Baxter, 2010, p. 95). By observing the processes within the selected case, a broader exposition can be illustrated and used to help build knowledge outside the case itself.

I used three main criteria in selecting my specific case study: first, identifying an area that demonstrates how social processes are changing the urban treescape, second, identifying a community located in Ottawa’s urban core (e.g. inside the Greenbelt), and third, identifying a neighbourhood with a mature treescape. As elaborated below, my initial set of scoping interviews

with key informants were helpful in identifying a relevant case study community. These scoping interviews helped me to better understand some of the key issues facing Ottawa's urban forest, thus helping with the identification of the case study as well as key issues such as infill development in mature neighbourhoods and the lack of enforcement of Ottawa's tree conservation by-laws. It was also through this initial set of interviews that participants identified Champlain Park as a community that is being seriously impacted by infilling and, as a result, losing many of its mature trees. These initial interviews revealed a community that had a unique connection to their treescape and was known for fighting for the protection of their trees. As explored further in chapters 4 and 5, the use of a specific neighbourhood case study presents important insights into how treescapes at a neighbourhood level are being managed and contested in the current planning context.

3.3 Research Methods

This research uses multiple methods drawing upon primary and secondary source materials. This section will identify the specific methods used in the case study. It will identify the strategies used to select participants, conduct the interviews, as well as the identification and collection of primary and secondary sources. It will then outline the process of organizing the research material, and explain my discourse analysis approach. The source materials used for the discourse analysis were: interviews, policy documents, and secondary materials, however, with the exception of developers, my discourse analysis focused primarily on my interview data.

3.3.1 Interviews

For my research, I interviewed 11 participants. Each interview session was recorded using an audio recording device. Each interview varied in length due to the semi-structured approach

taken and lasted between 60 and 90 minutes. The interviews took place between December 12, 2014 and August 28th, 2015 (see Appendix B for detailed participant information). Interview participants were selected through a snowball sampling strategy. In a snowball sampling strategy, potential interviewees are initially approached to take part in the study. These potential participants were initially contacted via email describing the purpose of my research (see Appendix C). Interviews were then arranged at the convenience of the participants and each participant chose the time and location for the interview. Those agreeing to participate were then asked if they knew of other individuals who may be interested in participating. This strategy identifies potential participants involved in similar cases (Bradshaw & Stratford, 2010; Kirby & Hay, 1997; Stratford, 2008). The purpose of a snowball strategy is to reveal important actors who may not be known to the researcher. As such, a snowball strategy is purposeful; that is, it is a non-probability sampling strategy (Sadler et al., 2010).

To visualize the snowballing sample method, I draw on Milroy (1980) and Zhang et al. (2013). The snowball sampling stagey has two main tiers (Figure 3.1). Tier one incorporates the

Figure 3.1. Conceptual web of the snowball sampling method (Adapted from Milroy, 1980; Zhang, 2013).

initial contacts that were identified by the researcher. Tier one participants were identified based on their expertise related to urban forestry and urban forest management. Tier two participants represent the additional participants identified by the tier one participants. In this research, key individuals involved in urban forest management were identified as tier one participants. These individuals, in turn, were asked to identify other individuals who were actively involved in issues surrounding the urban forest in general, and then later, additional key informants related to the Champlain Park community once I had decided to focus on this neighbourhood as my case study.

As an initial contact from my previous research, Jason Pollard, a forester with the City of Ottawa, acted as the start of the snowballing method (Copp, 2013). Jason Pollard had significant insights into the issues facing Ottawa's urban trees and helped me to identify other key actors. Figure 3.2 represents the initial scoping of the actors which led to the identification of other key actors in my research and case study. The participants were subsequently organized into specific actor categories: developers, the City of Ottawa (including Forestry Services and the Planning Department), the community association, the ward councillor, relevant NGOs (including the Champlain Oaks Project and Tree Canada), and residents. Unfortunately, I was unable to secure

Figure 3.2. Initial identification of actors

the voluntary participation of a developer in this research, a potential weakness in my study. To deal with this drawback, I drew upon other source materials, such as newspapers and media (see Appendix D), as well as observations made by other participants to understand the position of developers active in Champlain Park. These sources provided insights into how the developers operate, helping to establish their role and relevance within the case. Several other actors, including Hydro Ottawa, a variety of arboricultural companies, and the National Capital Commission, were identified as being important actors in the shaping of Ottawa's urban forest as a whole. However, they were not seen as pertinent for this particular case study and were, therefore, excluded.

3.3.1.1 Interview Design and Questions

The interview process took a semi-structured approach. The semi-structured format of the interviews allowed for a variety of unique answers, and allowed for the general direction of the interview to be established by each participant. This approach was taken due to the variety of participating actors within the case. The semi-structured interviews helped establish what each participant identified as major problems associated with the urban forest and neighbourhood trees. I used five principal questions as a general script in the interviews to probe a number of key issues with each participant (Table 3.1). These questions were used to reveal each participant's influence over actions concerning the urban forest. Based on these responses, the interviews allowed for a variety of different themes to emerge through the discussion with the participants that revealed their different perspectives, concerns and knowledges of the urban forest.

Table 3.1. List of key questions to interview participants

Key Questions
How does your job directly or indirectly relate to the urban forest?
How would you define the urban forest?
What is the current state of Ottawa's urban forest?
What do you think is impacting Ottawa's urban forest the most?
Who has the power to make changes towards Ottawa's urban forest?

3.3.1.2 Recording and Transcribing the Interviews

Prior to each interview, I provided a consent form to each of the participants (see Appendix E).

This consent form described the research, and notified them that I wanted to record the interview.

Each participant had the option to opt out of audio recording, or to stop the interview at any time.

After reviewing the consent form with each of the participants, I notified them that I was

beginning the audio recording, if permission had been granted. The audio recordings were used to provide interview transcriptions to be incorporated into the discourse analysis.

Following the interviews, the audio recordings were transcribed and imported into NVivo software. The majority of the interviews were transcribed in their entirety. Some non-essential information was not transcribed. Following the transcription of the audio recordings, transcript copies were returned to those participants who had requested a copy for review. No participants made changes to, or exempted any responses from, their interviews. Although the audio recordings were transcribed verbatim, there are no claims of 100% accuracy throughout the textual transcriptions due to the presence of background noise that occasionally overwhelmed the participant's voice. This was in part due to some of the locations where the interviews took place.

Interviews times and locations were chosen by the participants to ensure their comfort and convenience.

3.3.2 Secondary Literature

Findings from the interviews of participants were supported by four types of secondary materials: municipal and planning documents; grey literature including sources from newspaper articles, action groups, community associations and NGOs; supporting photographic evidence; and academic literature. This secondary literature was used to provide background context to the case, as well as to try to represent and understand the position of the developer. Municipal documents included those associated with the urban forest and with planning and development policies and practices in the City of Ottawa. These documents were identified and collected through two main strategies: 1) during interviews with employees of the City of Ottawa, and 2) through my own review of Ottawa's Official Plan, zoning and by-laws and other pertinent planning information identified through key word searches on the city's website. In addition, grey literature materials were identified and collected by conducting key word searches through multiple search engines. Key local media sources, principally the *Ottawa Citizen*, were identified, and using their online search tools, additional relevant secondary sources were obtained. In particular, I used newspaper sources to provide additional context information pertaining to: infill development, the regulation of Ottawa's urban forest, and the Champlain Park community. The full list of newspaper articles used can be found in Appendix D. Six major articles were identified and analyzed. These articles, published between April 2014 and October 2015, outlined the increase in infill development in mature neighbourhoods and its effect on communities and their trees. Within each of these articles, there was mention of the loss of trees

and the lack of protection for trees in the development process. Further, these articles helped to establish the position of developers, as several newspaper articles quoted developers themselves - this provided indirect perspectives from developers and helped to trace the discourses that they draw upon. The use of secondary literature was therefore important in trying to represent the position of developers, given that no developer agreed to participate in this study. Articles from both print and electronic media were similarly included in the discourse analysis. Media representations related to urban trees in Ottawa influence how people understand and perceive the urban forest.

3.3.3 Organization and Analysis of Source Material

In this thesis, discourse analysis is used to examine the positions of various actors drawing upon interviews and supporting secondary materials. It seeks to tease out the ways in which different actors invoke different discourses to understand and shape the urban forest. Different actors associated with the urban forest embrace different discourses to support their positions. The analytical position taken here is that the words, phrases and expressions used by an individual or group reveal the discourse he/she draws upon, even if the person is not aware of the discourse itself. In considering the issue of infilling and urban trees, I reflected upon several questions: How do business actors draw upon economic discourses as the basis for their positions? How do community actors draw upon environmental discourses? Are there other discourses that actors involved in the issue of infilling and urban trees draw upon (e.g. heritage)?

The NVivo software was used as the primary tool to assist with the discourse analysis. I organized the data, both source materials and secondary sources, based on its origin: interviews, policy documents, news reports, photographs, and other secondary material. The organization of

these materials were based on subject matter. These materials were coded and organized into six categories: issues facing the urban forest, infill development, zoning and by-laws, development perspectives, community perspectives, and challenges. The software allowed for the identification of common themes, phrases, linkages, and differences found within this qualitative data. This helped answer the research questions by identifying the different perspectives and knowledge of the actors. Based on the responses, I generated tables and thought webs (presented in chapter 5) that established the key positions and perspectives of the actor / actor groups. This helped answer my research questions by highlighting the ways in which the actors engage with the urban forest and to better establish their influences over the Champlain Park treescape. By locating and grouping key themes among the different sources, the use of NVivo qualitative analysis software revealed how the different actors in my case study situate themselves and their knowledge in the production of the urban forest. The organization of data by themes was an integral part of conducting the discourse analysis.

As already discussed, the use of a critical discourse analysis attempts to bridge the gaps between meaning, knowledge, and practices that influence the production of urban treescapes. Throughout the analysis process, various themes emerged through the perspectives of different actors related to the Champlain Park case study and the effects of infill development on the treescape. Some examples of the themes addressed are: infill development as a process destroying trees, lack of enforcement of tree protection by-laws, and the challenges of fighting the developers. These themes helped to organize the findings presented and analyzed in chapter 5. These ideas also helped highlight how certain and sometimes selective discourses of sustainable development are utilized more than others, and represent important drivers

influencing the community's treescape. In so doing, the analysis of findings helped identify possible asymmetries of power existing in the current management structure of the urban forest in the particular case of Champlain Park.

3.3.4 Site Visits and Observations

To better understand the case of the Champlain Park neighbourhood, I conducted three site visits and compiled observations between July and August of 2015. The site visits provided further context for understanding my case study community. I took photographs of the area to document and illustrate issues that came up in my interviews and throughout the overall research process.

In this way, the photographs served as an important visual tool related to my case study. Some of these photographs appear as evidence of certain claims and explanations I make in chapters 4 and 5.

3.4 Ethics

Ethics approval for this research was received November 7th, 2014 and fieldwork began shortly there-after. Appendix E is a copy of the consent form that the participants signed. All interviews and the handling of both the recorded and transcribed interviews were managed in accordance to the guidelines set by the university's research ethics application.

3.5 Limitations of the Research

Like all research, this research has limitations. Due to time and funding limitations, this research focuses on a single case study for in-depth observation. It is recognized that multiple or comparative case study research is more robust and a wider variety of case studies in the future could help establish a better and more representative understanding of the overall pressures facing Ottawa's urban forest. Nevertheless, this research acts as a point of departure to better

understand how the urban forest or treescapes are affected by a common and significant contemporary urban process in both Ottawa and other Canadian cities, that is, the infill development related to the “compact city.” Clearly, there are other important processes shaping the urban forest, but I have chosen to focus on this particular aspect of the social production of treescapes in the context of the time and funding limitations of a Master’s thesis. As previously mentioned, a further limitation with my research includes the lack of direct participation of developers in the interview process given that they are one of the key actors shaping the urban forest, especially in my case study community. I have tried to address this limitation by referring to interview data and indirect quotes from secondary materials, especially newspaper articles.

3.6 Summary

The purpose of this chapter has been to elaborate upon the methodological approach taken in this thesis. In order to help understand the complex nature of both the social and ecological parts of urban forests, this research is informed by and uses a key tool of urban political ecology for the case study analysis, namely, critical discourse analysis. In doing so, this research seeks to develop an understanding of the processes shaping a treescape, viewing this as an outcome of different and often competing discourses of urban nature and sustainable development. This helps to capture a more critical and intimate perspective for understanding and thinking about urban treescapes, including how they are perceived by different actors and how these differing perceptions are linked to both interests and power in shaping and contesting urban treescapes and landscapes.

Chapter 4. The Struggle over Urban Space: Managing the Urban Forest and Urban Planning

The bur oaks in Champlain Park make the neighbourhood's treescape a unique pocket of Ottawa's urban forest. However, these mature bur oaks are being threatened by continued urban densification projects that are transforming the community's treescape one tree at a time. This chapter introduces the context shaping struggles over urban space for trees and infill development, a conflict arising from contemporary urban development patterns and policies. These tensions lie between the protection of treescapes that make up the urban forest, and provincially-mandated planning initiatives to increase urban densification that result in a reduction of space for urban nature in downtown areas and neighbourhoods. I focus on these conflicts in my case study community of Champlain Park. This chapter will discuss the case of Champlain Park and its treescape in the context of Ottawa and its urban forest. I do this by introducing the case study community and outlining relevant municipal regulations, rules and by-laws associated with the management of trees in urban communities such as Champlain Park, including those related to lot sizes and housing densities. To introduce the case study community, I situate the community in the broader geography of the city of Ottawa and provide a brief natural history of this area and the neighbourhood's unique grouping of mature bur oak.

4.1 Seeing the Trees and the Forest: Ottawa's Urban Forest and Champlain Park's Treescape

As outlined in chapter 2, it can be argued that current definitions of an urban forest emphasize a top-down approach to urban forest management, masking important issues of scale and place.

Understanding the struggle over urban space and the social processes that affect the urban forest

makes it important to outline the political and regulatory planning frameworks that influence urban development. My own case study research suggests that the urban forest, and treescapes specifically, are influenced by the policies and land-use decisions made by municipalities within the provincial planning framework established by the Province of Ontario. Like all municipalities in Ontario, the City of Ottawa relies heavily on the Provincial Policy Statement (PPS) to establish land-use planning policies. Although this research does not provide a comprehensive analysis of the PPS, I do review in some detail the City of Ottawa's Official Plan and its overall development and planning strategy, which must "have regard to" the PPS, and which invariably impacts upon Champlain Park.

The PPS provides the overall policy direction and framework for growth and development in urban and rural areas of the Province of Ontario (Ministry of Municipal Affairs and Housing, 2014). Stated within the 2014 PPS, "provincial plans and municipal official plans provide a framework for comprehensive, integrated, place-based and long-term planning that supports and integrates the principles of strong communities, a clean and healthy environment and economic growth, for the long term" (p.1). The PPS outlines that Official Plans are designed for municipal growth management over the long term. Municipalities use the PSS to help establish their official plans in conjunction with the policies outlined in the PPS. An Official Plan is used to help guide a municipality's planning, development, and land-use decisions (Ministry of Municipal Affairs and Housing, 2014).

Drawing on the PSS, and reflected in Ottawa's Official Plan, densification is highlighted as a priority for urban development in Ontario, and represents an integral part of the province's sustainability goals (Ministry of Municipal Affairs and Housing, 2014). Indeed, the major

tensions in my case study community of Champlain Park stem from this policy of densification via infill development, leading to struggles between development and urban forest conservation. Moreover, these “local” and even community-based tensions are often adjudicated through the Ontario Municipal Board (OMB)⁷, a provincially-appointed tribunal that deals with land use disputes such as those related to infill development, often ruling in favour of developers (Environment & Land Tribunals Ontario, 2015). Before delving into the details of my case study, I first turn to the planning context needed for understanding Ottawa’s urban forest.

4.1.1 Ottawa’s Urban Forest

Prior to European settlement, the area known now as Ottawa was heavily forested with a mix of deciduous and coniferous trees characteristic of the Great Lakes-St. Lawrence Mixed Forest Zone. The Algonquin people of the area managed the forest. However it was not at the scale of impact of European lumbering and subsequent colonial settlement. Conversion of woodlands into farmland due to demands for lumber and firewood quickly reduced Ottawa’s forested area to a significantly low level (Findlay, 2001).

When Ottawa became Canada’s capital, more attention to beautification became a municipal concern. It was recognized early on that the city was lacking trees, and in the mid to late nineteenth century, trees became an integral part of city planning. The first municipal by-law specifically addressing what has become known as the Ottawa’s urban forest was passed in 1869. This by-law encouraged “the planting and protection of shade and ornamental trees” in the city of Ottawa, and trees were quite literally planted in and along unpaved streets (Dean, 2005). However, by 1922, complaints started to emerge explaining that the trees of Ottawa were

---

⁷ A dispute can be filed with the OMB under the Planning Act and other legislation (Environment & Land Tribunals Ontario, 2015). I discuss the role of the OMB in greater detail in chapter five.

obstructing utility wires, sidewalks, and pavement. Further, the Ottawa Horticultural Society (OHS) expressed that the trees were planted too densely resulting in unhealthy and misshapen trees (ibid, 2005; OHS, 1917-1937). The complaints of trees being planted too densely caused a shift in attitude towards the management of trees (ibid, 2005). Once cherished for their abundance and beauty (among other values), the attitude towards these trees shifted by the next generation. By the mid-1920s the city's emphasis shifted to more organized management strategies and practices that would increase 'control' over street trees. Increased cutting and removal of trees dramatically changed the shape of the urban forest and an increased emphasis on pruning exemplified further control over urban trees (ibid, 2005). This control extended to both how these were to be planted and what tree species were permitted.

The early twentieth century was a critical period in the development of Ottawa's built and natural form. Officials during this period established much of the urban forest, its structure and to some extent, how it is seen today. Early by-laws that focused on control through pruning, cutting, spacing, and species selection changed the approach of urban tree management. This parallels to what is happening today. As the city grows, trees planted in an earlier era are now being removed. Urban growth through densification and infill is affecting the Champlain Oaks in a similar way.

The idea of symmetry, as discussed in chapter 2, was an important design feature of the City Beautiful Movement. This idea of symmetry, for the sake of aesthetics, was very important both in the planting of new trees along streets in Ottawa and in determining what species of trees would be planted. From the early 1920s to the 1940s, it was deemed by "the city" that trees had to be planted nine metres apart, and the inspectors would enforce symmetry along the streets and

“may require that all trees proposed to be planted on such street or one side thereof, shall be of the same species and variance as the trees, or the greater number of trees, planted thereon” (ibid, 53). In conjunction with this idea of symmetry, planting prohibitions for a long list of fruit-, nut-, and cone-bearing trees were established, further limiting the species of trees that could be planted.

The regulation of the tree species permitted for planting to enhance the aesthetic appeal of Ottawa created today’s urban forest. These restrictions led to the two crises presented in chapter 2. The first was the devastation of the American elm by DED. Introduced into the region in 1948, virtually all of Ottawa’s majestic elms had been killed by the 1970s (Copp, 2013; Lewis, 1979). Unfortunately, city officials failed to learn from this event, opting instead to replace many of the dead elms with a limited selection of tree species, and principally the ash. This resulted in the ash tree comprising 20 to 25% of Ottawa’s urban forest (City of Ottawa, 2012). This concentration of ash lead to a second shock to Ottawa’s urban forest with the introduction of EAB in 2008.

The current City of Ottawa’s Official Plan estimates the urban tree canopy covers between 20 to 25% of the city. This includes the built, peri-urban and rural areas of the city. However, this coverage shrinks to 17% when considering only the neighbourhoods of the urban core (Alam, 2012). Management of public forested and wooded areas is described in the Greenspace Master Plan as a part Ottawa’s Official Plan. Currently, a specific strategy is being assembled to focus on the management of the public and private urban forest. The Urban Forest Management Plan is in its draft form undergoing public consultation and is expected to be presented in Committee and Council meetings in December of 2016. There are seven key initiatives and seven key management strategies targeted by the City of Ottawa (Table 4.1 and 4.2). These initiatives are

Table 4.1. Urban Forest Management Plan key management strategies. (City of Ottawa, 2016)

Initiative	Description
Municipal Tree Inventory	The City has an inventory of over 158,000 trees. The inventory contains species, size, location information, and is regularly updated.
Emerald Ash Borer (EAB) Management	The City's EAB strategy includes treating, removing and replanting trees, practice tree planting, and public education to raise awareness.
Tree Conservation By-laws	City by-laws regulate the injury or removal of trees on private and municipally-owned property. Permits are required to remove certain trees, depending upon the size of the tree and property.
Urban Natural Areas Assessments	The City has undertaken assessment of 192 Urban Natural Areas. Many of these are wooded upland or swam forests.
Proactive Tree Maintenance	City-owned street trees are pruned on a regular basis, and tree health and risk are inspected. Residents can also request tree inspection and maintenance.
Development Review	Many new developments in Ottawa, including new subdivisions and small site plan applications, require Tree Conservation Reports and tree protection, planting, and replanting.
Design Guidelines	The City has developed urban design guidelines to promote effective integration of trees and tree habitat into parks and along streets.

Table 4.2. Urban Forest Management Plan key initiatives. (City of Ottawa, 2016)

Management Strategies	Description
Knowing the Resource - Inventory	An inventory of urban trees can assist in planning maintenance, planting and other activities. It is essential for proactive tree management.
Recognition as Green Infrastructure	Urban forests provide numerous environmental, social and economic benefits to the community and should be recognized as valuable infrastructure assets.
Tree Preservation	Tools such as Official Plan Policies and tree protection guidelines and by-laws can support and improve tree protection during development. Education and enforcement are equally important to successful implementation.
Proactive Maintenance	Structural pruning of young trees and regular maintenance and inspection of mature trees can reduce risk, lower long-term maintenance cost and improve urban forest health.
Strategic Tree Planting	Planting the 'right tree in the right place' ensures successful long-term tree establishment. Tree species diversity should be encouraged to reduce pest and disease susceptibility.
Proactive Risk Management	Trees should be inspected and maintained to reduce risk. Risk management should take a conservation based approach to reduce tree removals.
Outreach and Stewardship	Residents and property owners play a key role in sustaining the urban forest. Knowledge of the benefits of the urban forest and proper tree care can increase engagement in community initiatives and support for urban forest stewardship on private lands.

important for my case study because they were sparked by many of the issues and tensions present in Champlain Park. Some of the concerns impacting Champlain Park are to be addressed in the future through the introduction of the new Urban Forest Management Plan, and these represent important aspects to consider in future cases of infilling to protect urban trees. These initiatives are also designed to situate urban forest management within Ottawa's Official Plan.

Ottawa's Official Plan, "Ottawa 20/20," is a 20-year vision for managing future growth (City of Ottawa, 2015). The plan is integral to how urban development will occur and outlines important planning strategies such as densification as a way to mitigate urban sprawl. As part of the Ottawa 20/20 vision, Ottawa plans to expand the tree canopy to 30% of the city's area by 2017. Based on a collaborative effort between the City of Ottawa and Tree Ottawa, a division of Ecology Ottawa, there is a plan to plant one million trees by 2017 in order to reach this target. These plans and targets raise a number of important questions, including: What about all of the trees being lost by densifying Ottawa's urban core? Will there be adequate space for trees amidst ongoing densification and infill development?

As evident in the case study, Ottawa's management of the urban forest faces competing agendas and interests. Indeed, development interests that push for more urban densification might make it difficult to achieve the target canopy cover by 2017. Much of Ottawa's built urban forest canopy is found within its mature neighbourhoods in the urban core and currently this part of the urban forest is under threat from two main processes: the emerald ash borer and infill development. Both provincial and municipal mandates promote infill development, and as infill projects sweep through these mature neighbourhoods, much of the existing, mature tree canopy is disappearing. In fact, Ottawa's urban forest is in a state of decline. Currently, between 20 and

25% of Ottawa's urban forest is threatened by the emerald ash borer (Copp, 2013), and it has been observed that some of the city's mature neighbourhoods were planted with upwards of 50% ash (City of Ottawa, 2012). Development pressures have added to this decline, as well as influencing the future state of the urban forest. Under the current development regime, densification, by means of infilling, is transforming many of Ottawa's mature neighbourhoods, not simply through the loss of mature trees, but also through the loss of potential space for new trees.

4.1.2 Champlain Park and the Bur Oak Case Study

Champlain Park is nestled within the Hintonburg/Westboro area of Ottawa's urban core.⁸ It is bordered by the Ottawa River to the north, Tunney's Pasture to the east, Scott Street and the transit-way to the South, and Island Park Drive to the West (Figures 4.1 and 4.2). The neighbourhood is approximately 35.65 hectares in area. According to the Champlain Park Community Association website, this community consists of 361 houses and contains a population of around 1,000 people. As of 2011, the general neighbourhood characteristics include a large percentage of single detached houses, 37.8% compared to 5.4% semi-detached houses (Statistics Canada, 2011). This community falls under the city's Mature Neighbourhood Overlay⁹ and consists of two zoning areas under city zoning by-laws - R1P and R2D. The western half of the neighbourhood from Island Park Drive to Keyworth Avenue follow the R1P

---

⁸ Ottawa's urban core is defined as the space within the borders of the Greenbelt. Appendix F provides a map of Ottawa labeling the Urban Core and Greenbelt boundaries.

⁹ The mature Mature Neighbourhood Overlay is a streetscape characteristic analysis type that is used to help identify zonings. Most Mature Neighbourhoods in Ottawa are zoned under R2, R3, or R4.

Figure 4.1. Geographic location of Champlain Park. Source: Google Earth, 2015.

Figure 4.2. Champlain Park neighbourhood boundary. Outlined in red is the Champlain Park Community. Boarded by the Ottawa River to the north, Tunney's pasture to the east, Scott Street and the Transitway to the South, and Island Park Drive to the West, this small mature neighbourhood is home to the bur oak. Source: Google Earth, 2015.

zoning by-laws, and the eastern blocks of the neighbourhood from Cowley Avenue to Northwestern Avenue fall under R2D zoning by-law.

The treescape of Champlain Park includes a wide variety of tree species including black walnuts, a variety of maple species (including the silver maple, Norway maples and sugar maples), hackberry, white spruce, white pine, elm, and ash varieties (both white ash and red ash) and oaks species (including the bur oak and the red oak). Nevertheless, it is the bur oaks that have become a rallying point for community engagement in the management of the community's urban forest generally and in the protection of the community's treescape specifically. The Champlain Park community cherishes their bur oaks and community initiatives have focused on the preservation and protection of the community's trees against development pressures.

4.1.3 History of Champlain Park

The Champlain Park area of Ottawa has a unique natural history that is detailed in Figure 4.3. Central to this timeline is the establishment of the growing cultural significance of the bur oak. This distinguished tree species is identified as having unique biological attributes and natural heritage significance (Buckles, 2014; Robbins, 2015). Furthermore, ecologists have hypothesized that the bur oak is the predecessor of all of the white oak variations in North America (Reed, 1958; Riley, 1997). As such, the bur oak is an important species to protect and preserve. It is common for these oaks to live 250 years and they can survive for up to 400 years. Mature bur oaks are concentrated in the Champlain Park community and the two surrounding neighbourhoods, Island Park and Westboro Beach, making this treescape a unique part of Ottawa's urban forest (Buckles, 2014). Although the bur oak is not unique to Ontario at the provincial scale, the grouping of these bur oaks is unique to Ottawa. As Dean (2016, per. com.)

Figure 4.3. Historical timeline of the development of Champlain Park. Adopted from Buckles (2014), see Appendix G. I would like to recognize that the above history overlooks the process of dispossessing indigenous peoples from their land/ territory.

writes, “the trees are special because they are a group, because as a community of trees, a forest, they are recorded as having been there since the 1600s.”

The bur oak is native to the deciduous forest zone of eastern and mid-west North America, and is one of the major Alvar Plant Associations¹⁰ (Catling et al., 2012; Farrar, 1995). The development of this Alvar dates back to the Mesozoic Period. The shoreline along the Ottawa River that is now the Rémic Rapids and the Deschênes Rapids in Gatineau is a limestone plain. This limestone plain consists a very thin layer of soil which was created after the retreat of glaciers from the last ice age (Hogarth, 1962). This glacial retreat formed the unique soil properties for the Alvar plant association in this area of Ottawa (Hugget, 1993, 1995). The Alvar plant association is consisted to be a rare ecosystem this far north in Ontario and Quebec and consists of two main plant associations: red cedar-prickly ash and bur oak-prickly ash (Catling et al., 2012; Farrar, 1995).

The significance of the bur oaks is noted in the human history of the region. Dating back to the 1600s, the Algonquin camp of “Micinimig,” which means “where the oaks grow,” was located in the area of the present day Deschênes Rapids, a French name that can be translated to “some oaks” (Beresford-Kroeger, 2010). To the Algonquin people, the bur oaks in this area were very special because the edible nuts could be collected in great numbers providing a reliable food source (ibid). Samuel De Champlain made note of these same trees some in his journals around 1620 (Buckles, 2014; Fischer, 2008, p. 308). Exploration by French Captain Pierre Chevalier de

---

¹⁰ Alvar plant associations provide rare environments for a variety of species. Uniquely situated in Ottawa, the bur oak has nuts that are favoured by a variety of animal species promoting heightened biodiversity. bur oaks are known for being faster growing species than most other oaks and due to the variety of properties of the bur oak is identified by the Ancient Tree Archive Project as global properties for propagation and conservation of the genetics of ancient champion trees (Buckles, 2014; Farrar, 1995; www.ancienttreearchive.org).

Troyes in 1686 further captured the ever growing human relationship to the oaks in this area. He took note of “the oak forest” and the sheer number of oaks in the area as he traveled through the north side of the Ottawa River between Chaudière Falls and the Deschênes Rapids (Buckles, 2014).

It was in 1794 that the parcel of land upon which Champlain Park is now located was surveyed for European settlement. This land was originally designated to be settled by Loyalists, but they never came to this particular area. Elliot (1991) explains that in 1810 this area was “a wooded wilderness” (p.7) and remained so until 1852 when one lot, Lot 33, was purchased by William Hamilton as a farmstead. It has been determined that the oldest bur oaks today were saplings of the existing oak forest of that time (Buckles, 2014; Elliot, 1991). During that period, there was a shift of land-use in this area transforming it into farmland. However, the bur oaks were not commonly cut down because they acted as wind breaks for farmland, as boundary markers for properties, and as woodlots (ibid).

In 1867, Lot 33 was further divided into smaller parcels of land in what might be considered the area’s first wave of densification (Buckles, 2014). Captain Daniel Keyworth Cowley purchased 192 acres of Lot 33. Cowley sold the north portion of land to an Ottawa Lawyer, Charles Hamnett Pinhey and to Senator James Skead in 1867. Still, this area remained largely untouched and there was enough space for Skead to host a fox hunt through his wooded land in 1874 (Buckles, 2014; Ottawa Free Press, May 2, 1874). In 1880, some of Skead’s land was purchased by Robert Cowley’s son Daniel Cowely (Elliot, 1991; Stothers, 1930). Pinhey sold 38 acres of the land back to Robert Cowley in 1903 and in 1916 it was subdivided into Riverside Park with streets named Daniel, Keyworth, Cowely, Mailes, and Oakdale Avenues. By 1900, a

proposed railway connecting this area to Ottawa increased the demand for property development (Elliot, 1991). It is significant to note that one of the original houses built in 1904 still remains in this neighbourhood and was intentionally built between two bur oaks (Buckles, 2014). Again, an evolving and continuing relationship between the community, its development and the bur oaks is seen through examples such as this. Due to the Depression and two world wars, residential development in this area was slow between 1927 and 1946 and only occurred on portions of the land (Figure 4.4).

Figure 4.4. An aerial photo of the case study area in 1946. Remnants of the original oak forest are visible in this map. Some development has started on the eastern portion of the Champlain Park. Development of Daniel and Patricia Avenues took place in 1947 further fragmenting the forest. Image source: Daniel Buckles (Interview 5, Feb. 22, 2015).

Figure 4.4 shows the state of the remaining oak forest in 1946 prior to subsequent development of the neighbourhood. As evident in this image, the eastern portion of Champlain Park had been partially developed. However, there is still significant tree coverage in the western portion of the area. In 1948, the Canada Life Assurance Company created lots and development along Daniel and Patricia Avenues, and as noted by Elliot (1991), this was the “first place in Ottawa that was subject to a standard subdivision agreement requiring developers to construct suburban roads” (pp. 230-231; cited in Buckles, 2014). As development continued in this area, streets were planted with maples, lindens, and pin oaks. Buckles (2014) notes, “many bur oaks were left in place during this development, gracing the streets and backyards of the new houses.” The examples of the bur oaks being intentionally left despite development shows how residents valued and identified with the bur oaks as an important part of the local natural heritage. Explanations of why the bur oaks were saved during this period varied; the fact they were saved is what is relevant.

In 1950, Ottawa annexed this parcel of land from the Nepean Township to form what is today known as Champlain Park. Figure 4.5 shows the neighbourhood as it is developed and provides an illustration of the location of the remaining bur oaks, as of 2014. There are 82 mature bur oaks mapped in Champlain Park. As explored in the next chapter, Buckles (2014) describes how the bur oaks still remain an important and defining feature of the community today. Although this community values the unique presence of the bur oak, the process of urban densification via infilling is threatening the bur oaks and the treescape as a whole. As described in the following section, the threat of Champlain Park’s treescape is pitted between competing agendas and

with the desire to increase this density within city neighbourhoods. Champlain Park lies within a target area identified by the city for densification. In the Official Plan, the city defines densification under two main designations: residential densification and employment densification. Infilling is defined by the City of Ottawa as “an urban planning term that describes the practice of building on unused or underdeveloped property within an urban boundary. Infill places more residents within a more compact urban area and makes more efficient use of existing infrastructure” (City of Ottawa, 2015a). This indicates the approach to sustainable development, as discussed in chapter 2, consistent with the neoliberal, compact city.

Zoning is an associated and significant issue related to the impact of infill development on local treescapes. Zoning describes the permitted size and use of land parcels. Infilling is permitted under “Infill I Zoning” which was adopted by city Council on May 9, 2012 under the infill by-law 2012-147. This zoning designation prescribes lot sizes and permitted building sizes. Due to the impact of infill development in mature neighbourhoods, changes to zoning rules designated by Infill I were proposed in 2013 through the formation of the Mature Neighbourhood Overlay. As established by the Mature Neighbourhood Overlay:

The purpose of the Mature Neighbourhoods Overlay is to regulate the character of low-rise residential development in order to recognize and reflect the established character of the streetscapes within the area of the Overlay. The local streetscape character is the key consideration in determining how a) a new dwelling on a new lot, b) a new dwelling on an existing lot, c) a conversion of a residential use building from one dwelling type to another permitted dwelling type, d) an addition, to an existing residential use building, that abuts the front yard or corner side yard, and e) the incidental use of lands within front, interior side and corner side yards on residential lots, will be permitted to develop, so that it complements and reinforces the established neighbourhood character as seen along each street (City of Ottawa, 2012).

Within the City of Ottawa, infill development has also seen recent community resistance. In fact, the considerations set out under the Mature Neighbourhood Overlay were largely procured through the involvement of several community associations concerned with how Ottawa's infill development rules were affecting their neighbourhoods. As explored further in chapter 5, the Champlain Park community provided one of the main voices advocating for changes in infilling rules. Through community involvement and outreach to the city's planning committee, amendments were applied to Infill I, creating the new "Infill II" by-law which was first discussed in January 2015 and then enacted in June of 2015 (City of Ottawa, 2015b). But what were the changes and how might these changes effect treescapes in Ottawa's mature neighbourhoods in the urban core? This question is central to the discussions in the following chapter and the case of Champlain Park is at the forefront of these changes.

Zoning and by-laws designed to encourage infill development under Infill I focused on the development of vacant lots or portions of vacant lots in established urban areas. A vacant lot may have been vacant historically, or created by a severance, or the result of demolition, fire or some other event (City of Ottawa, 2015b). From the perspective of sustainable urban development, infill projects have the benefit of making efficient use of already serviced lands adjacent to existing infrastructure and transportation modes. Infilling through the designations of Infill I allowed developers to maximize the lot space for development. Under Infill I, there were few to no guidelines on protecting front, rear and side lot space. Of particular significance was the fact that such infill projects were removing all of the trees on existing lots to maximize the developable lot space. Unfortunately, as a result of this, many neighbouring trees were also in danger of being injured, thus reducing their chance of survival and lifespan. Although there are

by-laws protecting against the damage of trees, the lack of municipal enforcement and regulatory powers made it relatively easy for developers to get away with root removal and root damage during construction.

As a result of the above situation, a number of amendments have been made recently to the city's infill by-laws. The initial Infill By-law (2012-147) was adopted by City Council on May 9, 2012. This version of the by-law dealt primarily with parking, landscaping projects, and grade for residential infill within central and mature neighbourhoods. Appeals were made to the OMB and a revised version of the Infill By-law was considered in April, 2015 (Sinclair, 2015). The critical assessment of Infill I was the result of public feedback. The public feedback led to an appeal by the City Council to the OMB in March of 2013 to re-configure infill by-laws and to designate further infill zones and associated by-laws. Currently, Infill II is in its final stages of public consultation and is designed to address community concerns regarding infill development. Under Infill II, the primary goal is to help protect the characteristic of mature neighbourhoods. This will be established by prescribing stricter building set-back rules for the developers in order to protect more yard space, a key component in tree retention and protection. Some of the key issues and changes related to Infill I and II are outlined in Tables 4.3 and 4.4. As evident from these tables, Infill II is seeking to provide additional clarity on what is permitted when developing a vacant lot within an existing mature neighbourhood. When finalized, the new guidelines of Infill II will impact 11 city wards within the Greenbelt. Proposed changes are intended to set up restrictions of rear and side yard setbacks and to therefore preserve existing green space and trees. Infill II is designed to address some of the problems of infill projects in Ottawa's urban core by setting new guidelines and boundaries for such projects. The area of

Wellington West consists of zoning R1, R2, R3, and R4. Champlain Park falls under R1 (sub-zone P) and R2 (sub-zone D) zoning. It is within these zoning codes that new guidelines for lot

Table 4.3 Infill I and Infill II implications and outcomes (City of Ottawa, 2015c)

Zoning	Implication to land use and development	Outcome
Infill I	Infill 1 was about the development of vacant lots or portions of vacant lots in established urban areas. A vacant lot may have been vacant historically, created by a severance, or result from demolition, fire or some other means. Infill makes efficient use of already serviced lands adjacent to existing infrastructure and transportation modes.	Allowed Developers to maximize lot space for development. Minimal guidelines on protecting front, rear and side lot space.
Infill II	Infill 2 is seeking to provide additional clarity on what is permitted when developing a vacant lot within an existing neighbourhood. The project impacts 11 city wards within the Greenbelt.	Intended to set up restrictions of rear and side yard setbacks. This is intended to preserve some existing greenspace and an attempt to help protect some trees.

Table 4.4. Infill II adjustments (City of Ottawa, 2015d)

Adjustments made with Infill II	Description
Building Height	<i>Reduce the maximum building height in properties designated R1 from 11 metres to 8.5 metres and R2 from 11 metres to 9 metres. In R3 and R4 zones with an 11 metre maximum height reduced to 10 metres for most built forms. Sub-zones with a current building height of 14.5 metres or 15 metres will be reduced to 13.5 metres. (Emphasis added)</i>
Building Mass	Covers building shape and size. In addition to limiting the height, this will also limit any projections coming from a building – balconies, staircases, landings, steps, bay windows and rooftop patios that extend outside of the building
Rear Yard Set Back	This will ensure that properties have a rear yard rather than developing as close to the property line as possible. In most cases, the rear yard will be at least equivalent to the height of the building.
Side Yard Set Back	Ensures access around the sides of the building so access to the rear yard is possible. Rear and side yard setbacks combined will limit the footprint of a building, particularly on a large lot

size, land use, and building perimeters have been being set.¹¹

In addition to development rules and zoning, there are also specific tree protection by-laws (Table 4.5) that influence the urban forest and underline the city's role as a key actor in shaping the urban forest. For example, by-law 2009-200 sets out restrictions on what property owners can do with the trees on their property. These restrictions bring up a key question that I raised in chapter 2, namely, who owns the trees? Further, discourses of sustainable development come into play with the restrictions. By restricting the ways in which residents can interact with the trees on their private property, the city supersedes the resident with regards to tree related issues; it becomes the city's decision to identify distinctive trees, to remove trees, or to enforce the protection of trees.

Table 4.5. Three major by-laws directly and indirectly impacting urban trees and the urban forest (City of Ottawa, 2015e)

By-Law	Implication of By-Law
Urban Tree Conservation By - Law (No. 2009-200)	- A by-law of the City of Ottawa to protect trees on private in the urban area. - Applies only to a tree, the trunk of which is located entirely on private property in the urban area - Removal of trees cannot occur until written approval of Tree Conservation report has been granted - Tree removal, and any activities that could injure trees, must not occur until the amendment has been approved.
Trees and Natural Areas Protection By-Law (No. 2006-279)	- A by-law of the City of Ottawa respecting the protection and maintenance of trees and natural areas on municipal property - Applies only to a tree, the trunk of which is located entirely on municipal property - Approval to plant trees on municipal property; guidelines and regulations of tree planting
Infill By-Law (No. 2012-147)	- Establishes development rules, regulations and protocols such as rear, side, and front yard set backs, building height restrictions and mandates to develop within the surrounding streetscape characteristic - See Table 4.3 for more information on infill I and infill II

¹¹ See appendix H for the detailed zoning guidelines for zones R1(P) and R2(D)

As outlined in Table 4.5, trees on private property are subject to municipal protection by-laws. Further, if a property owner or developer wants to remove a tree, they need (at least by law) to obtain approval the city. The process of tree removal differs with relation to tree size (Table 4.6). This by-law is intended to help protect trees from 1) property owners cutting down and damaging trees on their property, and from 2) development projects of small and large scale. The City of Ottawa has a set of tree and root guidelines for trees that are being retained on development sites and trees on adjacent properties (Table 4.7).

Table 4.6 Defining significant tree size based on property size (City of Ottawa, 2015f)

Property Size	Description
Large Property Component	For properties greater than one hectare in size, except condominium and multi - residential properties, landowners must have city-approved Tree Conservation report before trees over 10 centimetres in diameter can be cut down.
Small Property Component	For properties one hectare or less in size, and condominium and multi-residential properties of all sizes, if a landowner wants to remove a tree that is greater than 50 centimetres (20 inches) in diameter, they must obtain a Distinctive Tree Permit from the City of Ottawa.

Table 4.7 Tree and root protection guidelines (City of Ottawa, 2015d)

Critical Root Zone (CRZ) Guidelines in the City of Ottawa
Erect a fence at the CRZ of trees
Do not place any material or equipment within the CRZ of the tree
Do not attach any signs, notices, or posters to any tree
Do not raise or lower the existing grade with the CRZ without approval
Do not tunnel or bore when digging within the CRZ of a tree
Do not damage the root system, trunk or branches of any tree
Ensure that exhaust from all equipment are not directed toward any tree's canopy

As defined by the City of Ottawa in accordance to their tree protection by-law, the critical root zone (CRZ) is established “as being 10 centimetres from the trunk of a tree for every centimetre of trunk diameter. The trunk diameter is measured at a height of 1.2 metres for trees of 15 centimetres diameter and greater and at a height of 0.3 metres for trees of less than 15 centimetres diameter” (City of Ottawa, 2015). Similarly, before the removal of a distinctive tree on private property, or any tree on public property, the contractor must also obtain approval from the Forestry Services at the City of Ottawa. As established by tree protection by-laws, if a contractor is caught damaging or removing any trees, it is their responsibility to undertake the following compensatory measures: 1) pay the cost of repairs and labour, or pay for the removal of the tree; 2) pay the value of the tree removed; and 3) pay the cost of a replacement tree and its installation (City of Ottawa, 2015). An important consideration toward how development and treescapes intersect is raised when looking at the tensions between the infill zoning by-laws and the tree conservation by laws, or to put it more bluntly, by looking at the space required for trees versus the space required for houses in the form of saleable commodities.

4.2.1 Space for Trees versus Space for Development

The neoliberal city places importance upon the idea of the free market and property rights. Under this framing, property owners are free to use their properties as they wish within the parameters set by zoning and other regulations. These regulations limit the freedom of the landowner, but because of other political economic drivers, the resident and the developer become two very different kinds of property owners who are influenced differently by the regulation of private property - a point that will be further discussed in chapter 5. As noted in chapter 2, and by Heynen et al. (2006) and Konijnendijk et al. (2006), trees on public property represent a small

portion of the urban forest, and that it is the private trees that make up a significant portion of a city's overall tree canopy. The consequence of this focus polarizes the power between public and private treescapes, requiring stronger municipal monitoring, enforcement and intervention on private property to avoid social and environmental conflicts and to protect the urban forest (see Heynen et al. 2006 p. 5). This dynamic can be seen in the Champlain Park case.

As discussed in chapter 2, trees require space. Dujesiefken et al. (2005) recognize that the root mass in mature trees can extend well beyond the crown of the tree, as trees occupy a lot of space above and below ground. As excavation for new development occurs, root systems of surrounding trees are threatened by removal, damage, and soil compaction. Construction close to trees can cause severe damage, as the bulk of the root mass of mature trees reaches horizontally rather than vertically. Figure 4.6 shows a common assumption about root systems, with image (a) representing a common conceptualization of a tree's root system, whereas image (b) shows the

Figure 4.6. Illustrate of a trees root system. Image (a) represents a commonly held idea of a trees root system. Image (b) represents a more realistic representation. Source: Crow, 2005, p. 2

more realistic horizontal spread of roots. This horizontal spread increases the footprint of the tree. The majority of the root system lies within the first three metres of soil under the tree (Perry, 1989). The case of Champlain Park presents an illustrative example of extreme tree damage due to root removal from infill development. The trunk of the tree and its canopy are easy to visualize in relation to the property line. The same is not true for the root system which may extend far beyond the property line but is invisible. This instills an important gap in existing tree protection regulations, and demonstrates how the exclusion of the root systems from developer's plans can have severe consequences. This leads to the need for greater acknowledgement and recognition of the required root space rather than the focus on the protection of what is seen above ground (Braverman, 2015).

Although there are by-laws protecting trees from development, a lack of enforcement and weak knowledge of tree health impairs overall tree protection efforts in the city, a topic that I return to in chapter 5. As densification of mature neighbourhoods occurs with the infilling of properties to maximize lot space for houses, the space for trees and their above and below ground habitat requirements is being reduced. It is possible to design houses with smaller footprints by building upwards. However, zoning by-laws have restricted the maximum height of buildings, and under the initial Infill I zoning parameters discussed above, developers tended to maximize lot building space to property lines. The process of infilling in Champlain Park continues to impact the health of existing trees and reduces the possibilities for re-planting initiatives.

The issues presented here show the increasingly evident tensions between existing infill development practices and tree protection and conservation by laws. Various factors and actors

are key in how these tensions play out on the ground. First, the Planning and Growth Development Department actively supports the “compact city” development model, including the infilling of mature neighbourhoods like Champlain Park. This particular narrative of sustainable urban development and its related actions are supported not only by the city, but also by developers, the provincial government (e.g. through the PPS) and the OMB. On the other hand, there are also municipal initiatives that support urban treescapes, such as tree conservation by-laws and the city initiative to plant one million street trees by 2017. Other elements also enter into this complex situation, such as community action and resistance as seen in the case of Champlain Park, a community that cherishes their treescape and opposes the forms of infill densification affecting their treescape.

4.3 Summary

As highlighted in this chapter, Champlain Park represents a mature neighbourhood in Ottawa’s urban core that is currently undergoing change due to the development pressures of infilling. These pressures are a result of the neoliberal compact city - as discussed in chapter 2 – focusing on market-led urban development, often to the exclusion of social or environmental goals. The mature neighbourhood of Champlain Park provides an example of the existing conflicts that arise between the compact city and urban densification and tree protection and conservation. As explored in the next chapter, the case suggests how different actors struggle over space and ideas of nature in the city within the context of both urban policies and community change. More specifically, with the presence of the bur oak and a well-established mature treescape, this case study helps to highlight the tensions existing between initiatives of sustainable development and the conservation and protection of urban trees and the urban forest.

The existing tree conservation and protection by-laws are in conflict with the densification targets in mature neighbourhoods such as Champlain Park. I now turn to the findings of my case study research and a more elaborate discussion of the complex socio-environmental interactions that are changing the treescape of this and other downtown neighbourhoods in Ottawa.

Chapter 5. Findings and Analysis: The Case of Champlain Park

Direct and indirect influences on the structure and maintenance of the urban forest are dependent upon a wide range of actors and factors. The interconnectedness of nature and the city, as presented in chapter 2, become evident in the case of Champlain Park through a treescape that is undergoing significant change. The social production of Champlain Park's treescape is influenced by a variety of actors, processes, and discourses, leading to certain outcomes and changes that reflect power relations. In this chapter, I seek to use my primary and secondary research to answer my main research questions.

This study focused specifically on the key actors and stakeholders involved in questions concerning the urban forest and its management, using Champlain Park as a case study. This chapter therefore begins by identifying key actors and stakeholders. It then considers how different actors perceive trees and how these perceptions influence the production and management of the urban forest. Next, it examines how existing rules and regulations, differential access to power and resources, and differing discourses lead to specific outcomes, or in this particular case, the changing treescape in Champlain Park. To help in this analysis, I will draw upon a model used by Konijnendijk (2015) and Liefferink (2006) to help understand the governance of urban forests by understanding the various actors and their associations with power and resources, rules of the game, and discourse. Central to this model is the identification of key actors, an important part of my analysis that I turn to now.

5.1 The Key Actors in Shaping Champlain Park's Treescape

To better understand Champlain Park's treescape, it was first important to identify the key actors involved in shaping it. No single municipal department, institution, business or individual is

inherently the sole manager of the urban forest. The urban forest is produced by the outcome of a myriad of complex interactions between different actors, mostly situated at the municipal scale, but not exclusively. It is also important to acknowledge that local actors draw upon supporting actors from beyond the local scale and upon narratives within broader society to support their positions. Private developers (builders) can draw upon neoliberal narratives (e.g. the need for market-oriented growth) to support their position towards urban infilling, while in this case the community group, NGOs and some private residents draw upon alternative narratives of a more biophilic understanding of sustainability through conservation and biodiversity protection, to counter the position of developers. Furthermore, local actors often draw upon support from non-local actors. For example, developers draw upon economic institutions and professional organizations for support, while community organizations and NGOs (and even residents) secure support from similar organizations at the provincial, national and even international levels. While important, an examination of these networks is beyond the scope of this work. Therefore, this research focused primarily on key actors at the local level as defined by community and city boundaries.

In this section, I focus on a number of key actors in shaping the urban forest in my case study community. The first question within my research sought to interrogate the key actors involved in the treescape of Champlain Park, including: developers (builders), residents, NGOs, the community association, and city officials. As explained in chapter 3, a snowball strategy was used to identify key actors and actor categories. The range of actors evolved as each interview participant was asked to identify other individuals who they believed were influential in the production of the urban forest and care of urban trees in Champlain Park.

In the process of identifying key actors, it became clear that the city was not a homogeneous entity with a singular perspective or position. Two city departments were subsequently identified as key contributing actors: Forestry Services within the Public Works and Services Department and the Planning and Growth Management Department. The ward councillor was also identified as an important actor seen as having a principal connection with the community as well as city actors. Each of these actors have distinct and often conflicting mandates. Municipal actors also interact with different social or community actors in different ways. There is, for example, an important relationship between the community and the ward councillor that emerges in my analysis below.

5.1.1 The Key Actors of Champlain Park: Who matters?

The analysis of source materials support my contention that the actors listed in Table 5.1 are some of the most relevant and influential in current urban processes shaping the treescape of Champlain Park. These actors were: Daniel Buckles, Heather Pearl, Jason Pollard, Martha Copestack, Peter Giles, Dianne Emmerson, Jeff Leiper, Velta Tomsons, Zachary Dayler¹², two interviewees who wished to remain anonymous, and developers (see Table 5.1 for their detailed information and actor category). These findings were the results of an analysis of both first hand testimony within the interviews and of media sources. Each actor contributes different knowledges of the urban forest and thus provides unique interactions with the treescape. The significance of these findings allowed this research to identify varying discourses held and deployed among different

---

¹² Although interviewed, this actor was not deemed a key actor to my case study, rather he provided insight related to the broader context of urban densification in my study area.

Table 5.1. Key Actors of Champlain Park. Source, Author, based on analysis of source materials.

Participant	Institution / actor category	Contribution to urban forest
Daniel Buckles	Champlain Oaks Program leader / Champlain Oaks Resident	Tree Conservation, lobbied for Infill II, Trees as unique urban features (Natural Heritage registry), tree advocate in Ottawa.
Heather Pearl	Champlain Parks Community Association vice chair; executive member on the Development Committee	Lobbied for Infill II, tree conservation, pushed for better development practices.
Jason Pollard	City of Ottawa, Forestry Services	Forest Manager - Emerald ash borer response, public awareness on tree issues and the importance of trees.
C1	City of Ottawa, Planning Department - Forester	Forester in the planning department - bringing forestry knowledge into the planning department.
Martha Copestack	City of Ottawa, Planning Department - Forester	Forester in the planning department - bringing forestry knowledge into the planning department.
Peter Giles	City of Ottawa, Planning Department	Planner, Better Suburbs Project Manager - uses unique ways to include trees in new street types or streetscapes. Focus on retaining existing trees and increasing plantable zones for new trees.
C2	City of Ottawa, Planning Department;	Planner - focus on zoning, by-laws, densification, and neighbourhood development.
Dianne Emmerson	City of Ottawa, Planning Department	Planner - Focus on Ottawa parks and trees in park land.
Left Leiper	Kitchissippi Ward Councillor	Promotes the protection of trees, talks to city council about issues and has influence upon change, voice of the community.
Velta Tomsons	Tree Ottawa Organizer (Ecology Ottawa)	Promoting tree planting, 1 million trees program for 2017. Works with multiple stakeholders including the city and residents.
Developer(s)	Small and large scale developers, institutions vary	Developments that may result in the loss, damage, and/or planting of trees.

actors towards the urban forest. These findings also provided important insights into issues of scale that exist between the perspectives of the residents and community of Champlain Park and those of other actors.

Based on these results, the research provides insights into how the treescape of Champlain Park is perceived, experienced, and contested by different actors. One resident in particular was identified as an important actor concerning the case of Champlain Park. Daniel Buckles (interview 5) formed an action group, the Champlain Oaks Project, as a result of infilling destroying mature trees. This group of individuals will be further discussed in subsequent sections of this chapter as an influential group critically engaged in tree protection and combating the effects of infill development in Champlain Park. Now that the key actors have been outlined, I now turn to discussing how they perceive the urban forest and impact upon the treescape of Champlain Park.

5.2 How Champlain Park's Treescape is Perceived

How trees, treescapes, and the urban forest are perceived influences how they are assigned value and how they are managed or acted upon. In this section, I will present a number of different positions and perspectives (often conflicting) provided by the different actors outlined above. These provide insights into the various ways of understanding trees and the urban forest and helped to establish a foundation for examining the power and discourses surrounding the treescape of Champlain Park and the bur oaks. Table 5.2 provides a summary of the varying foci and perspectives of trees, treescapes and the urban forest held by these key actors. This analysis helps to expose some of the key differences between community residents, the community association, developers, the city, and NGOs.

Table 5.2. The perspective of actors on the urban forest and the associated scale. Source: Author, based on analysis of source material.

Actor	Focus	Perspective on the UF	Scale of focus	Approach to urban forest
Developers*	Infill development in Champlain Park. Maximization of densification. Work in conjunction with the Ontario Municipal Board. Profit driven.	Trees are tools to help sell houses. Trees are a nuisance on the property being developed. Trees surrounding the development site are a tool to increase property value.	Development limited to the individual site.	Top-down
Forestry Services	Health of the urban forest. First line of defence between a homeowner and the developer. Ability to issue tree protection signs.	Protecting urban trees and acting as the scientific expert on trees. Urban forest as a whole. Little focus on individual treescapes.	The urban forest as a whole.	Top-down
Planning and Growth Management Department	Zoning and by-laws relating trees and development. Interlinked with developers.	Protect trees when possible. Mixed perspectives within department. Disconnection between planning and Forestry Services.	Zoning implications. Different attitudes for different zoning areas.	Top-down
Champlain Park Community Association	Preserving the overall aesthetics of their community while allowing for neighbourhood growth. Protecting the bur oak within the community and pushing for further infill development bylaws and regulations.	Protection of mature trees and pushing for stricter enforcement of significant trees.	Community treescape. Focus on their neighbourhood.	Bottom-up
Champlain Oaks Project	Conservation and preservation of trees in mature neighbourhoods. A focus on the bur oak, but an overall focus on tree protection. Tree Advocacy group.	There should be increased protection of mature trees. Increased enforcement of by-laws pertaining to the protection of mature trees and new developments. Against development that harms mature trees	Mature neighbourhoods throughout Ottawa. Variety of treescapes.	Bottom-up
Resident	Focus related to site lines on their property. Management of private property.	Limited to treescape. Varies between individual.	Limited to treescape and their property.	Bottom-up
Ward Councillor	Focus on representing concerns of the ward's residents.	Shares the perspectives of the community and situating it within the city	Limited to ward.	Mixed approach

* The position of the developer as an actor is based on the insights provided throughout the analysis of source material. Since no developer agreed to participate in the study, I did not have the benefit of interview data to construct their perspective, a limitation addressed in chapter 2.

5.2.1 The Perspective of the Residents and the Community

Figure 5.1 outlines the most important findings from the discourse analysis related to the community perspective. Residents possess an intimate understanding of the treescape in their community. Community participants described the trees and treescape of Champlain Park using words such as, ‘beautiful’, ‘meaningful’, ‘important’, ‘significant’, and through phrases describing them as important cultural and natural features of their community. The perspective of the community focused on issues of tree loss, tree protection, development, infilling, and enforcement issues. This experience and perception is derived from a daily engagement with the trees. The trees are neither merely decorative nor part of the larger urban forest; they are part of the very fabric of their community. Further supporting this perspective of the treescape is evidence of the community using significant trees as meeting places. Attachment to the bur oaks is particularly important to residents. The bur oaks and mature tree canopy of the neighbourhood cherish the existing character of the community that champions the trees. The increased infilling

Figure 5.1. Champlain Park community perspective web. Source: Author, compiled from interview data, web sources, and newspaper articles.

in this neighbourhood has caused much concern, which is seen through statements like “infilling trumps all,” “dwarfing our houses,” and “destroying our trees.”

The nature of the residents’ attachment to the trees of Champlain Park is due, in part, to their experience of, or engagement with, these trees. For the community resident, that experience is intimate: it occurs at the personal scale through daily contact with the trees. For these actors the urban forest begins with the individual trees and every tree is important at this scale. Their interest, while acknowledging the existence of an urban forest, is focused more on the treescape of the community than the city’s urban forest as a whole.

When considering the perspectives of the community presented above, it is important to be aware that not all residents are as cautious, aware, and tree friendly as others. For instance, an account presented by Debra Huron, a community member of Champlain Park, explains how “A year ago, a neighbour opposed to tree protection on private property told me, sarcastically, ‘It’s not like bur oaks are an endangered species’” (Huron, 2015). Although it is true that they are not a recognized endangered species, the presence of a remnant bur oak forest is not common in Ottawa’s urban core. This example of one resident defending private ownership rights related to a neoliberal narrative is important to note even though the overall community perspective highlighted from this research tends to be one of intimacy and value.

In the case of Champlain Park, the focus on tree conservation is accentuated by the presence of the bur oaks. The desire to protect their trees is situated in the community’s deep connection to the bur oak. Further supporting this perspective of the treescape is evidence of the community using significant trees as meeting places. In the Heritage Ottawa News Letter, Daniel Buckles explains how “a mature bur oak on Patricia Avenue is the gathering place for the Annual Patricia

Avenue Street Party” (2014, p.4) or Heather Pearl talking about the value of the community’s trees stating: “*Beautiful trees*, they screened that end of the community from the transit way, they *provided tremendous value to the entire community*, and now it is just a house on the corner with no greenspace around it. There are a few trees on the lot but they are going to end up having to out compete with each other” (Interview 8, May 22, 2015: emphasis added). For many residents in Champlain Park, the treescape is more than just an accumulation of trees; the trees provide social and cultural significance for this neighbourhood. The perspective of cultural significance is drastically different from other actors, most significantly that of the developer.

5.2.2 The Position of the Developer

The trees and the treescape possess a different type of value for developers. Figure 5.2 provides key words and statements from the source material illustrating the main positions of the developer as derived from the secondary sources and interviews. According to information drawn from these sources, for the developer in Champlain Park there appears to be a clear separation of nature and built form – or the dichotomy of nature and the city discussed in chapter 2. The term “diversity” is used to discuss built form with no mention of natural elements (trees,

Figure 5.2. Developer position web. Source: Author, compiled from newspaper articles (see Appendix D) and interviews.

shrubs, and other landscape elements). To the developer, trees do not seem to represent anything more than decorative features and, as such, secondary to the built structures. As a City of Ottawa planner states “in their [the developer’s] development project they do not see that tree as being a part of a bigger system, they see it as something that looks good; it isn't nature it is just a decoration” (Interview 7, Feb. 10, 2015). This understanding of trees as decoration would seem to conflict with that of the community and the notion of social nature.

The developer’s position and approach is likely reinforced by the drive for profit. As another city planner said, “the reality is that developers operate under different models than the city does. They are profit driven... There is not as much emphasis on tree protection, and trees do for some developers, become an annoyance...” (Interview 2, Jan. 12, 2015). The focus on profit leads to a view of urban nature where trees are narrowly seen as tools to benefit increased profits and property values. In this framing, trees are presented as a feature of the neighbourhood and this has more to do with selling potential buyers on the neighbourhood as a desirable place to live. The well-being of the trees, however, is not considered in the design of infill housing. Nor is the well-being of the trees considered during the construction of these houses. The loss of a single tree due to infilling is neither seen to be an issue nor as something which compromises the community’s treescape.

Notably, this kind of attitude of developers towards trees may also reflect the more transitory nature of a developer’s involvement in a community. It is important to recognize that the developers are not inherently against nature; rather, their relationship with the community and trees is short- lived compared to that of the residents. Once a housing project is completed and sold, the developer’s interest in the trees and the community is effectively over as they move on

to the next development project. In this way, the attitudes of developers towards trees may also be a reflection of the scale of the developer's involvement in the city. Most developers operate in multiple communities, meaning that their perception of the urban forest is on a larger scale than that of a resident of a specific neighbourhood. Consequently, the loss of a tree in one community can be balanced by planting of trees in other housing projects, at least in theory.

Heather Pearl (resident / Champlain Park Community Association) explains that her personal experience with developers is that they do not care about the trees in the same way as the community. She states that “most members of the development community have no concept of trees, they don't mind them if they can sit in the shade but the rest of the time they are just wood” (Interview 8, May 22, 2015). Further she explains a personal experience she had with a developer when renovating her home:

The oak in the front yard ...you have to protect it' and he said "oh yes it will be protected" well at the end of it we discover they had crushed the bark in many places and now it is spongy and what that means is that the living part of the tree behind the bark was crushed and died. And we ended up spending over one thousand dollars to have a forestry company come in and make sure our oak tree would survive. And they were not 100% sure it would. Well they told us upfront if we want to continue and we said yes. And it is not close enough to the street to be a city tree. The one that is a city tree is a hackberry and they also crushed the bark on it, I pulled nails out of the tree. And this is after saying they would 'protect the tree' (ibid: emphasis added).

She explains that this paints a picture of what many homeowners in the neighbourhood have faced when developers say they will “protect the tree.” The position of the developer seems to follow the neoliberal narrative focusing on the economic opportunities presented by trees, however, even in this sense, in the case of Champlain Park, trees are often neglected all together. Instead, their perspective is driven by profit and often supported by the compact development

focus contained in the PPS and the city's Official Plan promoting urban densification through infilling. Between the perspectives of the resident and the position of the developer, there is a distinct difference in how the treescape is viewed - the resident cherishes the trees and identifies their social and cultural significance, whereas the developer seems to view the trees as decorative features and focuses on their economic value. The difference in these perspectives suggests the conflicting or competing interests contained within discourses of sustainable development. These are further amplified when looking at how the municipality perceives the urban forest, including their conflicting initiatives in supporting both infill development and tree protection.

5.2.3 The Perspective of the Municipality

Not surprisingly, municipal actors hold differing perspectives. As indicated in Figure 5.3, the Forestry Services and the Planning Department have different interests and perspectives concerning the urban forest. The city's perceptions of the treescapes and the urban forest, while influenced by their specific roles, is primarily oriented to the scale of the city as a whole.

Figure 5.3. City of Ottawa perspective web. Source: Author, compiled from interviews and policy documents.

Although forestry officials are certainly concerned with the integrity of treescapes and the protection of individual trees, notably mature and distinctive trees (as discussed in the section on ‘rules of the game’), this concern has failed to translate into action under existing regulations designed to protect trees. Planning officials seem to be more concerned with the ongoing evolution of the urban form in accordance with the city’s Official Plan. In general, city officials’ perceptions of the urban forest originate from a city-wide top-down vantage point considering the structure and management of the urban forest as a whole and not necessarily at the scale of the community treescape. This applies to, for example, the city’s broad focus on the EAB.

Although some of the actors with the city identified development as an issue of concern for the urban forest, the EAB still takes the “limelight” in terms of city-wide forest management priorities.

Although not a city employee, the perspective of the ward councillor is added here due to the daily interaction with City Council. The analysis of perspectives held by the ward councillor, Jeff Leiper, presents interesting results that touch upon a variety of actors. This is due in part to the intimate connection between him and the community of Champlain Park and in part due to his connection to the city and city policy through city council. As evident in Figure 5.4, key issues such as infill development arise. Here there is further evidence of the existing disconnect between different city departments. For example, during the interview Leiper stated that “city staff are never just neutral agents; within the bureaucracy different departments are agents themselves with their own cultures and world views” (Interview 10, Aug. 21, 2015), thus providing further acknowledgement of the development driven agenda being undertaken in

Figure 5.4. Kitchissippi ward councillor perspective web. Source: Author, compiled from interviews and secondary materials.

Champlain Park. He continued to explain that there is an inherent tension between a strong push towards infill development, and a push for infill reform and tree protection.

Some common ideas, such as “development-driven,” are seen through the results of all of the actors in this case study where development, in the form of infilling, is taking precedence over the protection of trees and other green initiatives. However, the analysis of the ward councillor indicates a few unique elements not drawn out from other actors. Leiper identifies that, within the Champlain Park community, there is an increasing push to politicize the effects of infill development on their neighbourhood and more notably their mature trees. Sitting as the moderator between the community, developer, and the city, the councillor sees issues from all angles. He explains that:

any candidate that expects to win Kitchissippi is going to have to address the question of trees. It is that mainstream and *on the top of the mind of residents*. *The dramatic loss of tree canopy is front and foremost on voters' minds which makes it an issue which is great*. Since taking office it has been a daily

discussion. Trees are something that I hear about every single day (Interview 10, Aug. 21, 2015: emphasis added).

He goes on to say that “the issues are very clear in the community’s mind and they are pushing me every day on every aspect of it...So they [Champlain Park community] were working with me with infill II, pushing me hard to make sure some of the positive changes got made with trees first and foremost in mind” (ibid).

Leiper also identified the tensions between market forces versus the desires of the community. He explains how “you have these big tensions between market forces and community desires” (ibid). These market forces provide support for developers. However, the community is asking for a more holistic approach that adopts strategies to preserve the treescape, and specifically the bur oaks, of their neighbourhood and for development to occur with a consistent vision respecting the current character of the neighbourhood. These tensions will become more evident later in this chapter when I discuss competing discourses of sustainable development and how the varying perceptions of trees ties in with these varying discourses.

5.2.4 The Perspective of NGOs

Two NGOs were identified through the interviews as important actors within the case. The first, Tree Ottawa, is a project within the NGO Ecology Ottawa, positions itself closely with the City of Ottawa and communities throughout the city. As seen in Figure 5.5, their focus resides primarily on the planting of new trees by facilitating tree planting days and activities to help Ottawa residents get involved in tree planting. This focus on tree planting is reflected in the One Million Tree Initiative for 2017 (Canada’s 150th birthday). This commitment to urban trees is also reflected in public awareness initiatives on issues such as the EAB, although, it was

Figure 5.5. NGO perspective web. Source: Author, compiled from interviews and secondary source materials.

identified that the EAB is all too often a scapegoat for urban forest problems and there are larger issues that need to be raised such as urban development and the space for trees (Interview 3, Jan. 21, 2015). Through the analysis of Tree Ottawa, their insights provide a perspective that acknowledges the need for more community support in the urban forest management process. Tree Canada identifies the pressures of development on Ottawa's trees but also highlights the frustrations of community groups not able to protect their trees or get approvals to plant new ones.

The perspective of Tree Ottawa exposes the frustrations experienced by communities trying to organize planting projects. Due to the competition for space in the city, these planting initiatives often get shut down in the approval process as a consequence of urban densification in mature neighbourhoods taking precedence over green initiatives (Interview 3, Jan. 21, 2015). Highlighting an engagement with social nature and the complexities of producing the urban

forest, Tree Ottawa recognizes important social, political, economic, and environmental interconnections. Overall, the perspective of Tree Ottawa is rooted in support of community forestry initiatives to try to deliver a larger, more diverse tree canopy. However, their perspective continues to be in conflict with the perspective of the PPS and the City's Official Plan focusing on urban densification in mature neighbourhoods.

The second important NGO identified as an important actor was the Champlain Oaks Project. The two main voices of this group are Daniel Buckles and Debra Huron. Their focus differed from that of Tree Ottawa as their primary focus is on the existing treescape of Champlain Park and combating infill development to protect their trees, primarily their bur oaks. Their mission statement says “we are a volunteer group of neighbours, honoured to share our community with these magnificent old-growth giants, and dedicated to celebrating, preserving, and restoring the historic oak forest in Ottawa's west end” (Champlain Oaks Project, 2016). Although their focus tree is the bur oak, they are advocates for the entire treescape in the community. Their perspective is a passionate voice towards the protection of genetic diversity and the defining features provided by the large bur oaks of Champlain Park.

This community network emerged as a special interest group to help save mature trees from the infill development happening in Champlain Park. Sparked by a developer felling multiple bur oaks, this group formed around protecting the trees. The importance of such a community group is “they are organizing a group of concerned Ottawa citizens around the more serious issues with our tree by-laws [...] They are very aware of what is going on and urban infill is their main issue” (Interview 3, Jan. 21, 2015).

This is a unique coalition formed to try to change the actions of developers and the city and to help strengthen tree protection in urban areas, promoting alternative forms of development.

Daniel Buckles explains the formation of this coalition:

So, the community group emerged to encourage the owner to do something else, to manage the property differently in order to save the tree. And also *to encourage forestry services in the City of Ottawa to deny a tree permit* and at that stage a tree permit had been applied for so we were trying to both *encourage the developer to do something different and the city to deny the permit*. From the property owners perspective he ignored us and it escalated to a Committee of Adjustment. Both the community association, which is the formal body representing the residents in the area, and this informal group *made petitions to the Committee of Adjustment to not remove, or allow the structure because of the impact on the tree* (Interview 5, Feb. 2, 2015: emphasis added)

This action group formed around the community's care for trees and represents an attempt to increase their impact on urban forest management. The research shows that the actions of this group are intended to help change current strategies of infilling within the development community, as well as to create greater awareness and concern for enforcing existing tree conservation by-laws. The uniqueness of the involvement within this case continues to show how the perspectives held by this community have evolved into concrete action.

Favouring a more biophilic narrative of sustainability, the Champlain Oak Project provides further evidence around a neighbourhood that holds an intimate connection with their trees. The value of trees is greater than the value of developing expensive housing. As a group that identifies the cultural and ecological services provided by trees, the perspective of this group differs significantly from the developers, the city, and even Tree Ottawa. Their focus is the scale of the neighbourhood. Their knowledge of trees comes not from arborists, foresters, planners, or

other professionals, rather it comes from a passionate bond with their trees and a desire to protect them.

5.2.5 Summary of Perspectives and Positions

The perspectives outlined above amongst different actors set up the important context for understanding the evolving treescape of Champlain Park and its related conflicts. These perspectives are grounded in different sets of knowledge and understandings around development, urban nature and the urban forest. Understanding the way in which different actors perceive or relate to the urban forest provides a general framework for the ways in which they also try to influence its shape and structure. Some general conclusions can be made from these perspectives. The position of the developer seems to highlight that the dichotomy between nature and the city is still often present, where trees are commodified as an ornament or singular feature and not seen as an important element of a broader urban ecology. This position conflicts with that of the resident, community, and NGOs such as the Champlain Oaks Project. Their perspectives tend to encompass an intimate understanding of the urban forest, seeing the trees for their social, cultural, and environmental values. Finally, the perspectives of the city may support positions with conflicting interests. On one hand, the city supports initiatives to protect trees and plant more trees. On the other hand, they promote forms of urban development set out in the Official Plan that favour urban densification as an overarching solution to sustainable development, thus setting up conflicts with tree conservation and protection initiatives. Finally, I would argue that answering my question of how different actors perceive the urban forest helps to provide significant insights into related discourses and how this influences what is happening to the

treescape. I turn now to the questions of who influences the treescape, how this came to be, and related ramifications.

5.3 Influences over the Treescape

As discussed in chapter 2, the urban forest is a complex socio-ecological system made up of important social and environmental components. As a social nature, it is important to understand the processes that lead to its governance and management. Konijnendijk (2015) and Liefferink (2006) provide us with a model for examining governance and management surrounding the urban forest (Figure 5.6). Central to this model are the *actors*, the individuals and organizations involved in the governance of the urban forest. Above, I have identified some of the key actors, however, these actors operate within a framework established by the ‘rules of the game,’ power/resources and discourses. The ‘*rules of the game*’ represents the by-laws, procedures, and regulations set in place regarding urban trees in Ottawa, as well as zoning regulations for development of which were identified and discussed in chapter four. Within the process of governance over the urban forest, *power* represents the ability of an actor to promote their

Figure 5.6. The components of governance of the urban forest.

specific interests. Finally, *discourses*, which has been defined throughout this research using Foucault (and can be seen as “an ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through practices” [Hager & Versteeg, 2005, p. 176]) establish the framing. Understanding the influence over the treescape in this way provides the foundation for the analysis in this section.

How much influence then does each actor have in making decisions concerning urban trees specifically and the urban forest generally? Table 5.3 summarizes how different actors are seen as influencing the urban forest and the degree of that influence (low, medium, high) by research participants. The understanding of what constitutes high versus low influence is the degree of influence each actor has in transforming the treescape. A high degree of influence was prescribed to an actor who possesses the power to make direct and immediate change to the treescape. A low degree of influence was prescribed to actors who do not possess the power or ability to affect high levels of change or immediate impacts on the treescape.

Most of the participants agreed that the developers, or ‘builders,’ have the largest and most direct impact on the treescape of Champlain Park. Daniel Buckles stated that “builders would be number one. Both large and small. You cannot talk about them as a homogeneous community because an infill developer is very different than the big condo builder but they both have impact on trees and considerable influence” (Interview 5, Feb. 2, 2015). Martha Copestake, a planning forester at the City of Ottawa, similarly stated “I think the developer. We [the city] have a lot of impact, *but they [developers] are the ones really shaping it*, and things like increased densities are key city priorities” (Interview 4, Jan. 21, 2015: emphasis added). Statements identified within

Table 5.3. Degree of influence of differing actors over Champlain Park's treescape. Source: Author, based on analysis of source material.

Actor	Influence on treescape	Degree of influence (Low, Medium, High)
Developers	Processes of development, techniques of development, densification, infill development, conservation techniques (or lack thereof). Direct change to urban landscape.	High
City of Ottawa (Forestry Services/ Planning and Development)	Management of trees on public property. Tree planting, zoning, by-laws, planning, street-scape design, official plans / future visioning, infill mandates.	High
Ward Councillor	This actor acts as a mediator between communities and city council as an appointed city official. The councillors are able to take the concerns of communities to city council to propose change.	Medium/High
Tree Ottawa	Works towards community outreach and education towards the urban forest awareness, tree planting opportunities, and other tree related issues.	Medium
Champlain Oaks Project	Focused special interest group on protecting the treescapes of mature neighbourhoods. Brought a lot of attention to the bur oak, but focuses on the protection of all species of mature, distinctive trees. Actively involved in discussions with the ward councillor and city councillor.	Medium
Champlain Park Community Association	Knowledge on local community and trees, input to councillors, future vision, and desire for change. Actively engaged with the Ward Councillor to help protect more trees	Medium
Residents / Homeowner	Management of trees on private property, backyard trees, knowledge of trees on their land, maintenance of trees. Difficult to make big contribution due to lack of power.	Low

the interviews of Velta Tomsons, Heather Pearl, Peter Giles, Dianne Emmerson, C2, and Jeff Leiper all similarly concluded the high level of influence possessed by the developer.

A few of the participants identified the resident as an influential actor, although most participants stated that the resident had the lowest level of influence. While it is true that the

homeowner has partial control over their private property,¹³ and thus the trees on their property, overall the homeowner is not seen as having a high level of influence on the overall community treescape. Participant C1 within the city, when asked about the influence of the homeowner on the overall treescape, stated: “Oh very far down because if they [the homeowner] want to stick a tree in their back yard that is fine, but it is not done at such a scale that it really will make much of a difference... it is also difficult for them as well because there are a lot of things out of their control” (Interview 2, Jan. 12, 2015). This lack of influence extends to the impact of infilling. Significant damage has been reported by residents due to infilling development on adjacent properties (to the point where trees are killed as a result of root damage), without much effect.

The process of infilling and its effect on trees in Champlain Park is one of the main indicators that the developer currently has the highest level of influence over the treescape. Their influence is supported by the PPS and Official Plan’s push for urban densification. As the city directly influences the streetscapes - and associated street trees - the city possesses a high level of influence. It is through processes of city planning and development that the city is able to plan (or not) for the planting of new trees along streets influencing the treescape.

5.3.1 The Process of Infilling in Champlain Park

Being a regular attendee of Committee of Adjustment meetings and other city consultations, Heather Pearl can cite ongoing protests from communities concerned for their trees and infilling:

When Infill I and infill II bylaw were just a gleam in the city’s eye, I was attending all those initial consultations with the communities, and *what kept coming up over and over again was "they are killing all our trees" they are cutting everything down and killing all our trees and putting up these buildings that have no ecological value, there is nothing sustainable about*

---

¹³ By-laws and regulations restrict what can and cannot be done by landowners on their land. This limits their overall influence.

this, the air quality is declining, there is more dust, there is more noise, it is less pleasant. (ibid: emphasis added).

Ward Councillor Jeff Leiper helps to explain the effect of infill in Champlain Park and his hopes for Infill II by stating:

What you have in *Champlain Park*, is *one of the neighbourhoods being really affected*. The other dynamic to a chunk of Westboro is you have R2 and R3 zoning where you are allowed to take down a single family home and you can put in a semi-detached and you get variances of semi-detached and are allowed to be slightly larger than the zoning would ordinarily be allowed. And *this is guaranteed to result in tree loss in the front and the back. The new infill rules that we have implemented are intended to prescribe a bigger back yard that I am hopeful will reduce some of the pressure on the tree canopy*. And in the front the first round of infill by-laws is requiring a percentage of landscaping that is more consistent with what is already there. I do not know if this will help us much with the trees or not. So the built form of Champlain Park and the zoning that is there with the R2 zoning the built form of Westboro with the sized lots they have the zoning that is there that allows the removal of single houses is rendering those particularly vulnerable to tree loss in a time when our overall densification policy is driving that denser development (Interview 10, Aug. 21 2015).

Although this research cannot produce an exact number of infill development rates, all of the participants agreed that infill is the major cause of change in Ottawa's urban forest - an issue that has not seen a lot of attention related to the urban forest. Although there is a lot of focus on the devastating EAB that is attacking the ash trees of Ottawa, Velta Tomsons of Tree Ottawa explains that:

The most immediate and devastating is the EAB for sure, but *over a long period of time what is the biggest threat? I'm not necessarily going to say it is the EAB because it is urban infill and design, improper urban planning... it is people not taking care of their trees*, it is all of these things (Interview 3, Jan. 21, 2015: emphasis added).

Martha Copestake (planning forester) similarly emphasizes that "*the biggest impact [on the urban forest] in the urban core would be infill development*. There is a lot of work being done on

infill development and its impacts, and a big project within the city, and we have changed the by-law within the city... because that is really where the impact is happening on tree cover” (Interview 4, Jan 21, 2015: emphasis added).

Such statements were raised by all 11 participants and are often topics of discussion at City Council. Through photographs gathered by residents of the community and taken through my own observation of the case study (see Figures 5.7-5.10), as well as through online resources, the result of infill development shows a dramatic change to the physical presence of the built and natural form of Champlain Park. These photos tell the story of a changing streetscape through the

Figure 5.7 Infilled semi-detached home on Northwestern Ave. Source: Author, 2015.

Figure 5.8 An infill semi-detached on Northwestern Ave. sitting in-between an empty lot to the left and a single detached home to the right. Source: Author, 2015.

Figure 5.9 New developments along Carleton Ave. Source: Author, 2015.

Figure 5.10 Two new infills at the corner of Carleton Ave. and Premier Ave. Source: Author, 2015.

development of deluxe semi-detached houses which are maximizing lot space and changing the landscape characteristics of this mature neighbourhood.

Concerns over infilling in Champlain Park predominantly focus on two major concerns. First, the damage and removal of mature trees, and secondly, the overall change in the characteristic of the neighbourhood. The two issues are very much intertwined. The continuing loss of trees is seen as changing the very character of the community. The result of infill development has drastically changed the Champlain Park Community since 2008. Considering the bur oak alone, Daniel Buckles explains that, “infill started intensively in 2008. About 12 bur oaks have been lost, two of which were pre-confederation” (Interview 5, Feb. 2, 2015). In a recent article in the *Ottawa Citizen*, the changes taking place in the Champlain Park neighbourhood are summarized as follows: “At least 20 large singles or detached doubles have been built or are under construction on Carleton Avenue alone... *the neighbourhood has in recent months, lost 15 large trees considered “distinctive” under the tree bylaw*” (Adami, 2015: emphasis added). This is the common occurrence in this community, based on several newspaper articles (see appendix D).

Supporting this finding, further accounts are present in the interview with Heather Pearl, where she explains:

...as you notice if you drive down Carleton Avenue you [will] say "wow" because if I showed you a picture I took in 2008, it was a tree lined street, it was not the most upscale street in the neighbourhood but it was tree lined. And that was one of the first things I said at the planning committee meeting when I introduced the Neighbourhood. I said "*in particular on Carleton Ave. we are developing a 'hard edge'*" where before, if you look at an aerial shot it shows trees and greenery everywhere” (Interview 8, May 22, 2015: emphasis added).

The discussions with residents, the ward councillor, and members of the city, all confirm that Champlain Park is being significantly impacted by infill development and losing trees because of it. The results of my research on media sources further communicate the problems of infilling in mature neighbourhoods. Finally, these articles highlight some of the implications that infilling is having on the overall characteristic of mature neighbourhoods on both hard and soft infrastructure.

Heather Pearl and much of the Champlain Park community that fought for changes in infill zoning by-laws hope that new regulations (Infill II) will be set out to help protect trees within their community. However, will this new by-laws set out in Infill II help communities protect their treescapes? In a newsletter addressed to the Champlain Park community Jeff Leiper stated: “I was very pleased to work closely with the Champlain Park Community Association, to accomplish one significant amendment to what was passed at Planning Committee: a lower height for duplexes in our R2 zones for the sake of consistency and to provide a clear signal to the Committee of Adjustment to increase rear and front yard setbacks” (Champlain Park Community Association, 2015). The process of adapting Infill I to Infill II is seen as a modest victory by communities and community activists, including in Champlain Park. It will be important to follow up on the long-term results of Infill II to see if it will, in fact, help protect trees in mature neighbourhoods. Current practices of infilling are not only adversely affecting neighbourhood trees and the community treescape, but also effectively eliminating the re-establishment of that treescape because the space left for trees is insufficient for their root systems.

One important outcome that occurred from the increase of infilling in Champlain Park is seen with the creation of the Champlain Oaks Project. Jeff Leiper explained the involvement of this community and how it has pushed him to focus on protecting trees when dealing with City Council:

The issues are very clear in the community's mind and they are pushing me every day on every aspect of it. So where do we go, infill - since I took office we went through the Infill II process. It is very recent. And you know I was extraordinarily active on that as a member of the planning committee in the Champlain Park Community was very active and are my most active association in that discussion. So they were working with me with Infill II pushing me hard to make sure some of the positive changes got made with trees first and foremost in mind (Interview 10, Aug. 21, 2015: emphasis added).

The outreach presented by this community initiative shows a desire to save a treescape from infilling, and seems to provide a positive outcome with the change of infill zoning to Infill II. However, although the community was successful in helping change some of the regulations leading to Infill II, the struggles over saving trees from infilling continue to dampen the community's efforts and trees continue to be lost and damaged from infill development. This turns the attention of the discussion to the 'rules of the game' to look at the pressing issue of enforcement of the tree-protection by laws.

5.3.2 Rules of the Game through Regulations and Enforcement: Are Trees Being Protected?

The implementation of any forest management plan can be lost in the disconnect between the Planning Department and Forestry Services with a municipality. Conflicts arise as a result of the lack of communication between departments within a city. One major issue raised by Jeff Leiper is the fact that "for several years now, since the implementation of the new urban tree conservation by-law [2009], *there has been no reporting back to council about the number of*

permits issued” (Interview 10, Aug. 21, 2015: emphasis added). Without any feedback on the issuing of building permits or changes to lot sizes, it is hard for other actors and/or departments to be aware of any issues. Heather Pearl (resident / Community Association co-chair) elaborates by explaining how, “there are these people existing in their silos not talking to each other which is what I see happening in many areas of the city... a lot of by-laws do not seem to get enforced partly because of these silos. *There are people that are trying within the city but they say ‘I am trying but I am powerless’*” (Interview 8, May 22, 2015: emphasis added).

My research suggests that the lack of enforcement of tree protection by-laws is a significant issue relating to who has the power to shape an existing treescape. On the planning side, there is an ongoing relationship between city officials and land developers. On the other side, the Forestry Services has the authority to recognize mature trees and to establish protocols to protect distinctive trees. Forestry staff also have the ability to help enforce penalties related to infractions of tree protection by-laws. Within my analysis of Forestry Services, an important finding reveals that in the summer of 2015, *for the first time in the neighbourhood’s history*, the Forestry Services posted a tree protection sign as seen in figure 5.11 (Huron, 2015). It is interesting to

Figure 5.11. The first documented sign posted by Forestry Services for tree protection. Source: Champlain Oaks Project, 2014

note this finding because this neighbourhood has been pressing the issue of tree protection since the onset of infill development in 2007. It took eight years of fighting to get the first tree protection notice posted in this neighbourhood, further evidence of the low level of influence held by the resident and the community.

Although there exist guidelines set by the city to help protect trees from a variety of development concerns, as outlined in chapter four, this research found that in the case of Champlain Park these guidelines are rarely followed or enforced. For example, Figures 5.12 -5.15 provide a variety of pictures from the Champlain Park community that show failure to follow the proper tree protection protocol. Detailed by a variety of participants, this gap in enforcement was identified as the primary obstacle when fighting developers to help protect the neighbourhood trees. As Heather Pearl explains:

I think right now one of the biggest ones is the fact that the city is not enforcing the urban tree protection by law. I think that is the biggest one because I think that if they were going to be some financial consequences to not protecting the trees then I think the trees would be protected. And right now a lot of the contractors will say "yes I want to protect the tree" but "oh darn my guys are not doing it and they don't know what to do" and it is like "darn it, supervise them god damn it" (Interview 8, May 22, 2015).

Figure 5.12 Fences against the tree and no fence around the CRZ. Source: Author, 2015.

Figure 5.13 Failure to properly adhere to the CRZ guidelines. Source: Author, 2015.

Figure 5.14 Failure to erect a CRZ fence. Note the close proximity of the foundation and the tree. This observation could conclude severe root damage to this tree. Source: Author, 2015.

Figure 5.15 CRZ not identified. Extreme root damage of a tree meeting distinctive qualities. Source: Champlain Oaks Project, 2014.

Section 4.2 highlighted the three major by-laws that help protect urban trees. The Urban Tree Conservation By-Law (number 2009-200) focuses on the protection of trees on private property. However, the focus on this by-law to date has been on education rather than enforcement. As noted by Daniel Buckles, the Champlain Oaks Project had discussions with the Forestry Services on the enforcement of by-laws but the city was focused on education:

Several years ago when we started this work, Forestry Services was saying “well, urban tree conservation by-laws are new, it is primarily an *educational vehicle and we are trying to educate both the public as well as builders. So we are not really enforcing it for the time being.*” That has been going on for quite a

few years and so *the shift from education to enforcement has not happened* (Interview 5, Feb. 2, 2015: emphasis added).

So, it would seem that the goal of educating the public about the by-laws has failed. Although Champlain Park is populated with many residents with personal knowledge and understanding of tree care and health, not everyone is aware of these issues. A case documented by Daniel Buckles in 2014 shows two trees that were covered in gravel, dirt and rocks (figure 5.16). This image shows that during construction there was no protective fence and further, the dumping materials were deposited around the trees, potentially harming the tree through stresses such as soil compaction as well as bark and trunk damage. As explained by Daniel Buckles, the contractor was unaware that they were in violation of any by-laws. The contractor “claim[ed] to not be aware of the bylaw, or that her actions might damage the trees” (Buckles, 2014). There were no repercussions for this by-law violation.

Figure 5.16. Photo showing two city trees being used as a ‘dump’ site for a construction project. This is in violation of By-law 2006-279 and illustrates the weakness of relying solely on public education for by-law conformance. Source: Champlain Oaks Project, 2014.

Although education is a very important component to the protection of trees, the lack of enforcement of the by-law has continued to permit the mistreatment of trees on private property. This lack of enforcement was a major issue raised by the residents and community activists interviewed. The by-laws were made by the city to protect urban trees from development and other human induced pressures. However, the lack of enforcement of such by-laws consequently extinguishes its powers to preserve the urban forest. As Velta Tomsons (Tree Ottawa) states:

For the tree advocates it is rather frustrating and unfortunately we do not have the capacity to hit hard when it comes to the by-laws and the forest management strategy. Our petition is petitioning the City of Ottawa to establish a strong publicly accessible forest management strategy. And we have around 700 signatures on that already which is really great, seeing that it was developed in October. So that is really good. But it's people like Daniel Buckles and his group of concerned citizens that are really going to take that to the city... to do the leg work on the by-laws... and criticizing the city" (Interview 3, Jan. 21, 2015).

Even if enforcement occurs, developers seem to disregard the by-laws anyways because of the leniency involved in the consequences of their actions. The by-law states that any violation of the by-law could result in a minimum fine of \$500 and a maximum of \$100,000. However, even at its maximum, as Jeff Leiper explains, "the developers have fines that are the '*the costs of doing business*' even if we [the city] enforces the rules it is just 'the cost of doing business.' In Champlain Park a semi-detached home will go for 1.2 million, *for them [the developer] it is just a 'whoops' and it is not much of a hit with the current fines*" (Interview 10, Aug. 21, 2015: emphasis added).

The political nature of this case seems stacked against the community. The community of Champlain Park wants to protect their trees. However, different agendas within the political economy of densification currently do not favour spending money on trees. Zachary Dayler

(Executive Director of Wellington West BIA), explains that although money does go towards planting new trees, “and were you to spend the money planting trees right now in the city, as much as I like to say it is a top priority, frankly there are other things we need to spend money on” (Interview 11, Aug. 28, 2015). In an economically driven society and the neoliberal city, the availability of scarce resources, specifically money, defines what does and does not happen.

Further problematizing the issue is how most trees are damaged. The true damage to a tree occurs beneath the surface to its root system, and therefore, to many it is not visible. It is clearly stated in both the Tree Conservation Report Guideline as and in by-laws 2006-279 and 2009-200 that development activities should not damage the root system of trees (City of Ottawa, 2015f). Nevertheless, there are numerous accounts of developers not taking the necessary steps and protocols to protect trees from development impacts within Champlain Park (Figures 5.17 and 5.18). Furthermore, these impacts might affect trees on adjoining properties.

Figure 5.17 Development and excavation on this property fail to meet the standards outlined by the Urban Tree Conservation By-Law. Source: Champlain Oaks Project, 2014.

Figure 5.18. Another example of failure to properly adhere to the tree protection by-law. Source: Champlain Oaks Project, 2014.

Damage to root systems as the primary cause of the death of trees has been acknowledged in the media. Accounts from the media indicate the impact of developments on root systems:

Last month, a majestic black walnut on Daniel Avenue in Champlain Park, near Westboro, had to be removed after *half its roots were ripped apart during an excavation for a big semi-detached double on the neighbouring lot*. The same thing happened to another walnut on the street two years earlier. And last Wednesday, two pre-Confederation bur oaks in Champlain Park — one on Carleton Avenue and the other, two blocks away, on Keyworth Avenue where the house is being enlarged — suffered a *significant amount of root damage during excavations* (Adami, 2015: emphasis added).

However, how does ‘our’ understanding of the trees below ground influence what is happening in cases of infill developments? Who owns those roots? As Braverman (2015) argues, roots, and their manifestation beneath the tree remains largely unregulated and neglected due to their physical invisibilities. This highlights important connections towards the place of nature in the compact city indicated in chapter 2 and the space required for trees. Although attempts at root protection are evident in the by-laws with the provision for CRZ, the governance of roots does not seem to exist. As an example, one city planner explained:

[...] root space in the ground and protecting that rooting area from all the stresses that really do the trees in[...] not having enough rooting area or volume is really a challenge. That underground competition. *Every plan I’ve ever looked at has always left out roots, trees are represented with a little dot and maybe the crown drawn around it but there is nothing that accommodates the roots underground and that’s a real big challenge in our urban forest* (Interview 2, Jan. 12, 2015).

Notably, in the experience of this planner, there has never been due consideration given to the root mass in design plans. While, the above-ground aspects of the tree are considered (the trunk and sometimes the canopy), the roots below- ground seem to be an afterthought. The discovery

of multiple examples of major root damage provides some of the main evidence highlighting how infill developments are affecting trees.

The competition for space below ground intensifies as housing density is increased. There is a continual competition for space between utilities, building basements, soil volume and tree roots. The interviews lend some insight on this issue, as Jason Pollard (Forestry Services) related to it stating, “there is a lot of competition underground... the regulations give utilities the right of way” (Interview 1, Dec. 12, 2014). It is common to see this in every development plan because “there is always underground competition between roots and utilities” (Interview 2, Jan. 12, 2015), or as Peter Giles (City Planner) explains “in new developments we often run out of space underground” (Interview 6, Feb. 4, 2015). This insight raises further concerns on conflicts between regulations and urban nature.

There is an awareness of the competition for space below ground among the key actors presented here, but these discussions did not project any solutions or further insights. The interview with Martha Copestake (Planning Forester) touched on this issue when she stated that “it is not just losing trees on lots from infill development that is happening, but...all the trees surrounded by the development are being affected by this infill development so there has been a lot of discussion about that” (Interview 4, Jan. 21, 2015).

Pragmatically, the struggle between treescapes and infill development becomes one centred around space: space for nature versus space for new houses. This reveals the tensions between market-led development and community-sponsored ecological spaces. How is urban space to be used? Answering this questions begins with the recognition that trees need above-ground and below-ground space in which to grow and flourish. While different species of trees have different

types of root systems, the International Society of Arboriculture defines the standard for calculating the reach of a tree's root system as 32 to 38 times the tree's trunk diameter (Day & Wiseman, 2009). The issue of adequate space for existing trees and for the planting of new trees was raised by residents and community activists in this study. One cannot re-design a tree to reduce the space required by its root systems.

Reduction in lot sizes combined with the maximization of the footprint of new houses is reducing the essential space required for trees. A conflict arises between the valuation of infilling and related profits and the existing treescape. Further, the maximization of lot space from infilling reduces potential new tree planting. Through the maximization of lot size within the built form of mature neighbourhoods, infilling is minimizing the potential for replanting in the future, thus reducing the potential to regenerate damaged treescapes.

As mentioned with the idea of the “green illusion,” presented by Heynen and Perkins (2005), the trees in neighbourhood are important assets. They write that this “green illusion” is derived “from a relatively small number of trees that make the most striking impression on residents and visitors, since those are the trees they see along the city's streets and boulevards” (p. 100). However, when the developer shifts the vision to the specific lot, trees are now a hindrance and often taken down for the convenience of easier development as well as the ability to maximize the footprint of the development. For instance, the hypothetical example on the next page illustrates how trees on adjacent lots are utilized versus trees on a lot intended for infilling (Figure 5.19). In this case, there are three developed lots with existing mature trees on the property. Lot 2 however is being infilled. In total, there are eight distinctive trees within the 3 lots, two of which are on lot 2. Because the developer wants to maximize their economic gain,

Figure 5.19. A visual example of a hypothetical infill development impacting the treescape.
Source: Author, based on case study observations and insights.

the intended development will maximize the lot space. Due to this, the two trees on lot 2 will have to be removed. Instead of identifying these trees as key assets to the property and developing around them to protect the trees, the trees will likely be removed. The consequence of this is greater than the removal of these two trees. Lot 3 has two trees bordering the property line of lot 2. Because the infill intends to build as close to the property line as possible, these two trees are in danger of severe root damage due to the excavation of the neighbouring development. In this case, the developer utilized the value of the surrounding trees on lots 1 and 3 to maximize the perceived value of the new development. However, the consequence of development likely damaged the root system of the two trees on lot 3 to the point that the integrity of the tree has been diminished and the tree will likely die.

This example provides evidence of the importance of issues of space for nature versus space for infill houses. The example above illustrates what is currently happening in Champlain Park and other mature neighbourhoods within Ottawa's urban core. The push for urban densification through processes such as infilling in mature neighbourhoods follows the economic narrative present in the neoliberal city, one favouring development profits over tree conservation and a community's treescape.

5.3.3 Power Over the Urban Forest in a Neoliberal City

Although current urban strategies focus on increased densification in mature neighbourhoods in Ottawa's urban core, Champlain Park continues to fight for the protection of its mature trees, and for better infilling by-laws and enforcement of such by-laws. As Daniel Buckles (resident / Champlain Oaks Project) stated:

I am very supportive of infill development but not haphazard and indiscriminate and destructive and not trying to actually work with the existing environment. *That has been one major obstacle and that is translated into the lack of enforcement of the existing by-laws. We have two main by-laws they are not firmly enforced.* (Interview 5, Feb. 2, 2015: emphasis added)

In addition, Heather Pearl (resident / Community Association co-chair) explains that:

Money is a huge deterrent to reasonable infill. As I said before, no one wants to stop it. We always have lots of turnover in this neighbourhood -new houses being built, but it was rational, they were fitting in with the community and it fit on the lots. The other thing is that it isn't just about infill either, a huge number of houses, even before it was legal you would have a little basement apartment, an upstairs apartment, you would have a room and this was good. And student housing, it allowed elderly people to stay in their houses because there was another person there. It meant that young couples, young married couples very often had their own space in their house, granny flats, elderly people living with their kids and so that is real densification. And what we are getting instead of densification is million dollar plus houses being built replacing a smaller house that had an apartment in the basement. That's not densification; that is someone getting really rich off this schemed idea of what densification is. And it is not

actually intensifying the neighbourhood. It might look like it is but it is not necessarily. We are, actually, I think, [seeing] anti-densification in this neighbourhood. (Interview 8, May 22, 2015)

The frustrations from continuing to speak to the city against such developments is revealed as she says, “we [community members] really do not have a lot of say” (Heather Pearl, Interview, 2015). She continues to explain that it is more-or-less a losing battle, “I think that *people are getting tired of fighting* so after a while they just roll over. They’re trying to fight a losing battle so I understand how it gets tiring” (ibid: emphasis added). This problem is aggravated by the expense of court costs. Jeff Leiper is familiar with the process. He explains that with:

enforcement of our by-law... is more than [saying]when people want the rules enforced, just enforce the rules. [It] is like anything where you have people who are contravening a by-law - you have to go to court, and it is not as simple as saying no. *It is time, money, and you have to be reasonably certain if you are going to spend the time that the courts are going to back you.* All of these decisions take place with so many actors and not any one of whom have full control of the reins (Interview 10, Aug. 21, 2015: emphasis added).

As noted in this discussion with the ward councillor, one deterring factor is a lack of confidence that the community has when taking claims of tree protection violations to court. In such situations, they must also confront the power of the developer, and their backing by the OMB, and their ability to justify infill development using the PPS. The developers have backing from the PPS and OMB regarding infilling as an initiative to support the ‘public interest.’ The PSS has defined this ‘public interest’ as urban densification although, as the case of Champlain Park shows, the interest of the community is to develop in a way that protects the trees and cherishes their community's existing character.

Heather Pearl (resident / Community Association co-chair) explains that in all of her years working with developers and the Committee of Adjustment that they have only won once:

We actually won, the one time we were able to win, we bought a lawyer and a planner, it was expensive, but we won at the OMB. We won everything that we went in with. And that told me that *if communities had the money and had the backing of legal services and planners than a lot of this wouldn't happen, but the developer community can afford it. It is their cost of doing business* (ibid, Interview, 2015: emphasis added).

What is seen in the case of Champlain Park is a myriad of power conflicts and clashing agendas. This idea links back to the non-singularity of knowledge suggested by Castree (2001) in chapter 2, and how knowledge and understanding are reflected through the positions of the knower(s). It is obvious that the agenda of the developer is to make money through infilling. The agenda of the city is to ensure development is in accordance with the Official Plan, zoning regulations, and by-laws. What happens in cases such as Champlain Park is that other powerful actors such as the OMB¹⁴ tend to side with the developers, including cases where the city might try to save distinctive trees based on tree protection by-laws. Jeff Leiper identified this problem in his interview. He explains how in spite of the new Infill II protocols for infilling in mature neighbourhoods and despite the tree conservation by-laws:

Trees will probably continue to be lost. *If you try to stop a developer from building the new semi, on a basis of 'we do not want to lose the tree' the OMB is saying 'the balance of the public interest and the necessity to reduce urban sprawl outweighs that tree'.* So, we are not masters of our own domain. (Interview 10, Aug. 21, 2015).

---

¹⁴ As an independent adjudicated tribunal, the OMB decides appeals according to the PPS. In this case, appeals regarding the removal / protection of trees are often brought to the OMB by residents or the city. The OMB has a history of siding with the developer on the removal of trees based on the overall goal of urban densification, as outlined in the PPS, outweighing the protection of a tree or trees.

Finally, the discussion of power brings the discussion back to concerns of enforcement discussed in the previous section. The authority, or power of enforcement, is held by Forestry Services. As indicated in the above examples, however, they have admitted to a lack of enforcement in favour of educational approaches.

Forestry Services and the City as an actor as a whole are responsible for regulating and enforcing municipal by-laws pertaining to tree protection, development and zoning by-laws. If they are not enforcing these by-laws then they are in part abdicating their power. A related issue that also requires consideration is the issue of the penalties imposed by violating tree protection by-laws. Do they offer a harsh enough penalty to actually deter developers from damaging or neglecting trees? This may be a moot question. Due to the lack of enforcement of protection protocols, it seems that developers continue to disregard tree protection by-laws.

Despite the community's frustrations with the city and developers, the resident participants had few harsh words for the city. Interestingly, there seems to be sympathy towards the city's Forestry Services officials as both Heather Pearl (resident / Community Association co-chair) and Daniel Buckles (resident / Champlain Oaks Project) described their concerns of power within the structure of the city:

The number one tension is *the lack of power of the Forestry Services within the city system*. It is very low on the pecking order of decision making at the city." (Interview 5, Feb. 2, 2015: emphasis added)

The thing that makes me sad is that I think our Forestry Services has no clout, zero clout with the city, and I feel they have very talented people working there and *they are not allowed to do their jobs* (Interview 8, May 22, 2015: emphasis added).

These two quotes reveal the struggle over power that occurs at the city level. Although there are people willing to fight for the protection of trees, the balance of power seems to favour the developers and adherence to a discourse of compact, sustainable development practices which favour downtown development and real estate profits over other considerations. As such, developers and planners in favour of infilling initiatives are well-positioned to continue to exert power over alternative forms of sustainable development that advocate greater space for urban nature in general and treescapes specifically. Evidence suggests it is the Planning Departments that possess the greatest power within the city over matters affecting infill development decisions, and by extension the treescapes of mature neighbourhoods such as Champlain Park.

It is clear that in the current structure of management over the urban forest, and as densification remains the priority within Ottawa's urban core, developers will possess considerable power in producing urban environments. Their position of power is supported by the dominant narrative of market-led sustainability which embraces the principles of the compact city. Furthermore, the city's endorsement of the compact city as the strategy for achieving a more sustainable city further strengthens the developer's position. For the residents and community activists of such inner city neighbourhoods as Champlain Park, the privileging of the compact city and, therefore of infilling, is directly impacting on the existing treescapes of these communities.

5.3.4 Conflicting Visions of Sustainable Communities: How do Different Discourses of Sustainable Development Affect the Treescape of Champlain Park?

In chapter 2, I argued that there exists competing discourses of sustainability. It was further argued that different actors draw upon different discourses to support their positions and actions,

thus influencing how social nature is produced. Sustainable development, as understood by the city and advocated by developers, concentrates on densification and infill. Residents and community activists, on the other hand, tend to adopt a broader definition of sustainable neighbourhoods, one that includes the preservation of the mature tree canopy and the protection of trees. Whereas for the city and developers the term ‘sustainable’ is defined primarily by economics, sustainable development as understood by residents and community activists contains features in common with McHarg’s harmonious design with nature and his ecosystem approach. These competing ideas of sustainable development and the ways in which different actors utilize this term becomes relevant in discussions concerning neighbourhood design, the importance of nature and trees in these designs, and who has influence over treescapes of these neighbourhoods.

Competing discourses of sustainability and development were evident in the perspectives and positions held by the variety of actors. Both the city and the developer seem to embrace the compact city discourse for urban sustainability. Residents and community activists express a more biophilic or holistic discourse regarding sustainable development. This leads to very different interpretations of what constitutes a sustainable city or neighbourhood. For instance, when considering ideas of diversity and creativity, developers think only of the built form, the diversity of houses, and the creativity of the built form, with little attention given to the importance of nature in a community’s design. For the resident and community activist, nature in general and trees specifically were important components of community design.

The tension between the developer and the resident is clear. From a developer’s perspective, the compact city represents a convenient model of urban sustainability and neighbourhood

densification is a key strategy for realizing this urban form. This model is grounded on a neoliberal basis that embraces market-driven urban development and produces higher profit margins for developers. However, as Heather Pearl (resident / Community Association co-chair) observes, “[...] those buildings are going to be hot and they add nothing to the treescape [...] there is no vegetation, no trees, nothing. *They [developers] are hauling out houses and replacing them with units that are maxing out the entire lot size and there is just no room from anything anymore*” (Interview 8, May 22, 2015: emphasis added). This points to differences in what is understood as important components of sustainable development.

Similar tensions within the city are also evident here with often incompatible programs and goals. While the overall planning vision embraces the compact city, there are initiatives within the city to foster a ‘greener’ presence and to increase the urban forest canopy such as the million tree initiative. However, as explained during the interview with a city planner, “we [the Planning Department] are really pushing densification, and the densification really restricts them [the Forestry Services], and *I honestly do not think that our current practices are going to support that vision of a healthy, canopy dominant street the way that some people may want it to be*” (Interview 2, Jan. 12, 2015: emphasis added). How can you push densification and a healthy urban forest at the same time? As noted in chapter 4, initiatives to increase the compact form and create a denser city makes increasing the urban forest canopy challenging, if not impossible, due to the increasingly limited space for nature. Evidence from the results presented above support this conclusion, highlighting the issue of root space and the competition of space below ground between utilities and roots. The city’s position regarding sustainable development is conflicted. The Official Plan, with its commitment to a compact city, remains a principal driver of urban

form. However, there exist various initiatives aimed at enhancing the built environment with greenspace, including trees.

The paradoxical relationship with trees lends credence to critiques of the economically-driven narrative seen in sustainable development as discussed in chapter 2 (Redclift, 1987; UNDP, 1996). These critiques argue that policies and institutions “that are associated with market-based economic growth often worsen ecological problems, accelerate resource depletion, and produce unsustainable development” (Haque, 2000, p. 14). This is the case, and the concern, in Champlain Park. For residents and community activists, the outcome of such economically-driven sustainable development is aptly described by Heynen and Perkins (2005) as a “green illusion.” This “green illusion” perpetuates the place of nature and trees as first expressed under the framing of beautification.

This process is seen in the Champlain Park case study where a community which historically has fostered a mature tree canopy of mixed species is under increasing pressure from infilling. Furthermore, the trees themselves become simply commodities for consumption under this discourse. As already explained, developers utilize the existing tree cover of neighbouring properties to help maximize property value for their development (cf. Beatley, 2011; Campbell, 2015; Heynen & Perkins 2005; Perkins, 2015; Tyrvaenen et al., 2005; Wu, 2008). Trees are seen more as marketing assets and not for providing important ecological services. Champlain Park residence Daniel Buckles (resident / Champlain Oaks Project) paints a good picture of this. He explains:

Of course they [developers] are buying into neighbourhoods that are treed, and relying on the tree'd canopy in neighbourhoods to attract buyers to their individual property...It is kind of a tragedy of the commons in the area where

an individual builder wants to cut all the trees down on their specific property but they rely on the treed neighbourhood in order to charge premium for their product that they are building (Interview 5, Feb. 2, 2015).

However, as a result of infilling, the trees are being damaged and/or removed, thereby reducing the extent of the treescape.

As explained by Daniel Buckles, and as discussed with Heather Pearl (resident / Community Association co-chair) and Jeff Leiper (ward councillor), the commodification of trees as a marketable feature has alluded to a vision of treed neighbourhoods, while the reality is that the developers use these trees as a selling tool to the new property buyer, while continuing to cut down more trees for other infill projects. Furthermore, a problem also lies in the fact that the tree canopy and its benefits are shared benefits. A developer, or a resident, can enjoy the benefits of a tree planted on a neighbours' property without incurring the cost. Eventually, as this pattern continues until the treed neighbourhood no longer exists. The process of infill development, that does not consider the importance of protecting trees, will thus create a desert effect - a neighbourhood that has lost its tree canopy.

From a utility standpoint, this makes sense for the developer - to use the aesthetic value of trees to sell their property - but little else. As described by Daniel Buckles (resident / Champlain Oaks Project), this utilization of trees to help sell infill properties does not establish a lasting vision:

And that will work for a few years with the first few developments but *eventually you will end up losing one of the assets of the neighbourhood that the developers are selling*. And so there is a declining return and it reflects a very short sighted nature of any building business so that is a problem (Interview 5, Feb. 2, 2015: emphasis added).

As a longtime resident, Heather Pearl, similarly expressed her concern with the outcome of infilling as follows:

Well my primary goal is to try to keep this neighbourhood from being desertified by means of infill development ... We are losing the green we had, and they [developers and city] are losing the potential to green the neighbourhoods. And we will have no potential to green either because of how it is being built. We are losing what is there and then losing future potential (Interview 8, May 22, 2015).

This point both helps to illustrate the concern over how the development community, residents and community activists understand sustainability differently. The latter groups adopt a more biophilic vision of community design, one in which nature and trees specifically are important components. The importance placed on trees is in part due to the natural beauty they inscribe on the neighbourhood and in part due to the ecological benefits they provide. Here again the issue of scale comes into question. What constitutes a sustainable neighbourhood or community is understood differently through experience. For many residents of Champlain Park, the treescape and its bur oak serve to define the community itself. They see the treescape as essential to the nature of the community. The trees are not simply seen as providing essential ecological benefits; they are an important component of the community's identity. Trees provide such benefits to those immediate areas where they are found. This prompts residents to question the process of infilling as promoting greater sustainability: although the process of densification is seen as a tool of sustainable development by means of developing a more compact urban form, in the case of Champlain Park, is it actually sustainable?

These ideas are reflected more in the biophilic city. Such a vision recognizes and embraces the cultural, environmental and physical health benefits of nature's presence in urban

environments. The biophilic city perspective moves sustainable beyond economic gain to include dimensions of human health (as was the case under beautification), and argues for the promotion of developing for “the livelihood of future generations” (Beatley, 2011, p. 6). The biophilic narrative differs from the development narrative in that it focuses on what exists, rather than what can be added. As Beatley (2011) writes, “Biophilic cities cherish what already exists (and there is much, as we have already seen) but also work hard to restore and repair what has been lost or degraded and to integrate new forms of nature into the design of every new structure or built projects. We need contact with nature, and that nature can also take the form of shapes and images integrated into building designs” (p. 45). Further discussions of this perspective on the scale of the community presents itself in the well-being and health of the community.

As identified repeatedly by residents, and through testimonies of interviews and other sources such as the Community Associations web page, the Champlain Park community cherishes their trees as significant elements of their neighbourhood. One of the benefits identified by biophilic narratives of sustainability is that nature is essential for human health and well-being, a narrative seemingly shared by the Champlain Park community. Statements from the interviews and secondary sources show the emotional ties that this neighbourhood has towards their mature tree canopy which represents itself through their care of the trees. This inherent emotional connection presents itself further as Beatley (2011) presents the way in which E.O. Wilson describes it: “Biophilia . . . is the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature.” (p. 3). This places nature as a central component to human health and well-being. This aspect of the biophilic narrative is shared by much of the Champlain Park community. This narrative does not

have much clout against the developers, and the failure of the city to regulate the developers further exemplifies this.

The interests of developers to maximize their profits through infill development in neighbourhoods such as Champlain Park often trumps the desire of the community to protect its mature tree canopy. This conflict extends deep into city policies and ideas of sustainable development. On one hand, the Official Plan focuses on ideas of ‘sustainable development’ through compact design and densification. On the other hand, the Official Plan promotes a ‘green’ city through the Greenspace Management Plan and the new urban forest management plan with targets to increase the urban forest canopy. These conflicting ideas help to trace the influence of power through discourse. As the case suggests, the discourses of sustainable development adhering to the promotion of market-driven development trumps ecological and social objectives of the city - “the interests of the powerful, in particular contexts, become the norms that guide political debate and practice to the exclusion of others” (Raco, 2005, p. 328). In the case of Champlain park and its treescape, the ‘norms’ guiding the debate is infilling within Ottawa’s urban core. Further, these ‘norms’ influence how development takes place and the model by which development unfolds. The discussion with Daniel Buckles (resident / Champlain Oaks Project) provides a perspective on the developers and their focus:

So the business model of the developers is a main barrier. A business model that does not recognize, or that treats the presence of trees as a net loss - a presence of trees on a particular property and a business model that does not try to make use of the whatever is on the property and add that to the process of their building. A business model that counts square footage as the only driver of the price of the final product so when you only think of square footage you think of how can I occupy 100% of this land or lot. And it is actually, I would argue, not the only potential business model for builders and there have been some success stories and even one in our neighbourhood where we took the builder to the

Committee of Adjustment and they had bought a double lot that had a single house and they wanted to put four units on the property that was proposed by the community association at the Committee of Adjustment and won, the community won, we wanted three instead of four buildings (Interview 5, Feb. 2, 2015).

The results presented above provide examples of the neoliberal narrative driving discourses of sustainable development with a market focus. The consequence of this is seen through processes such as infilling in Champlain Park and the power of the developer. As highlighted throughout this chapter, these processes, along with interactions among key actors as well as ‘the rules of the game,’ power, and discourse all cohere to shape the production of Champlain Park’s treescape.

5.4 Summary: Asymmetries of Power

Different actors understand and view the treescape and the trees of Champlain Park differently depending upon their interests and scale of engagement with the city and the urban forest (Figure 5.20). As discussed, the Champlain Park community possesses an intimate perspective of the

Figure 5.20. Visions of scale and focuses of the urban forest between the developer, municipality and community. Source: Author.

treescape. The trees are seen not merely as decorative but as essential parts of what makes Champlain Park a community. This perspective naturally identifies infill development not simply as adversely impacting the treescape, but also its impact on the community's very identity. Developers operate at the scale of the city, often undertaking projects in several communities simultaneously. Although it is important to recognize that all developers do not operate at this scale, the underlying issue is that developers can benefit from the treescape, using neighbouring trees to enhance their property, while removing the trees on their development site at the expense of the community. Consequently, their understanding of the treescape of a specific neighbourhood is influenced by their engagement with the urban forest at the scale of the city. This further exposes the issue of Heynen and Perkins (2005) description of the 'green illusion.' The essence of a 'green illusion' exists where the impacts occurring at the community and neighbourhood level are masked by the illusion of a larger urban forest beyond their reach. This idea of the 'green illusion' also makes itself relevant as the OMB often favours developers on the issue of tree conservation, viewing the public interest through the PPS and seeing the urban forest in its entirety rather than scaling it down to the local community. For its part, the city is trying to achieve a balancing act of scale and focus. Although there is evidence of the city trying to work with communities to help protect trees, the lack of enforcement and the development initiatives favouring infilling benefit the developer and the neoliberal narrative of sustainable development through the compact city.

As the research suggests, there are efforts towards greater education of the public and developers on issues of trees. In part, this is to increase the awareness of development pressures that trees experience, as well as reinforce the benefits trees provide to the community. As stated

in the interview with a planning forester, “[w]e can plant hundreds and thousands of street trees but *if the general public does not take on stewardship of the trees we will not see a healthy urban forest going forward*. Not all people have an affinity about the natural environment or landscape so *anything we can do to improve education would be worthwhile*” (Interview 9, June 30, 2015: emphasis added). However, as evident in the results of this research, the focus on education has shifted action away from the enforcement of tree protection by-laws. Furthermore, in the case of Champlain Park, a high level of stewardship already exists, however, processes of infill development and the lack of enforcement on tree protection by-laws dampens the community’s ability to be stewards of their treescape.

The evidence presented in this case study suggests that developers hold the balance of power and greater influence over Champlain Park’s treescape. This power is derived in part from the focus on urban development through densification, as outlined by the current PPS and Official Plan. Developers are further supported by both the dominant discourse of sustainable development and by institutions both at the municipal and provincial level which embrace the same discourse. This is not to suggest that the residents and community activists do not have any power. However, the most significant finding of this study is how little power the community does have over their treescape. Thus, there is a fundamental asymmetry of power between the developer and residents regarding the management of trees. Yet, conflict is not an inevitable outcome between these two actors. As noted, community residents are not opposed to infilling per se; they are opposed to “haphazard” infilling. This suggests a compromise between the environmental benefits of a compact city (through infills) and the retention of the urban forest. As explained by Heather Pearl (resident / Community Association co-chair), the Champlain Park

community always considers trees when it comes to development concerns. She makes statements such as “[trees] provide tremendous value to the entire community” and “trees are always on our agenda.” Yet, she also points to the hardships faced by the residents in trying to protect their trees:

Lately because they [developers] know that this community values its mature trees, a lot of the contractors are coming to us with their building plans. We got them to do this because we go to every single Committee of Adjustment and trees are always on our agenda. So now they come to us and say they will preserve trees. And then they proceed not to preserve trees. I think in some cases they are sincere but they do not understand, even when you give them the materials, they don't understand and there are other cases where it is - ‘we will just get their compliance and if it happens...oops’ (Interview 8, May 22, 2015: emphasis added).

However, the fear expressed here is that engagement between the developer and community might mask the true attitudes of developers in order to gain the trust and approval of the community for development. Her concerns towards infilling development continues when she emphasizes:

I think right now the urban forest is being decimated and it is the developers that are doing it. They are the agents of decimation right now. By not enforcing the by-laws the city is enabling them. Then what you have is communities across the city all pushing back really hard, really really hard. (ibid: emphasis added)

Most obviously, the overarching concern in this case study is the negative effect of infilling on the trees and the identity of Champlain Park. As the above results indicate, actors of the community, as well as the city, identify that the current treescape of Champlain Park is in decline due to development pressures. Underlying this general concern are five major concerns raised by participants in this study: root damage to trees, a lack of by-law enforcement to protect trees, loss of green space, changes to community character, and a lack of future visioning (Table 5.4).

However, there is a general acknowledgement that protection of trees and community treescapes remain secondary in importance to densification of the city in accordance with the ideals expressed in the compact city, as presented in and supported by the PPS and Official Plan. This provides developers the ability to have backing from the OMB when issues are brought to the tribunal, as the OMB often sides with infilling based on its prominent position in the PPS.

Table 5.4 Five major concerns identified by interview participants regarding the Champlain Park treescape. Source, Author, based on analysis of source material.

Concern	Implication	Actors identifying concern
Root damage	There is a lack of consideration for root mass. Developers identify trees on property plans with a dot that does not represent the true footprint of the tree.	Ward Councillor Planning Department Community Association
Enforcement of by-laws	Lack of enforcement across the two tree conservation and protection by-laws. A lack of resources and power within the Forestry Services is a major concern	Ward Councillor Community Association Champlain Oaks Project
Future Visioning	A lack of future visioning of newly planted trees often places trees in locations that will not support a mature tree. i.e. not enough soil volume or location of trees under hydro lines.	Planning Department Forestry Services Community Association Ward Councillor
Loss of green space	Large footprints of infills reduce potential to re-green the urban core	Community Association
Change of existing neighbourhood characteristic	Larger houses and a lack of room for trees and landscaping is not in character of the rest of the neighbourhood	Community Association

The case of Champlain Park, its mature tree canopy and its significant bur oak, provides unique insight into the effects of infill development on a treescape in Ottawa's urban core. In this

case, there are numerous actors involved in creating a complex web of interactions and tensions between development, tree protection, knowledge, and care for trees. It is within the different perspectives held by different members of a community, of different institutions, and of different departments that significantly affects how urban space and the urban forest is managed.

In the case of Champlain Park, the adopted discourse of sustainable development through the compact city coheres with the process of infill development. In this research, the question of protecting neighbourhood treescapes becomes inextricably intertwined with the issue of infilling. Pragmatically, the struggle between treescapes and infill development becomes one of space: space for nature versus space for houses, revealing the tensions between intimate spaces and market-led development. The treescape of Champlain Park and mature neighbourhoods alike are being influenced by the asymmetries of power that exist between developers, residents, and the city, thus revealing the local and city-wide complexities of the political ecology of the urban forest.

Chapter 6. Conclusion

The purpose of this study was to examine the variety of actors and their associated power/influence to shape a treescape in Ottawa's urban core. The investigation of a treescape through the selection of a case study provided an in-depth examination of a particular process influencing the urban forest. This research answered a series of questions to better understand the case of Champlain Park and expose the asymmetries of power that exists between and among a variety of key actors. This research sought to tease out some of the key the social, political, economic, and ecological connections that together influence the production of the urban forest. This research was conducted to better understand Ottawa's urban forest and how it is socially produced.

As demonstrated by the significant impacts that DED and EAB had on the urban forest, a new perspective has begun to emerge on how urban trees and thus the urban forest is managed. There are now discussions of diversification and naturalization. However, the power still lies with a select few based upon the current neoliberal framework for urban planning that favours urban densification. At best, trees are still often seen as a "selling" feature and at worst a nuisance for development, and consequently, trees are often valued as less important than development in the name of promoting the "compact city."

This research moved beyond a quantitative approach to urban forestry to better understand how urban nature is socially produced and reproduced. The use of urban political ecology also helped to foreground the need to examine questions of scale important to understanding the urban forest and specific treescapes. It orients urban forest research from a bottom-up perspective versus the more common top-down perspective that tends to dominate urban forestry

research and policy. Using Champlain Park and its unique treescape, this research provides a focused perspective at how social processes impact the urban forest at the scale of the community and the treescape.

This thesis is based on case study research of a particular treescape. The case study reveals important linkages between varying interests, perceptions, knowledge, and actions towards urban nature based on different understandings of what an urban forest is and the scale at which it is conceptualized. The purpose of doing case study research was to “illustrate the specific, and to understand phenomena as they are perceived by social actors in context...[to] gather ‘deep’ information and perceptions through inductive, qualitative methods... [it] seeks to understand the collective experiences of individuals to a phenomena [the production of urban treescapes]” (Spencer, 2011, p.44). Through this approach, this research was able to focus on a specific treescape that is currently being threatened by infill development. Champlain Park was selected because it is a mature neighbourhood located in Ottawa’s urban core and has experienced infill development pressure since 2007. Champlain Park’s selection as a case study is also significant because of the presence of mature bur oaks. Their unique presence in the Ottawa urban core area establishes a significant environmental value and are a potential natural heritage tree.

To expose the asymmetries of power that exist in the production of this treescape, the research was structured to identify the key actors involved in the Champlain Park case. Through the use of semi-structured interviews, this research was able to discover important insights from the actors to better understand their perspective on the urban forest, sustainable development, and their relationship to urban nature as a whole. This was made possible through analyzing the

‘voice’ of various actors and participants in my interview data. Some research limitations posed challenges to this research. Most notably, there was an absence of interviews with developers. Attempts were made to identify and interview developers, however, no developer agreed to participate in the research. To compensate for this shortcoming, I resorted to the interviews with a variety of participants and referred to newspaper articles in order to represent the positions of developers. In all cases, the available interview data was complemented by the analysis of policy documents, such as official plans and zoning and by-law documents to provide additional context for understanding the current ways that the urban forest is managed. As evident throughout this research, the application and enforcement of tree protection by-laws is lacking and this represents a significant issue for urban forest management in my case study. The release of the new Urban Forest Management Plan may impact this issues in the future and will be important to monitor in terms of Ottawa’s urban forest.

This thesis utilized Foucaultian discourse analysis to interrogate the use of different knowledges, discourses, and perspectives, linking these to the exercise of power. Spencer (2011) discusses how the production of knowledge is not a one-way process, rather, people take in ideas and concepts and draw them back into the public realm. For instance, different ways that urban trees and urban sustainable development are perceived will produce different urban landscapes. Here, these ideas are circulated and can form social phenomena: How development processes such as infill development are carried out and how trees are thought about and treated through this process will ultimately influence the future treescapes. The case study suggests the need for a re-imagination of the urban forest through the scale of the treescape. By focusing on infill

development in the case of Champlain Park's treescape, this research provides important insights into the need for policy reform and a shift in power between actors operating at different scales.

6.1 Research Findings and Insights

Throughout this research, it became evident that the treescape in Champlain Park was created and contested by a specific set of actors. This community is very engaged and concerned about their treescape. This community has established a coalition of concerned residents, forming the Champlain Oak Project, to fight the power of development pressures that are destroying their mature treescape. Rallied around the consequences of infill development on their trees, this group fights to protect their trees from development through better by-law enforcement. They are highly involved by having a continual dialogue with the city and developer community about tree protection and better tree by-law enforcement.

The asymmetries of power that exist between the developer and residents have an effect on the unique treescape of Champlain Park. Influenced by the neoliberal city narrative, there are clear tensions between having a more "sustainable" compact city, and having a healthy urban forest. This research has provided a case study highlighting the challenges between these competing discourses of sustainable development, one which favours the compact city, and another that reflects the perspective of the biophilic city and the importance of space for nature in urban design. Overall, the idea of space for nature became a central concern regarding Champlain Park and its bur oak.

One main conclusion from this research is associated with different ways of engaging with the urban forest. The issue is that of the scale at which the urban forest is perceived and understood. At the micro-scale, trees are experienced and understood in their singularity. At the

scale of the tree, a holistic approach is not adopted and visualizing the tree as a part of a larger system does not occur. This micro-scale is often adopted by the developer, seeing the tree(s) on the property being developed as singular units. The developer tends to see the tree as a decoration or singular object rather than how it contributes to the greater socio-ecological system within the city. This micro scale approach hides some of the important social and ecological issues that became evident in the case of Champlain Park. For instance, the value attributed to the bur oaks by the community is not shared by the developer. Secondly, the lot-specific focus of infill developers can also overlook the damage inflicted by new housing on trees on neighbouring properties. One of the most significant examples of this is seen through the damage or complete removal of the extended root system to a tree that grows on an adjoining property.

At the other end of the scale, the macro-scale, the urban forest is seen through its entirety, viewing the urban forest as it exists from a satellite image, assuming homogeneity of the system. The way in which the municipality engages with the urban forest is principally from this macro-scale. Using “grand” visions from Official Plans and the PPS, the urban forest is seen from above. Although this approach adopts a more holistic vision of the urban forest, it hides variations that exist within the system. Instead, it is managed as a homogenous unit envisioning ‘the urban forest’ as a whole. This hides issues of diversity and difference at smaller scales, such as that of the community. This research reveals some of the important issues that are hidden from the macro-scale, such as the impact of infill development on communities and their trees.

From this research, I suggest that there exists an important framing of the urban forest between the micro- and macro-scales that is more sensitive to the socio-natural interactions that shape the urban forest at the scale of the neighbourhood or community treescape. I therefore

argue for the re-imagination of the urban forest as a mosaic of diverse treescapes. These treescapes, such as the one in Champlain Park, are unique assets that are affected by different actors, contexts, and urban processes. It is at the scale of the treescape that a more nuanced understanding of the overall complexity of the urban forest can be realized. For instance, this research focused on the process of infill development and how it is negatively affecting the treescape of Champlain Park. The bottom-up approach held by the community of Champlain Park is based upon the intimate and daily interaction with its trees, and my research and experience in this community led me to come to conceptualize and appreciate the idea of a community treescape.

Envisioning the forest through a more critical lens based on the intimate visioning of a community like Champlain Park contributes to new understandings surrounding the term “urban forest.” For example, this research suggests an alternative understanding to the term, whereby the urban forest is defined as more than simply the accumulation of trees in and around urban areas, but rather, looks at the urban forest as *a mosaic of treescapes that are connected and work together to produce the urban forest through complex socio-ecological interactions*. This research does not suggest that infilling is inherently a bad process; however, I argue that the ways in which infilling is being promoted and controlled, is currently a major concern for urban treescapes such as the one in Champlain Park.

This scalar and qualitative shift in how an urban forest is perceived will permit a better understanding of the urban forest as social nature consistent with the lens of urban political ecology. It will continue to tease out the complex socio-natural interactions that exist in the production of urban space and the urban forest. It provides important elements for better

understanding how urban natures are produced. This research uses understandings of social nature to situate the urban forest as a produced nature. It identifies the need for future research to adopt a similar approach using urban political ecology in order to further understand the complexities of the urban forest and how it is shaped and reshaped by a variety of social, political, economic and environmental factors.

Another major conclusion that I draw upon from this research is the important distinction between short-term actors and long-term actors. The developer is a short-term actor. Their interest in trees and development impacts tend to be short-term and immediate. They do not typically account for any long-term connection or investment within the community. Once they complete their development, their focus shifts to their next development site. The perspective of the community and the NGOs, is longer term. For example, as longer-term actors, Tree Ottawa and the Champlain Oaks Project are focused on addressing the most significant factors affecting the protection of the treescape. While the focus may vary over time, however, a long-term vision contributes to the overall goal of better urban forest management practices for future generations. The municipality, the City of Ottawa, is another long-term actor. However, their focus is different and at a different scale. The city's vision of development and the urban forest are established through the PPS and the Official Plan. These documents outline the long-term vision of the city as a whole and establish the ways in which the city will grow and transform over time. Overall, the case of Champlain Park leads to a better understanding of how development affects Ottawa's urban forest within the urban core. It provides insight into the asymmetries of power that exist among different actors and urban processes (i.e. infilling) on the urban forest. It provides a

greater understanding of the socio-ecological complexities of urban environments and the urban forest.

6.2 Future Research

As a singular case study, this research set out to understand a specific issue impacting one segment of a larger system. From the perspective of the treescape, Ottawa's urban forest is made up of a diverse mosaic of treescapes at the scale of the community. Although this research provides important insights into how infill development is having a negative impact on a mature treescape in Ottawa's urban core, it will be important to conduct further case studies showing how development is affecting treescapes in other parts of the city. For example, future research on suburban development and growth outside of Ottawa's greenbelt will help contribute further insights into the urban forest, highlighting a different set of urban processes and pressures on urban trees. However, it remains important to conceptualize and research the urban forest at the scale of the treescape in order to expose the variety of actors and processes impacting the urban forest.

One of the important components of this research was to stimulate change in future urban planning policy, as well as to potentially educate actors that influence urban trees. Further analysis should follow up on the effectiveness of the implementation of the new Urban Forest Management Plan in Ottawa. Now in its working stages and going through public consultation, this will be the first Urban Forest specific Plan created by the City of Ottawa. Prior to the Urban Forest Management Plan, the urban forest did not have a significant presence in the Official Plan or the Greenspace Master Plan. It will be interesting to see what this plan outlines and if it provides a more formal designation of what the urban forest is, and how it should be protected

and managed. Points regarding the required space for nature and the impact of infilling on trees will hopefully be included in this plan. The establishment of the Urban Forest Management Plan could be a potential step in the right direction toward better urban forest acknowledgement and understanding. However, without support from the PPS, the implementation of the Urban Forest Management Plan may be constrained. As established by this research, the power of the developer is largely backed by the focused densification initiatives outlined by the PPS, and this remains an imbalance of power in the current planning context.

Champlain Park and the community's continued fight to save their tree canopy and the bur oak may eventually lead to stricter infill regulations and enforcement of tree protection by-laws, defending the community's interest. Daniel Buckles (resident/ Champlain Oaks Project) continues to present arguments to the city to list and recognize the bur oak as a natural heritage tree. If this designation is set, it could dramatically increase the likelihood of the survival of the bur oak, a significant "win" for the community and for the Champlain Park treescape. The intimate attachment to the trees in the Champlain Park Community has established a strong working relationship with their ward councillor, Jeff Leiper. He has taken not only a personal interest, but also a community-wide interest to help protect urban trees. In fact, tree-related issues were the main issues that led to the councillor's electoral win. His outlook and commitment to help communities protect trees by bringing tree related issues to the attention of Ottawa City Council is a positive step forward. The relationship between the community and the councillor is an important outlet for the residents to exert their influence - by holding elected representatives accountable.

6.3 Summary

Overall, this work outlines the need to re-imagine how the urban forest is perceived and managed. Using the concept of the treescape, researchers, and policy-makers alike, will be able to expose issues that may be hidden at the micro- and macro-scales. The treescape of Champlain Park is being threatened by infill development, the power of the developer and the lack of enforcement of existing by-laws. A shift in power favouring the community and their values needs to be adopted to protect the treescape of Champlain Park and its bur oak population. The current asymmetries of power provide the short-term actor (the developer) with the power over the long-term actors (the resident and the city). The urban forest is socially produced and contested, and the treescape allows one to explore this varied socio-ecological mosaic in all of its complexity.

Works Cited

- Adami, H. (2014, April 4). Missing sliver of evidence topples bid to enforce city's tree bylaw. *Ottawa Citizen*. Retrieved from <http://ottawacitizen.com/news/local-news/hugh-adami-missing-sliver-of-evidence-topples-bid-to-enforce-citys-tree-bylaw>
- Adami, H. (2015, October 26). Infill development making sawdust out of Ottawa tree by-law. *Ottawa Citizen*. Retrieved from <http://ottawacitizen.com/news/local-news/adami-infill-development-making-sawdust-out-of-ottawa-tree-bylaw>
- Alam, R. (2012). Measuring tree canopy cover in an urban environment. *GoGeomatics Canada*. Retrieved from <http://www.gogeomatics.ca/magazine/measuring-tree-canopy-cover-in-an-urban-environment.htm>
- Alberti, M. (2008). *Advances in urban ecology: Integrating humans and ecological processes in urban ecosystems*. New York: Springer-Verlag.
- Banerjee, S.B. (2003). Who sustains whose development? Sustainable development and the reinvention of nature. *Organization Studies*, 24(1), 143-180 doi: 10.1177/0170840603024001341
- Baxter, J. (2010). Case studies in qualitative research. In Hay, I. (ed), *Qualitative Research Methods in Human Geography* (pp. 102-135). Toronto: Oxford University Press.
- Beardmore, T., Loo, J., McAfee, B., Malouin, C. & Simpson, D. (2006). A survey of tree species of concern in Canada: The role for genetic conservation. *The Forestry Chronicle*, 82(3), 351-363.
- Beatley, T. (2000). Preserving biodiversity: Challenges for planners. *Journal of the American Planning Association*, 68(1), 5-20.
- Beatley, T. (2011). *Biophilic cities: Integrating nature into urban design and planning*. Washington: Island Press.
- Beresford - Kroeger, D. (2010). *The global forest*. New York: Viking Press.
- Burnham, D.H., & Bennett E.H. (1996). *Plan of Chicago*. Princeton: Princeton Architectural Press.
- Bradshaw, M., & Stratford, E. (2010). Qualitative research design and rigour. In Hay, I. (ed). *Qualitative research methods in human geography* (pp. 2-14). Toronto: Oxford University Press.

- Braverman, I. (2015). Order and disorder in the urban forest: A Foucauldian - Latourian Perspective. In Sandberg, L. A., Bardekjian, A., & Butt, S. (eds), *Urban Forests, Trees, and Greenspace: A Political Ecology Perspective* (pp. 132-146). New York: Routledge.
- Bryce, J. (1886). The relations of history and geography. *Contemporary Review*, 49, 426-443.
- Buckles, D. (2014, July). The Champlain oaks as a community History. *Heritage Ottawa news letter: Dedicated to preserving our built heritage*, 41(3), 4-5, Retrieved from https://heritageottawa.org/sites/default/files/newsletter_pdfs/HerOttNews_2014_07.pdf
- Buckles, D. (2014). When will enforcement start? *The Champlain Oaks Project*. Retrieved from <http://www.champlainoaks.com/2014/11/when-will-enforcement-start/>
- Burchell, R. W., Lowenstein, G., Dolphin, W., Galley, C.C., Downs, A., Seskin, S., Still, K.G. & Moore, T. (2002). *The costs of sprawl (2000)*. Washington D.C.: National Academy Press.
- Campanella, T. (2003). *Republic of shade: New England and the American elm*. New Haven: Yale University Press.
- Campbell, L.K. (2015). Constructing New York City's urban forest: The politics and governance of the MillionTreesNYC campaign. In Sandberg, L. A., Bardekjian, A., & Butt, S. (eds). *Urban forests, trees, and greenspace: A political ecology perspective* (pp. 242-260). New York: Routledge.
- Carson, R. (1962). *Silent Spring*. New York: Houghton Mufflin Books.
- Catling, P, McKay-Kuya S., Kostiuk, B., & Kuja, A. (2012). *Ostrander Point – will it still be a hotspot? Trail and Landscape* (Ottawa Field Naturalists' Club), 46(3), 117-132.
- Carreiro, M.M. (2008). Introduction: The growth of cities and urban forestry. In Carreiro, M.M., Song, Y.C., & Wu, J. (eds), *Ecology, planning and management of urban forests* (pp. 3-9). New York: Springer.
- Castree, N. (2000). Marxism and the production of nature. *Capital & Class*, 24(3), 5-37. doi: 10.1177/030981680007200102
- Castree, N. (2001). Marxism, capitalism, and the production of nature. In Castree, N., & Braun, B. (eds.), *Social nature: Theory, practice, and politics* (pp. 189-207). Blackwell Publishing, UK.

- Castree, N. (2003). Commodifying what nature? *Progress in Human Geography*, 27(3), 273-297. doi: 10.1191/0309132503ph428oa
- Chadwick, L.C. (1971). 3000 years of arboriculture: Past, present and the future. *Arborist News*, 36(6), 73-78.
- Champlain Oaks Project. (2016). How old are they? Retrieved from <http://www.champlainoaks.com/how-old-are-they/>
- Chapman, L.J. & Putnam, D.F. (1984). *The physiography of Southern Ontario*. 3rd Ed., Ontario Geological Survey, Special Volume No.2, Government of Ontario, Toronto.
- Chatterton, P. & Style, S. (2001). Putting sustainable development into practice? The role of policy networks. *Local Environment*, 6, 439-452.
- City of Ottawa (2012). Emerald ash borer. Retrieved from http://www.http://ottawa.ca/en/env_water/tlg/trees/preservation/eab/index.html
- City of Ottawa. (2015a). Building a liveable ottawa by 2031: Intensification at a Glance. Retrieved from http://documents.ottawa.ca/sites/documents.ottawa.ca/files/documents/intensification_en.pdf
- City of Ottawa. (2015b). Ottawa's growth management plans. Retrieved from, <http://ottawa.ca/en/volume-1-official-plan/14-ottawas-growth-management-plans>
- City of Ottawa. (2015c). New infill housing rules inside the Greenbelt. Public Service Announcement, January 30, 2015. Retrieved from, <http://ottawa.ca/en/news/new-infill-housing-rules-inside-greenbelt>
- City of Ottawa. (2015d). Low-rise residential infill development in the mature neighbourhoods overlay (Section 139). Retrieved from <http://ottawa.ca/en/residents/laws-licenses-and-permits/laws/city-ottawa-zoning-law/zoning-law-2008-250-consolidation-99>
- City of Ottawa. (2015e). Protecting trees. Retrieved from <http://ottawa.ca/en/residents/water-and-environment/trees-and-community-forests/protecting-trees>
- City of Ottawa. (2015f) Tree conservation report guidelines. Retrieved from <http://ottawa.ca/en/residents/water-and-environment/trees-and-community-forests/tree-conservation-report-guidelines>

- City of Ottawa. (2015g). R1 - Residential first density zone (Sec. 155-156). Retrieved from <http://ottawa.ca/en/residents/laws-licenses-and-permits/laws/city-ottawa-zoning-law/part-6-residential-zones-sections/r1>
- City of Ottawa. (2015h). R2 - Residential second density zone (Sec. 157 - 158). Retrieved from <http://ottawa.ca/en/residents/laws-licenses-and-permits/laws/city-ottawa-zoning-law/part-6-residential-zones-sections/r2>
- City of Ottawa. (2016). Urban forest management plan: Putting down roots for the future. Retrieved from <http://ottawa.ca/en/city-hall/public-consultations/environment/urban-forest-management-plan>
- Clark, J.R., Matheny, N.P., Cross, G. & Wake, V. (1997). A model of urban forest sustainability. *Journal of Arboriculture*, 23(1), 17-30, Retrieved from http://conservation.ufl.edu/urbanforestry/Resources/PDF%20downloads/cLARK_1998.pdf
- Cohen, A. (2003). Ethnography and case study: a comparative analysis. *Academic Exchange Quarterly*, September, 7(3), 283-287.
- Conway, T., Shakeel, T., Attallah, J. (2011). Community groups and urban forestry activity: Drivers of uneven canopy cover? *Landscape and Urban Planning*, 101, 321-329.
- Coolen, H. & Meesters, J. (2011). Private and public green spaces: Meaningful but different settings. *Journal of Housing and the Built Environment*, 27(1): 49-67. doi: 10.1007/s10901-011-9246-5
- Copp, A. (2013). *Looking at ottawa's urban forest as a socio-ecological system: Understanding phase cycles from elm through ash*. BA. Thesis, Carleton University, Ottawa, Canada.
- Creese, W. (1966). *The search for environment: The garden city before and after*. New Haven: Yale University Press.
- Crow, P. (2005). *The influence of soils and Species on tree root depths: Information note*. Forestry Commission, Edinburg, UK.
- Costanza, R., d'Arge, R., de Groot, R.S., Farber, S., Grasso, M., Hannon, B., Limburg, K., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., & van den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, 387, 253-260. Retrieved from http://www.esd.ornl.gov/benefits_conference/nature_paper.pdf

- Daily, G.C., Soderquist, T., Aniyar, S., Arrow, K., Dasgupta, P., Ehrlich, P.R., ... & Walker, B. (2000). The value of nature and the nature of value. *Nature*, 289, 395-396. doi: 10.1126/science.289.5478.395
- Daniels, T.C., Muhar, A., Amberger, A., Aznar, O., Boyd, J.W., Chan, K.M.A., ... & von der Dunk, A. (2012). Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences*, 109, 8812-8819. doi: 10.1073/pnas.1114773109
- Davis, M. (1996). *Ecology of fear: Los Angeles and the imagination of disaster*. New York: Metropolitan Books.
- Day, S.D., Wiseman, P.E., Dickinson, S.B., & Harris, J.R. (2010). Contemporary concepts of root system architecture of urban trees. *Arboriculture & Urban Forestry*, 36(4), 149-159. Retrieved from http://www.isa-arbor.com/education/resources/educ_portal_rootgrowth_auf.pdf
- Day, S.D. & Wiseman P.E. (2009). At the root of it. *Arborist News*. Retrieved from http://www.isa-arbor.com/education/resources/educ_Portal_RootGrowth_AN.pdf
- De Groot, R.S. (1992). *Functions of nature: Evaluation of nature in environmental planning, management and decision making*. Groningen, Netherlands: Wolters-Noordhoff.
- De Groot, R.S. (1994). Environmental functions and the economic value of natural ecosystems. In Jasson, A.M. (ed.) *Investing in Natural Capital: The Ecological Economics Approach to Sustainability* (pp. 151-168) Washington, D.C: Island Press.
- De Groot, R.S., Wilson, M. & Boumans, R. (2002). A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics*, 41, 393-408. doi: 10.1016/S0921-8009(02)00089-7
- Dean, J. (2005). "Said tree is a veritable nuisance": Ottawa's street trees 1869-1939. *Urban History Review*, 34(1), 46-57. doi: 10.7202/1016046ar
- Dean, J. (2009). Seeing trees, thinking forests: Urban forestry at the University of Toronto in the 1960s. In MacEachern, A. & Turkel, W.J. (eds.) *Methods and Meaning in Canadian Environmental History* (pp. 236-253). Toronto: Nelson.
- Dean, J. (2011). The social production of a Canadian urban forest. In Massard-Guilbaud, G. & Rodger, R. (eds.) *Environmental and social justice in the City: Historical perspectives* (pp. 67-89). Cambridge: The White Horse Press.

- Deelstra, T. (1998). Towards ecological sustainable cities: Strategies, models and tools. In J. Breuste, H. Feldman, and O. Uhlmann (eds) *Urban Ecology* (pp. 17-22). Berlin: Springer.
- Dujesiefken, D., Liese, W., Shortle, W. & Minocha, R. (2005). Response of beech and oaks to wounds made at different times of the year. *Springer-Verlag*, 124, 113-117.
- Gregory, D., Johnston, R., Pratt, G., Watts, M.J., & Whatmore, S. (eds.) (2009). *The Dictionary of Human Geography* (5th ed.), London: Blackwell Publishing Ltd.
- Elliott, B.S. (1991) *The city beyond: A history of nepean, birthplace of Canada's capital 1792-1990*. City of Nepean, Nepean, Ontario.
- Elmqvist, T., Setälä, H., Handel, S.N., van der Ploeg, S., Arronson, J., Blignaut, J.N., Gomez-Baggerhun, E., Nowak, D.J., Kronenberg, J., & de Groot, R. (2015). Benefits of restoring ecosystem services in urban areas. *Current Opinion in Environmental Sustainability*, 14, 101-108. doi:10.1016.2015.05.001
- Elmqvist, T. (2011). Ecosystems, ecosystem services, and social systems in urban landscapes: Introduction. In Niemela, J., Breuste, J.H., Elmqvist, T., Guntenspergen, G., James, P., & McIntyre, N.E. (eds.), *Urban ecology: Patterns, processes, and applications* (p. 191), New York: Oxford University Press.
- Environmental & Land Tribunals Ontario (ELTO). (2015). About the OMB. Retrieved from <http://elto.gov.on.ca/omb/about-the-omb/>
- Escobar, A. (1999). After Nature: Steps to an anti essentialist political ecology. *Current Anthropology*, 40(1), 1-30. doi: 10.1086/515799
- Escobedo, F., Kroeger, T., & Wagner, J. (2011). Urban forests and pollution mitigation: Analyzing ecosystem services and disservices. *Environmental Pollution*, 159, 2078-2087. doi: 10.1016/j.envpol.2011.01.010
- Farr, D. (2008). *Sustainable urbanism: Urban design with nature*. London: John Wiley and Sons.
- Farrar, J. L. (1995). *Trees in Canada*. University of Michigan: Fitzhenry & Whiteside Ltd.
- Federal Housing Administration (FHA) (1941). *Successful subdivisions: Planned as neighborhoods for profitable investment and appeal to homeowners*. Washington, D.C.: Superintendent of Documents FHA.
- Federal Housing Administration (FHA) (1941). *A handbook on urban redevelopment for cities in the United States*. Washington, D.C.: Superintendent of Documents FHA.

- Findlay, S. (2001). *Capital woodlands: A field and armchair guide to Ottawa's urban woodlands and wooded Areas*. Toronto: Penumbra Press.
- Fischer, D. (2008). *Champlain's dream*. New York: Alfred A. Knopf.
- Fischer, F. & Black, M. (eds). (1995). *Green environmental policy: The politics of a sustainable future*. London: Chapman.
- Folke, C., Jansson, A., Larsson, J. & R Costanza. (1997). Ecosystem appropriation by cities. *AMBIO: A Journal of the Human Environment*, 26(3), 167-172. Retrieved from http://www.esf.edu/cue/documents/Folke_EcosysApprop-Cities_1997.pdf
- Folke, C., Jansson, A., & Rockström, J. (2011). Reconnecting to the biosphere. *AMBIO: A Journal of the Human Environment*, 40(7), 719-738. doi: 10.1007/s13280-011-0184-y
- Frederick, T. (1903). *Preliminary report to Ottawa improvement commission [microform]*. Ottawa Improvement Commission Report. Montreal: Harold Press.
- Gandy, M. (2006). Urban nature and the ecological imaginary. Heynen, N., Kaika, M., & Swyngedouw, E. (eds.), *In the Nature of Cities: Urban political ecology and the politics of urban metabolism* (pp. 62-74), New York. Routledge.
- Garson, G.D. (2008). Accepted practices and processes - case study management. Retrieved from <http://www.adizesgraduateschool.org/AGSPDF/casestudymgmt.doc>
- Gehl, J. (2011). *Life between buildings*. (2nd ed.), London: Island Press.
- Girling, C. & R. Kellett. (2005). *Skinny streets & green neighbourhoods: Design for environment and community*. Washington, D.C.: Island Press.
- Gomez-Baggethun, E., Corbera, E. & Reyes-Garcia, V. (2013). Traditional ecological knowledge and global environmental change: Research findings and policy implications. *Ecology and Society*, 18(4), 72. doi: 10.5751/ES-06288-180472
- Gómez-Baggethun, E., Gren, A., Barton, D.N., Langemeyer, J., McPherarson, T., ... & Kremer, P. (2013). Urban Ecosystem Services. In Elmqvist, T., Fragkias, M., Goodness, J., Güneralp, B., Marcotullio, P.J., McDonald, R.I., Parnell, S., Schewenius, M., Sendstad, M., Seto, K.C., & Wilkinsno, C (eds.), *Urbanization, biodiversity and ecosystem challenges: Challenges and opportunities: A global assessment* (pp. 175-251) Dordrecht, Germany: Springer.

- Gómez-Baggethun, E. & Ruiz-Pérez, M. (2011). Economic valuation and the commodification of ecosystem services. *Progress in Physical Geography*, 35(5), 613–628. doi: 10.1177/0309133311421708
- Grimm, N.B., Faeth, S.H., Golubiewski, N.E., Redman, C.L., Wu, J., Bai, X. & Briggs, J.M. (2008). Global change and the ecology of cities. *Science*, 319(5864), 756-760. doi: 10.1126/science.1150195
- Grimm, N.B., Grove, J.M., Pickett, T.A. & Redman, C.L. (2000). Integrated approaches to long-term studies of urban ecological systems. *Bioscience*, 50(7), 571-584. doi: 10.1641/0006-3568(2000)050
- Grusin, R. (2004). *Culture, technology and the creation of america's national parks*. Cambridge: Cambridge University Press.
- Gucker, C.L. (2011). Quercus macrocarpa: Fire effects information system. *U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory*. Retrieved from <http://www.fs.fed.us/database/feis/plants/tree/quemac/all.html#Taxonomy>
- Gulsrud, N.M., & Ooi, C.S. (2015). Manufacturing green consensus: Urban greenspace governance in Singapore. Sandberg, L. A., Bardekjian, A., & Butt, S. (eds), *Urban forests, trees, and greenspace: A political ecology perspective* (pp. 77-92.), New York: Routledge.
- Gutman, P. (2007). Ecosystems services: Foundations of a new rural-urban compact. *Ecological Economics*, 62, 383-387. doi: 10.1016/j.ecolecon.2007.02.027.
- Haber, W. (2004). Landscape ecology as a bridge from ecosystems to human ecology. *Ecological Research*, 19, 99-106. doi: 10.1111/j.1440-1703.2003.00615
- Hall, P. (1992). *Urban and regional planning*. London: Routledge.
- Hall, P. (1998). *Cities of tomorrow: An intellectual history of urban planning and design in the twentieth century*. Oxford: Blackwell.
- Hall, P. (2002). *Cities of tomorrow*. 3rd edition. Oxford, U.K./Malden, Mass.: Blackwell.
- Hall, P. and C. Ward. (1998). *Sociable cities: The legacy of Ebenezer Howard*. Chickerston, U.K: John Wiley & Sons.
- Hall, S. (2003). New labour's double-shuffle. *Soundings*, 24, 10-24. doi: 10.1080/10714410500338907

- Hall, T. & Barrett, T. (2012). *Urban Geography*, 4th ed. Routledge, New York.
- Haque, M., (2000). Environmental discourse and sustainable development: Linkages and limitations. *Ethics and the Environment*, 5(1), 3-21. Retrieved from http://www.jstor.org/stable/27766052?seq=1#page_scan_tab_contents
- Harris, R., Clark, J., & Matheny, N. (2004). *Arboriculture—Integrated management of landscape trees shrubs and vines*. 4th edition. Upper Saddle River, N.J.: Prentice Hall.
- Harvey, D. (1985). The geopolitics of capitalism. In Gregory, D & Urry J., eds. *Social relations and spacial structures* (pp. 128-163), London: Macmillan.
- Harvey, D. (1996). *Justice, nature, and the geography of difference*. Oxford: Blackwell.
- Harvey, D. (2005). *A brief history of neoliberalism*. Oxford: Oxford University Press.
- Hay, C. (2004). The normalizing role of rationalist assumptions in the institutional embedding of neoliberalism. *Economy and Society*, 33, 500-527. doi: 10.1080/0308514042000285260
- Helliwell, D.R. (1969). Valuation of wildlife resources. *Regional Studies*, 3, 41-49. doi: 10.1080/09595236900185051
- Heynen, N. (2013). Urban political ecology I: The urban century. *Progress in Human Geography*, 37(6), 1-7. doi: 10.1177/0309132513500443
- Heynen, N. (2003). The scalar production of injustice within the urban forest. *Antipode: A Journal of Radical Geography*, 35(5), 980-998. doi: 10.1111/j.1467-8330.2003.00367
- Heynen, N., Kaika, M., & Swyngedouw, E. (2006). Urban political ecology: Politicizing the production of natures. In Heylen, N., Kaika, M., & Swyngedouw, E. (eds.), *In the Nature of Cities* (pp. 1-19), New York: Routledge.
- Heynen, N., Perkins, H., & Roy, P. (2006). The political ecology of uneven urban green space: The impact of political economy on race and ethnicity in producing environmental inequality in Milwaukee. *Urban Affairs Review*, 42(1), 3-25. doi: 10.1177/1078087406290729
- Heylen, N. & Perkins, H. (2005). Scalar dialectics in green: Urban private property and the contradictions of the neoliberalization of nature. *Capitalism, Nature, Socialism*, 16(1), 99-113. doi: 10.1080/1045575052000335393

- Heynen, N., Perkins, H., & Roy, P. (2007). Failing to grow “their” own justice? The co-production of racial/gendered labor and Milwaukee’s urban forest. *Urban Geography*, 28(8), 732 - 754. doi: 10.2747/0272-3638.28.8.732
- Heynen, N. & Robbins, P. (2005). The neoliberalization of nature: Governance, privatization, enclosure, and valuation. *Capitalism Nature Socialism*, 16(1), 5-8. doi: 10.1080/1045575052000335339
- Hibberd, GB (ed). (1989). Urban forestry practice: Forestry commission handbook 5. London: HMSO.
- Hines, T.S. (2005). Architecture: The City Beautiful Movement. *The Electronic Encyclopedia of Chicago*, Chicago: Chicago Historical Society. Retrieved from <http://www.encyclopedia.chicagohistory.org/pages/61.html>
- Hobsbawn, E.J. (1963). The standard of living during the industrial revolution: A discussion. *The Economic History Review* 16(1), 119-143. Retrieved from <http://web.uvic.ca/~jfedorak/Hobsbawm.pdf>
- Hogarth, D. (1962). A guide to the geology of the Gatineau-Lièvre district. *The Canadian Field Naturalist*, 76(1), 1-55.
- Holl, K.D. & Aides, T.M. (2011). When and where to actively restore ecosystems? *Forest Ecology and Management*, 261, 1558–1563. doi: 10.1016/j.foreco.2010.07.004
- Hough, M. 2004 (1995). *Cities and natural process: A basis for sustainability*. London: Routledge.
- Hough, M. (1984). *City form and natural process: Towards a new urban vernacular*. New York: Van Nostrand Reinhold.
- Howard, E. (1902). *Garden cities of to-morrow*. London: S. Sonnenschien.
- Huggett, I.C. (1993) “The discovery of Alvars at Aylmer.” *Trail and Landscape (Ottawa Field Naturalists’ Club)*, 27(2), 55-57.
- Huggett, I.C. (1995) “Aylmer’s natural landscapes.” *Trail and Landscape (Ottawa Field Naturalists’ Club)*, 29(1), 24-30.
- Hull, Z. (2008). Sustainable development: premises, understanding, and prospects. *Sustainable Development* 16(2), 73-80. doi: 10.1002/sd.337

- Huron, D. (2012). Archangel Ancient Tree Archive. *The Champlain Oaks Project*. Retrieved from <http://www.champlainoaks.com/2012/11/archangel-ancient-tree-archive/>
- Huron, D. (2014). A graphic chronicle of damage. *The Champlain Oaks Project*. Retrieved from <http://www.champlainoaks.com/2014/12/a-graphic-chronicle-of-damage/>
- Jackson, E. (2015). Community associations ‘disappointed’ by infill by-law. *Ottawa Community News*. Retrieved from <http://www.ottawacommunitynews.com/news-story/5654536-community-associations-disappointed-by-infill-bylaw/>
- Jacobs, J. (1961). *The death and life of great american cities*. New York: Random House.
- Jones, O. (2015). (Urban) places of trees: Affective embodiment, politics, identity, and materiality. In Sandberg, L. A., Bardekjian, A., & Butt, S. (eds). *Urban Forests, Trees, and Greenspace: A Political Ecology Perspective* (pp. 111-131), Routledge, New York, N.Y.
- Jordan, H. (1994). Public Parks, 1885-1914. *Garden History Society*, 22(1), 85-113.
- Jorgensen, E. (1986). Urban forestry in the rearview mirror. *Arboriculture Journal*, 10, 177-190. doi: 10.1080/03071375.1986.9746750
- Jorgensen, E. (1970). Urban forestry in Canada. *Proceedings of the 46th international shade tree conference* (pp: 43a-51a), Toronto: University of Toronto, Faculty of Forestry, Shade Tree Research Laboratory.
- Jorgensen, M. & Phillips, L. (2002). *Discourse analysis as theory and method*. London: Sage Publications.
- Kambites, C. (2014). ‘Sustainable development’: The ‘unsustainable’ development of a concept in political discourse. *Sustainable Development*, 22, 336-348. doi: 10.1002/sd.1552
- Katz, L.G. (1994). The project approach. ERIC Digest. ERIC Clearinghouse on Elementary and Early Childhood Education, Chicago, Illinois.
- Keil, R. (2003). Progress report: Urban political ecology. *Urban Geography*, 24(8), 723–738. doi: 10.2747/0272-3638.26.7.640
- Kellert, S., J. Heerwegen and M. Mador (eds.). (2006). *Biophilic design: The theory, science and practice of bringing buildings to life*. Hoboken, N.J.: John Wiley & Sons.
- King, R.T. (1966). Wildlife and man. *New York Conservationist*, 20(6), 8-11.

- Kirby, S., & Hay, I. (1997). (Hetero)sexing space: Gay men and “straight” space in Adelaide, South Australia. *Professional Geographer*, 49(3), 295 - 305. doi: 10.1111/0033-0124.00078
- Kirkby, J., O’Keefe, P., & Timberlake, L. (1995). *The earthscan reader in sustainable development*. London: Earthscan.
- Konijnendijk, C.C. (2015). From government to governance: Contributing to the political ecology of urban forestry. In Sandberg, L. A., Bardekjian, A., & Butt, S. (eds). *Urban forests, trees, and greenspace: A political ecology perspective* (pp. 35-46). New York: Routledge.
- Konijnendijk, C.C., Ricard, R.M., Kenney, A., & Randrup, T.B. (2006). Defining urban forestry - A comparative perspective of North America and Europe. *Urban Forestry & Urban Greening*, 4, 93-103. doi: 10.1016/j.ufug.2005.11.003
- Kronenberg, J. 2015. Why not to green a city? Institutional barriers to preserving urban ecosystem services. *Ecosystem Services*, 12, 218-227. doi: 10.1016/j.ecoser.2014.07.002
- LaNier, R. (1975). Developing and ecological framework for the planning of human settlements. *Urban Ecology*, 1, 1-4.
- Lawrence, H.W. (1993). The neoclassical origins of modern urban forests. *Forest and Conservation History*, 37(1), 26-36. doi: 10.2307/3983816
- Lees, L., Slater, T., & Wyly, E. (2008) *Gentrification*. London: Routledge.
- Lefebvre, H. (1976). *The survival of capitalism: Reproduction of the relations of production*. London: Alisson & Busby.
- Leis, H.R. & Viola, E.J. (1995). Towards a sustainable future: the organizing role of ecologism in the North-South relationship. In Fischer, F. & Black, M.(eds). *Greening Environmental Policy: The politics of a Sustainable Future* (33-51). London: Chapman.
- Lewis, A. (1979, August 1). Canada’s trees: Ottawa’s elms are crashing down (television broadcast). *CBC Television News*.
- Liefferink, D. (2006). The dynamics of policy arrangements: Turning round the tetrahedron. In Arts, B., and Leroy, P. (eds.), *Institutional Dynamics in Environmental Governance* (pp. 45-68). Dordrecht: Springer.
- Limburg, K.E. & Folke C. (1999). The ecology of ecosystem services: Introduction to the special issue. *Ecological Economics*, 29, 179-182. doi: 10.1016/S0921-8009(99)00008-7

- Luke, L., Jackson, D. & Usher, K. (2006). Case study: A bridge across the paradigms. *Nursing Inquiry*, 13(2), 103-109. doi: 10.1111/j.1440-1800.2006.00309
- Marzluff, J.I. Shulenberger, E., Endlicher, W., Alberti, M., Bradley, G., Ryan C., Zugbrunnen, C., & Simon, U. (eds.) (2008). *Urban ecology: An international perspective on the interactions between humans and nature*. New York: Springer-Verlag.
- Massey, D. (2010). The political struggle ahead. *Soundings*, 45, 6-18.
- McHarg, I. (1969). *Design with nature*. New York: John Wiley & Sons.
- McDonald, R., & Marcotullio, P. (2011). Global Effects of Urbanization on Ecosystem Services. In Niemela, J., Breuste, J.H., Elmqvist, T., Guntenspergen, G., James, P., & McIntyre, N.E. (eds.), *Urban ecology: patterns, processes, and applications* (pp. 193 - 205). Oxford: Oxford University Press.
- McDonnell, M.J. (2011). The History of Urban Ecology: An Ecological Perspective. in Niemela, J., Breuste, J.H., Elmqvist, T., Guntenspergen, G., James, P. & McIntyre, N.E. (eds.), *Urban Ecology: patterns, processes, and applications* (pp. 5-12). New York: Oxford Press.
- McDonnell, M.J., & Pickett S.T.A. (eds.) (1993). *Humans as Components of Ecosystems: Subtle Human Effects and the Ecology of Populated Areas*. New York: Springer-Verlag.
- McDonnell, M.J., Hahs, A.K., & Breuste, J. (eds.) (2009). *Ecology of Cities and Towns: A Comparative Approach*. Cambridge: Cambridge University Press.
- McPhearson, P.T. (2011). Toward a sustainable New York City: greening through urban forest restoration. In M.I. Slavin, (ed.), *Sustainability in America's cities: creating the green metropolis* (pp.181-204). Washington, D.C.: Island Press & Centre for Resource Economics.
- McPherson, E.G., Nowak, D., Heisler, G., Grimmond, S., Couch, C., Grant, R., & Rowntree, R. (1997). Quantifying urban forest structure, function and value: the Chicago urban forest climate project. *Urban Ecosystems*, 1, 49-61. Retrieved from http://www.nrs.fs.fed.us/pubs/jrnl/1997/ne_1997_mcpherson_001.pdf
- Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Synthesis*. Washington D.C: Island Press.
- Miller, R.W. (1997). *Urban forestry: Planning and managing urban greenspaces*. 2nd ed. New Jersey: Prentice-Hall.

- Miller, R.W., Hauer, R.J., Werner, L.P. (2015). *Urban forestry: Planning and managing urban treespaces*. 3rd ed. Long Grove, IL: Waveband Press.
- Mincey, S.K., Hutten, M., Fischer, B.C., Evans, T.P., Stewart, S.I. & Vogt, J.M. (2013). Structuring institutional analysis for urban ecosystems: A key to sustainable urban forest management. *Urban Ecosystems*, 16(3), 553-571. doi: 10.1007/s11252-013-0286-3
- Milroy, L. (1980). *Language and Social Networks*. Oxford: Blackwell.
- Ministry of Municipal Affairs and Housing. (2014). *Provincial policy statement*. Toronto, Ontario. Retrieved from <http://www.Ontario.ca/PPS>
- Moeller, G.H. (1977). The Pinchot Institute: toward managing our urban forest resources. *Journal of Arboriculture*, 3, 181-186. Retrieved from <http://joa.isa-arbor.com/articles.asp?JournalID=1&VolumeID=3&IssueID=10>
- Mumford, L. (1961). *The city in history: Its origins, its transformations and its prospects*. New York: Harcourt, Brace & World.
- Myerson, G. & Rydin, Y. (1996). *The language of environment*. London: UCL Press.
- National Association for Olmsted Parks (NAOP). 2016. *Design principles*. Retrieved from <http://www.olmsted.org/the-olmsted-legacy/frederick-law-olmsted-sr>
- Neuman, M. (2005). The compact city fallacy. *Journal of Planning Education and Research*. 25, 11-25. doi: 10.1177/0739456X04270466
- Neumann, R. (2011). Political ecology III: Theorizing landscape. *Progress in Human Geography*, 35(6), 843-850. doi: 10.1177/0309132510390870
- Nowak, D.J. & Dwyer, J.F. (2000). Understanding the benefits and costs of urban forest ecosystems. In Kuser, J.E., (ed.), *Handbook of urban and community forestry in the Northeast* (pp. 11-25). New York: Kluwer Academic & Plenum Publishers.
- Odum, E.P. & Odum, H.T. (1972). Natural areas as necessary components of man's total environment. In *Transcript of the 37th North American Wildlife Resources Conference* (pp. 178-189). Washington D.C: Wildlife Management Institute.
- OECD. (2012). *Compact city policies: A comparative assessment*. OECD Green Growth Studies, OECD Publishing. Retrieved from <http://dx.doi.org/10.1787/9789264167865-en>

- O'Farrell, P.J., Anderson, P.M.L., le Maitre, D.C. & Holmes., P.M (2012). Insights and opportunities offered by rapid ecosystem service assessment in promoting a conservation agenda in an urban biodiversity hotspot. *Ecology and Society*, 17(3), 27.
- Olmstead, F. L., (1985). Parks, parkways and pleasure grounds. *Engineering Magazine*, 9, 253-354.
- Ottawa Free Press of May 2, 1874, reporting "The Chase: The hounds are out today at Skead's mill, and we understand that His Excellency Lord Dufferin is expected to witness the sports."
- Ottawa Horticultural Society (OHS) Records. "A civic policy for the control of street trees." Annual Reports and Programs, 1917-1937 (Ottawa: OHS, 1922). 33. 19-0-8-E, Library and Archives Canada.
- Patricios, N.N. (2002). Urban design principles of the original neighbourhood concepts. *Urban Morphology*, 6(1), 21-32. Retrieved from https://works.bepress.com/nicholas_patricios/15
- Pauleit, S.& Breuste, J.H. (2011). Land-use and surface-cover as urban ecological indicators. In Niemela, J., Breuste, J.H., Elmqvist, T., Guntenspergen, G., James, P. & McIntyre, N.E. (eds.), *Urban Ecology* (pp. 19-30). Oxford: Oxford University Press.
- Pauleit, S., Ennos, R. & Golding, Y. (2005). Modelling the environmental impacts of urban land-use and land cover change - a study in Merseyside, UK. *Landscape and Urban Planning*. 71(2-4), 295-310. doi: 10.1016/j.landurbplan.2004.03.009
- Pearce, D.W. (1993). *Economic values and the natural world*. London: Earthscan.
- Pearson, M. (2015). Planning committee considers new infill rules. *Ottawa Citizen*. Published May 27, 2015. Retrieved from <http://ottawacitizen.com/news/local-news/planning-committee-considers-new-infill-rules>
- Perkins, H. (2007). Ecologies of actor-networks and (non)social labor within the urban political economies of nature. *Geoforum*, 38, 1152-1162. doi: 10.1016/j.geoforum.2007.01.007
- Perkins, H. (2015). Urban forests are social natures: Markets, race, class and gender in relation to (un) just urban environments. In Sandberg, L. A., Bardekjian, A., & Butt, S. (eds.), *Urban Forests, Trees, and Greenspace: A Political Ecology Perspective* (pp. 19-34). New York: Routledge.
- Perkins, H. (2011). Gramsci in green: Neoliberal hegemony through urban forestry and the potential for a political ecology praxis. *Geoforum*, 42, 558 - 566. doi: 10.1016/j.geoforum.2011.05.001

- Perry, T. (1989). Tree roots: Facts and fallacies. *Arnoldia*. 49(4), 3-29. Retrieved from <http://arnoldia.arboretum.harvard.edu/pdf/articles/1989-49-4-tree-roots-facts-and-fallacies.pdf>
- Porter, K. (2015). Urban tree protection plan in the works for the City of Ottawa: Long term plan to help trees flourish will replace mix of policies, programs. *CBC News: Ottawa*, Published Sept. 21, 2015, Retrieved from <http://www.cbc.ca/news/canada/ottawa/ottawa-urban-tree-protection-plan-1.3236226>
- Profous, G.V. (1992). Trees and urban forestry in Beijing, China. *Journal of Arboriculture*. 18(3), 145-153.
- Raco, M. (2005). Sustainable development, rolled-out neoliberalism and sustainable communities. *Antipode*. Department of Geography, University of Reading, London, UK.
- Randrup, T., Konijnendijk, C., Dobbertin, M., & Pruller, R. (2005). Concepts of Urban Forestry in Europe. In Konijnendijk, C., Nilsson, K., Randrup, T., & Schipperijn, J., (eds.) *Urban Forests and Trees*. The Netherlands: Springer-Verlag Berlin Heidelberg.
- Redclift, M.R. (1987). *Sustainable development: Exploring the contradictions*. London: Routledge.
- Redman, C.L. (2011) Social-ecological transformation in urban landscapes: A historical perspective. In Niemela, J., Breuste, J.H., Elmqvist, T., Guntenspergen, G., James, P., & McIntyre, N.E. (eds.), *Urban Ecology: patterns, processes, and application* (pp: 206 - 212). Oxford: Oxford University Press.
- Reed, Clarence. (1958). *The improved nut trees of North America and how to grow them*. New York: The Devin-Adair Company.
- Relph, E. (1987). *The modern urban landscape*. Baltimore: John Hopkins University Press.
- Riley, M.A. (1997). *Species profile of the bur oak*. Department of Agroforestry, Kemptville. College at the University of Guelph.
- Robbins, J. (2015). *The man who planted trees: A story of lost groves, the science of trees and a plan to save the planet*. New York: Spiegel & Grau.
- Robbins, P. (2012). *Political ecology: A critical introduction* (2nd edition). Oxford: John, Wiley & Sons Ltd, Blackwell Publishing.

- Sadler, G.R., Lee, H.C., Lim, R.S., & Fullerton, J. (2010). Recruitment of hard-to-reach population subgroups via adaptations of the snowball sampling strategy. *Nursing & Health Science*, 12, 369-374. doi: 10.1111/j.1442-2018.2010.00541
- Sandberg, L.A., Bardekjian, A., & Butt, Sadia. (2015). Introduction. Sandberg, L. A., Bardekjian, A., & Butt, S. (eds). *Urban Forests, Trees, and Greenspace: A Political Ecology Perspective* (pp. 1-15). New York: Routledge.
- Sarukhán, J., & Whyte, A., (eds.). (2005). *Ecosystems and human well-being: Synthesis (Millennium Ecosystem Assessment)*. Washington D.C: Island Press, World Resources Institute.
- Short, J.R. (2014). *Urban theory: A critical assessment*. Palgrave, London, UK.
- Sinclair, B. (2015, Nov. 16). City of Ottawa infill zoning by-law and mature neighbourhoods. *Ottawa Business Journal*. Retrieved from <http://www.obj.ca/Blog-Article/b/26994/City-of-Ottawa-Infill-Zoning-Bylaw-and-Mature-Neighbourhoods>
- Smith, N. (1984). *Uneven development: Nature, capital and the production of space*. Oxford: Blackwell Publishing.
- Soleri, P. (1969). *Arcology: The city in the image of man*. Cambridge, MA.: M.I.T. Press.
- Spencer, S. (2011). *Visual research methods in the social sciences: Awakening bisions*. New York: Routledge.
- Statistics Canada. (2011). Census tract profile for 0045.00(CT), Ottawa - Gatineau (CMA) and Ontario. Retrieved from <http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/92-597/P3.cfm Lang=E&CTCODE=08>
- Steele, F. (1981). *The sense of place*. Boston: CBI.
- Stothers, Robert (1930) *A biographical memorial to Robert Henry Cowley 1859-1927*. Toronto:Thomas Neslon & Sons Ltd.
- Stratford, E. (2008). Islandness and struggles over development: A Tasmanian case study. *Political Ecology*, 27(2), 160-175. doi: 10.1016/j.polgeo.2007.07.007
- Swope, C. (2015). What's a 'biophilic city?' Let Timothy Beatley explain. *Cityscope*. Retrieved from www.cityscope.org/story/2015/whats-a-biophilic-city-let-timothy-beatley-explain/
- Swyngedouw, E. (1996). The city as a hybrid: on nature, society and cyborg urbanization. *Capitalism Nature Socialism*, 7, 65-80. doi: 10.1080/10455759609358679

- Swyngedouw, E. (1999). Modernity and hybridity: nature, Regeneracionismo, and the production of the Spanish waterscape, 1890-1930. *Annals of the Association of American Geographers*, 89(3), 443-465. Retrieved from <https://www.jstor.org/stable/2564492>
- Swyngedouw, E. & Heynen, N. (2003). Urban political ecology, justice and the politics of ccale. *Antipode*, 35(5), 899-918. doi: 10.1111/j.1467-8330.2003.00364
- Swyngedouw, E. (2006). Metabolic urbanization: The making of cyborg cities. In Heynen, N., Kaika, M., & Swyngedouw, E. (eds.), *In the Nature of Cities: Urban political ecology and the politics of urban metabolism* (pp. 21-40). New York: Routledge.
- Taylor, N. (1998). *Urban Planning Theory since 1945*. London: Sage Publishing.
- TEEB. (2010). *The economics of ecosystems and biodiversity: Mainstreaming the economics of nature: A synthesis of the approach, conclusions and recommendations of TEEB*. New York: UN Environment Programme.
- Thomas, K. & Geller, L. (2013). *Urban forestry: Toward an ecosystem services research agenda: A workshop summary*. Washington D.C.: The National Academies Press.
- Turner, R.K. (ed.). (1993). *Sustainable environmental economics and management: Principles and practice*. London: Belhaven Press.
- Tyrvaainen, L. (2001). Economic valuation of urban forest benefits in Finland. *Journal of Environmental Management*, 62, 75-92.
- UNDP. (1996). *Human Development Report*. New York/Oxford: Oxford University Press.
- Van den Berg, A.E. (2007). Preference for nature in urbanized societies: Stress, restoration, and the pursuit of sustainability. *Journal of Social Issues*, 63(1), 79-96. doi: 10.1111/j.1540-4560.2007.00497
- Van Dijk, T.A. (2003). Critical discourse analysis. In Schiffrin, D., Tannen, D. & Hamilton, H.E. (eds). *The Handbook of Discourse Analysis* (pp. 352-371). New York: Wiley-Blackwell.
- Van Zeijl-Rozema, A., Corvers, R., Kemp, R., & Martens, P. (2008). Governance for sustainable development: A framework. *Sustainable Development*, 16, 410-421. doi: 10.1002/sd.367
- Wachsmuth, D. (2012). Three ecologies: Urban metabolism and the society-nature opposition. *The Sociological Quarterly*, 53, 506-523. doi: 10.1111/j.1533-8525.2012.01247

- Waitt, G. (2010) Doing foucauldian discourse analysis - Revealing social realities. In Hay, I, ed., *Qualitative Research Methods in Human Geography*, 3rd ed. (pp. 217-240). Oxford: Oxford University Press.
- Wall, E. & Waterman, T. (2010). *Basic landscape architecture 01: Urban design*. Switzerland: AVA Academic Publishing.
- Whisnant, C.J. (2012). *Foucault and discourse: A handout for HIS 389*.
- Wilson, E.O. & Kellert, S.R. (eds.). (1993). *The biophilic hypothesis*. Washington D.C: Island Press/Shearwater Books.
- Wolf, K.L. (2003). Introduction to urban and community forestry programs in the United States. *Landscape Planning and Horticulture*, 4(3),19-28. Retrieved from http://www.naturewithin.info/UF/ALPHA_2003.pdf
- Wu, J. (2008). Toward a landscape ecology of cities: beyond buildings, trees, and the urban forest. In, Carreiro, M.M.; Song, Y.C.; Wu, J. (eds), *Ecology, planning and management of urban forests* (pp. 10 - 28). New York: Springer.
- Yin, R.K. (2003). Case study research: design and methods. *Applied Social Research Methods Series*, 5. London: Sage.
- Yocom, & Rottle. (2011). *Basic landscape architecture 02: Ecological design*. AVA Academic Publishing, London, U.K. pp. 20-112.
- Zari, M.P. (2015). Ecosystem services analysis: Mimicking ecosystem services for regenerative urban design. *International Journal of Sustainable Built Environment*, 4, 145-157. doi: 10.1016/j.ijbsbe.2015.02.004
- Zimmer, A. (2010). Urban political ecology: Theoretical concepts, challenges, and suggested future directions. *Erdkunde*, 64(4), 343-354. Retrieved from <http://www.jstor.org/stable/25822107>
- Zhang, C., Xie, J., Xie, J., Wu, M., Huang, Y., & Huang, X. (2013). Detecting the core network of microblog using snowball sampling. *International symposium on wireless multimedia communications (WPMC)*, 16, 1-5.
- Zube, E.H. (1971). Trees and woodlands in the design of the urban environment. In *Trees and forests in an urbanizing environment*. 17. University of Massachusetts.

Appendix A: Growing region and distribution of the bur oak in North America as of 1971

Figure A. Growing region and distribution of the bur oak (*Quercus macrocarpa*) in North America as of 1971 (Gucker, 2011).

Appendix B: Table of interview participants

Table B. Interview Participants

Participant	Interview #	Date	Actor Category
Jason Pollard	1	December 12, 2014	City of Ottawa (Forestry Services)
C1	2	January 12, 2015	City of Ottawa (Planning forester)
Velta Tomsons	3	January 21, 2015	NGO (Tree Ottawa)
Martha Copestack	4	January 21, 2015	City of Ottawa (Planning forester)
Daniel Buckles	5	February 2, 2015	Resident, NGO (Champlain Oaks Project)
Peter Giles	6	February 4, 2015	City of Ottawa (Planning)
C2	7	February 10, 2015	City of Ottawa (Planning)
Heather Pearl	8	May 22, 2015	Resident, Community Association
Dianne Emmerson	9	June 30, 2015	City of Ottawa (Planning)
Left Leiper	10	August 21, 2015	City of Ottawa (Ward Councillor)
Zachary Dayler	11	August 28, 2015	Special Interest Group (BIA)

Appendix C: Initial contact email: research information letter

Title of research project: Producing Ottawa's Urban Forest: An examination of power, actors, and processes (working title)

Date of ethics clearance: November 7, 2014

Ethics clearance for data collection expires: May 31, 2016

Dear (potential research participant name),

My name is Alexander Copp and I am a Masters student at Carleton University in the Department of Geography and Environmental Studies. I am doing a research project on the social drivers that shape and transform Ottawa's urban forest and green spaces. This research project is under the supervision of Jill Wigle, Associate Professor in the Department of Geography and Environmental Studies.

As a part of my research, I am hoping to speak with individuals who have been involved in the planning, management, and/or decision making of Ottawa's green spaces and specifically urban trees. I am specifically interested in discussing how trees are planned for and managed on both public and private property, role of the city, the National Capital Commission, and private land owners on urban trees, and any other insightful information regarding the planting, pruning, and removal of trees in the City of Ottawa.

With your permission, I would like to interview you. The interview would last approximately sixty to ninety minutes. The interview session would be recorded on a digital recorder and I would take hand-written notes. All audio files and notes will be kept in a secure, locked location and will only be directly viewed by myself, or my supervisor Jill Wigle. As this project will ask you about your employment, there are some potential professional risks to you if your statements are critical of your employer. While this risk is expected to be minimal, I will take precautions to protect your identity. You will have the option to remain anonymous and have your responses non-attributed. This will be done by keeping all responses anonymous and allowing you to request that certain responses not be included in the final project.

Upon completion of this research, and with your consent the data will be archived for future research related to Ottawa's urban forest. If you choose to withdraw your interview from the study, you may do so until November 30, 2015. If you choose, you may withdrawal from the interview while it is in progress. Should you decide to withdraw from the study, the information you provided will be destroyed by no later than November 30, 2015.

Research findings within the interview will be published in the form of a Masters thesis and may be included in presentations that arise from the research. Research participates may, and are encouraged to request a copy of the research findings. The final results and information may be used in articles and conference presentations. Any participants that choose to be anonymous and results non-attributed will remain so for any and all use of the research.

This research has received ethics clearance by the Carleton University Research Ethics Board on (Date). Participants who have questions or concerns about their involvement in this study can contact the Research Ethics Board Chair, Professor Andy Adler at (613) 520-2517 or by e-mail at ethics@carleton.ca.

I would greatly appreciate your participation in this research project as it would be of great assistance to my research project. Please contact me at (613) 407-3915 or by email at alex.copp@carleton.ca to discuss the project further.

Thank you.

Sincerely,

Alexander Copp, Student Researcher
Masters in Geography Candidate
Loeb Building
1125 Colonel By drive
Ottawa, Ontario K1S 5B6
alex.copp@carleton.ca
(613) 407-3915

Jill Wigle, Research Supervisor
Associate Professor, Geography
Loeb Building
1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
jill_wigle@carleton.ca
(613) 520-2600 x 8552

Appendix D: Newspaper summary table

Table D. List of the key findings from media sources on infill development and the perspective of the developer.

Source	Date	Article Title	Summary of article and key phrases
Ottawa Citizen	April 4, 2014	<i>Missing sliver of evidence topples bid to enforce City's tree bylaw</i>	- Illustrates what is believed to be a first time case against a private citizen under Ottawa's urban tree conservation by-law - Because of a technicality, nothing happened, the bylaw was not enforced - Even though it was clear that this case was about a tree in an Ottawa Neighbourhood, by not mentioning the municipality, there was no evidence the tree was in Ottawa.
Ottawa Business Journal	March 23, 2015	<i>City of Ottawa Infill Zoning By-Law and Mature Neighbourhoods</i>	- Revision of infill by-law addressing concerns on the effects of infill development in mature neighbourhoods - Designed to help protect streetscapes in mature neighbourhoods .
Ottawa Citizen	May 27, 2015	<i>Infill Rules</i>	- "New houses dwarfing the one next door" - "Blank walls running the entire property line" - Infill 2 to help protect mature neighbourhoods in the core of Ottawa - Developers complain of infill 2 bylaws being limiting
Ottawa Community News	June 01, 2015	<i>Community associations 'disappointed' by infill law</i>	- "A parade of residents and community members packed the planning committee... to take issue with the proposed infill 2 by-law" - Discussion of the need for setback regulations
CBC News	September 21, 2015	<i>Urban tree protection plan in the works for the City of Ottawa: Long-term plan to help trees flourish will replace mix of policies, programs</i>	- Trees are under stress by development in Ottawa - "It is hard to save trees during infill projects and development" - Public consultation will help offer guidance to landowners, both residential and commercial, on how to protect trees on their properties.
Ottawa Citizen	October 26, 2015	<i>Infill development making sawdust out of Ottawa tree by-law</i>	- " It doesn't take a genius to realize that an excavation for a so-called monster home will result in major root damage to any large tree near the periphery" - "Ottawa City Hall doesn't seem to get it" - "How do the current by-laws actually protect the trees" - Developers are playing "Russian Roulette" with the trees.

Canada's Capital University

Appendix E: Consent form

Consent Form

Title: Producing Ottawa's Urban Forest: An examination of power, actors, and processes (working title)

Date of ethics clearance: November 7, 2014

Ethics Clearance for the Collection of Data Expires: May 31, 2016

I _____, choose to participate in a study on Ottawa's urban forest. This study aims to critically examine the question of how Ottawa's past, present, and future urban forest has been and is socially produced. **The researcher for this study is Alexander Copp in the Department of Geography and Environmental Studies at Carleton University**

He is working under the supervision of Professor Jill Wigle in the Department of Geography and Environmental Studies.

This study involves one 60-90 minute interview. With your consent, interviews will be audio-recorded. Once the recording has been transcribed, you have the option of having the audio-recording destroyed, otherwise the recordings will be archived for future urban forest and social-nature research.

As this project will ask you about your employment, there are some potential professional risks to you if your statements are critical of your employer. While this risk is expected to be minimal, I will take precautions to protect your identity. You will have the option to remain anonymous and have your responses non-attributed. This will be done by keeping all responses anonymous and allowing you to request that certain responses not be included in the final project.

You have the right to end your participation in the study at any time, for any reason, up until May 31, 2015. You can withdraw by phoning or emailing the researcher or the research supervisor. If you withdraw from the study, all information you have provided will be immediately destroyed.

All research data, including audio-recordings and any notes will be encrypted and password-protected. Any hard copies of data (including any handwritten notes or USB keys) will be kept in a locked cabinet at Carleton University. Research data will only be accessible by the researcher and the research supervisor.

Once the project is completed, all research data will be kept for five years and potentially used for other research projects on this same topic. At the end of five years, all research data will be

securely destroyed. (Electronic data will be erased and hard copies will be shredded.)

If you would like a copy of the finished research project, you are invited to contact the researcher to request an electronic copy which will be provided to you.

This project was reviewed by the Carleton University Research Ethics Board, which provided clearance to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact:

REB contact information:

Professor Andy Adler, Chair
 Professor Louise Heslop, Vice-Chair
 Research Ethics Board
 Carleton University
 1325 Dunton Tower
 1125 Colonel By Drive
 Ottawa, ON K1S 5B6
 Tel: 613-520-2517
 ethics@carleton.ca

Researcher contact information:

Alexander Copp
 Geography and Environmental Studies
 Carleton University
 Tel: (613) 407 - 3915
 Email: alex.copp@carleton.ca

Supervisor contact information:

Jill Wigle
 Geography and Environmental Studies
 Carleton University
 Tel: (613) 520 – 2600 x 8552
 Email: Jill_wigle@carleton.ca

- ☐ I consent to be audio recorded.
- ☐ I wish for any results to be attributed to my name
- ☐ I wish to remain anonymous. The researcher will assign a pseudonym.
- ☐ I wish for any results to be non-attributable.
- ☐ I wish to receive transcript and interview notes of the interview session.
- ☐ I would like the audio recordings to be destroyed after the completion of research

_____
 Signature of participant

_____
 Date

_____
 Signature of researcher

_____
 Date

Appendix F: Ottawa's urban growth boundary (the Greenbelt)

Figure F. Ottawa's urban growth boundary. The red outline represents the boundary between the centralized urban area and the Greenbelt. (Source: Google Maps, 2015).

Appendix G: Detailed historical timeline of Champlain Park

Mesozoic period

The shoreline at what is now Rémic Rapids in Ottawa and Deschênes Rapids in Gatineau is a limestone plain with very thin soil known created after the retreat of glaciers of the last Ice Age. It develops as an alvar, a rare ecosystem with diverse plant associations, including the Bur Oak (*Quercus macrocarpa*) and Prickly Ash.

1600s

Present day Deschênes Rapids (which means “some oaks” in French) was in the 1600s a Algonquin camp called “Miciming,” which means “where the oaks grow”.

1613

Samuel de Champlain notes in his journal that the Ottawa River near its confluence with the Gatineau River was “very beautiful and wide,” with banks covered with “fine open woods”.

1686

The French Captain Pierre Chevalier de Troyes took note of “the oak forest” he portaged through on the north side of the Ottawa River between Chaudière Falls and Deschênes Rapids.

1792

Nepean Township granted to George Hamilton, an Irish veteran of the Revolutionary War. Surveyed in 1794, creating Lot 33 fronting the Ottawa River where Champlain Park is now located. The township was intended for settlement by Loyalists, who never came.

1830

Anthony Swalwell’s plan of 1830 shows Lot 33 as a Clergy Reserve.

1852

William Hamilton purchases Lot 33 and builds a stone house called Maple Grove on the north side of Richmond Road. Begins to improve the land as a farm. The oldest of the bur oaks in Champlain Park today were saplings in the original forest.

1867

Captain Daniel Keyworth Cowley purchases the south part of Lot 33 and moves into the Hamilton stone house, which he renames “The Manor House”. Senator James Skead purchases the north part of Lot 33, and moves into The Elms.

1874

Senator Skead entertains Lord Dufferin with a fox hunt through his land.

1896

In anticipation of residential development along the Britannia line (established in 1900), Robert H. Cowley (son of Captain DKC) buys 81 acres from James Skead's mortgagee, and 38 acres immediately to the west from Ottawa lawyer Charles Pinhey.

1903

RH Cowley subdivides Skead and Pinhey property as a cottage area called Riverside Park (Plan #219), with streets named Daniel, Keyworth and Cowley. DKC Manor House is destroyed by fire. Formerly located roughly at intersection of Mailes Avenue (DKC's father's name) and Patricia Avenue, west of Oakdale Avenue.

1904

124 Cowley Avenue cottage built centred between two Bur Oak trees.

1912 and 1916

RH Cowley subdivide another portion of Lot 33 and Lot 34 to create Plan #331 and Plan #388, which included the east side of Carleton and Northwestern Avenue (formerly Kensington Road) and south of Sunnymede to the CPR line. Police Village of Ottawa West created in 1912, comprised mainly of land owned by RH Cowley.

1920s and 30s

Very slow development of houses in Riverside Park, due to depression and competition from Britannia.

1945

Returning veterans and very small scale developers build on Keyworth, Cowley, Carleton and Northwestern.

1948

Canada Life Assurance Company develops Aberdeen, Daniel and Patricia in Ottawa West. First larger scale subdivision model in Ottawa's history, with the financial burden for road construction and installation of services shifted from the township to the developers. Many examples of mature Bur Oaks left intentionally in place, on the street and in backyards

1950

Annexation by the City of Ottawa, and renamed "Champlain Park" to distinguish it from "Riverside Park" in the south end of Ottawa (Mooney's Bay).

2007

Bur Oaks are prominent landmarks in the community today and a defining feature of three connected neighbourhoods: Champlain Park, Island Park, and Westboro Beach. Area begins to feel the impact of the current drive for densification.

Source: Word document provided by Daniel Buckles (Interview 5, Feb. 22, 2015).

Appendix H: Zoning Provision Tables

Table H1. R1(P) Subzone Provisions (By-law 2009-164) (Subject to By-law 2015- 228) (City of Ottawa, 2015g)

<i>I Sub- Zone</i>	<i>II Minimum Lot Width (m)</i>	<i>III Minimum Lot Area (m²)</i>	<i>IV Maximum Building Height (m)</i>	<i>V Minimum Front Yard Setback (m)</i>	<i>VI Minimum Corner Side Yard Setback (m)</i>	<i>VII Minimum Rear Yard Setback (m)</i>	<i>VIII Minimum Interior Side Yard Setback (m)</i>	<i>IX Maximum Lot Coverage (And Other Provisions)</i>	<i>X End Notes (see Table 156B)</i>
P	15	440	11	3	3	7.5⁴	1.2	na	4

Table H2. R2(D) Subzone Provisions (Subject to By-law 2015- 228) (City of Ottawa, 2015h)

<i>I Sub- Zone</i>	<i>II Prohibited Uses</i>	<i>III Principal Dwelling Type</i>	<i>IV Minimum Lot Width (m)</i>	<i>V Minimum Lot Area (m)</i>	<i>VI Maximum Building Height (m)</i>	<i>VII Minimum Front Yard Setback (m)</i>	<i>VIII Minimum Corner Side Yard Setback (m)</i>	<i>IX Rear Yard Setback Minimum (m)</i>	<i>X Minimum Interior Side Yard Setback (m)</i>	<i>XI Endnotes (see Table 158B)</i>
D	None	Detached, Duplex, Linked- detached	15	450	11	3	3	7.5⁶	1.2	6
		Semi- detached	9	270	11	3	3	7.5⁶	1.2	6