LIMINAL ECOLOGIES: A LEXICON AND PRELIMINARY INVENTORY OF LIMINAL ECOLOGIES IN THE CITY OF TORONTO

by

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ABSTRACT

The existence of liminal ecologies provides an opportunity to reintegrate nature into urban spaces and urban life. Supporting biodiversity and the human nature connection in cities is necessary to mitigate the harms of Global Climate Change. A connection to nature has been linked to environmentally protective behavior and identified as a strategy to grow a more resilient future. Westernized valuation systems of conceptualizing and protecting biodiversity have isolated people from nature. This disconnection from nature disproportionately impacts equity seeking communities in cities. Considering the geographic and policy landscape of the City of Toronto, this paper will demonstrate the opportunity for liminal ecologies to increase equitable access to nature, foster the human nature connection and support urban biodiversity. A lexicon and preliminary inventory will be proposed to facilitate understanding of liminal ecologies and their potential towards reimagining the city. This work will set the foundation for further investigation of liminal ecologies as a catalyst for cultivating our collective relationship to nature in the City of Toronto.

Keywords: landscape connectivity, temporary use, liminal space, biodiversity

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1.0 Introduction

Liminal ecologies exist as a threshold for wildness in the city, and present an opportunity to activate existing spaces in the city to support biodiversity and the human nature connection. Ecological thriving in the in-between spaces has the potential to prompt resilience and facilitate equitable reimaginings of access to nature in the city (Sikorska et al., 2020; Rupprecht & Furuya, 2018). This work will ground the potential for liminal ecologies in the City of Toronto as a nature-based solution that is accessible to communities and can be practiced by communities. The recognition, identification and further study of these ecologies is necessary to understand their role in supporting the resilient flourishing of the City of Toronto.

Urbanization is at an all-time global high (Weller et al., 2017). Global Climate Change and extreme weather are changing the status quo of urban life with more unprecedented heat waves and flooding events every year (Hunt, & Watkiss, 2011; Koop, & van Leeuwen, 2017). These demands have increased the study and implementation of nature-based solutions in urban design and policy. Grounded in resilience, nature-based solutions apply ecological principles through infrastructure to solve problems (Cohen-Shacham et al., 2016). The naturalization of Toronto's Port Lands is an example of applying a nature-based solution to mitigate flooding risk (Dulmage et al., 2014). As the hazards of extreme weather grow, urban planners, policy makers and communities are evaluating the role of nature as part of the solution.

Generating support within communities for environmental issues is significant to co-creating climate resilient cities. The connection that people and communities feel to nature has been linked to environmental protective behaviour (Whitburn et al., 2020; Soga & Gaston, 2016; Giusti, & Samuelsson, 2020). Therefore, ensuring that urban residents feel connected to nature and exhibit environmentally protective behaviour is a planning issue that may be addressed through innovative nature-based solutions. This work will explore how environmentally protective behavior can be encouraged through the nature-based solutions of liminal ecologies to transform the potential for resiliency and nature in cities (Abson et al., 2016).

Nature has empirical, physiological, psychological, spiritual and environmental benefits for individuals and communities (Marselle et al., 2019). As a determinant of health and social well-being, access to nature is an equity issue that disproportionately affects racialized and marginalized communities (Van Sant et al., 2021; Chakraborty et al., 2020). Communities that do not have access to private greenspace rely on the policy and design permissions of nature access in public spaces. If nature is not present in public spaces, the health and well-being of these communities can be negatively affected. An increase in access to nature may displace marginalized communities through the process of green gentrification (Wolch et al., 2014; Jelks et al., 2021). Recognizing this dynamic is necessary when analyzing nature and access in the city.

The in-between spaces of the city already support informal ecologies. Plants push through cracks in the pavements and climb fences. Often these ecologies are looked to as being unruly, but these habitats speak to the inherent resilience of ecosystems to flourish in unfavorable conditions. If policy and communities supported liminal ecologies, instead of impeding them, what could nature in the city look like? The potentiality for biodiversity in liminal space is the basis for this investigation. The influence that informal spaces have to connect landscapes, provide habitat and promote interactions with nature are significant. Liminal ecologies are not an all encompassing solution for climate resiliency or equitable access to nature, but they represent an opportunity to reevaluate the place for nature in the city.

Temporary use offers an opportunity to reevaluate the ways we engage with the city. Temporary uses can be facilitated by mechanisms of community empowerment to create place that allows for increased experiences of nature. These ephemeral approaches to planning may encourage cultural shift, institutional changes and lead to permanent changes. The temporary is a powerful tool in community planning to motivate change (Ferreri, 2021; Oswalt et al., 2013). These processes of community empowerment can be observed in the practice of guerilla gardening as a form of reclaiming space in the city to reflect community valuation of nature. Temporary use and the activation of liminal ecologies offer a catalyst for reintegrating nature in the city and in our daily lives. Liminal ecologies have the potential

to increase resilience, biodiversity, and foster the human nature connection in the city. This work will make a case for the recognition of these ecologies in the city and contend with how they may grow our collective relationship to nature.

Biodiversity is a complex ecological phenomenon that can be measured with many indices. Defined by various ecological, social and cultural understandings, biodiversity is multidimensional in its representation of a range of relationships between and within ecosystems. Within this work, biodiversity will be used interchangeably with nature to describe the complex relationships that communities may have to the environment around them. This framework will facilitate exploration of the social resilience, as well as the climate resilience that can be fostered through urban biodiversity.

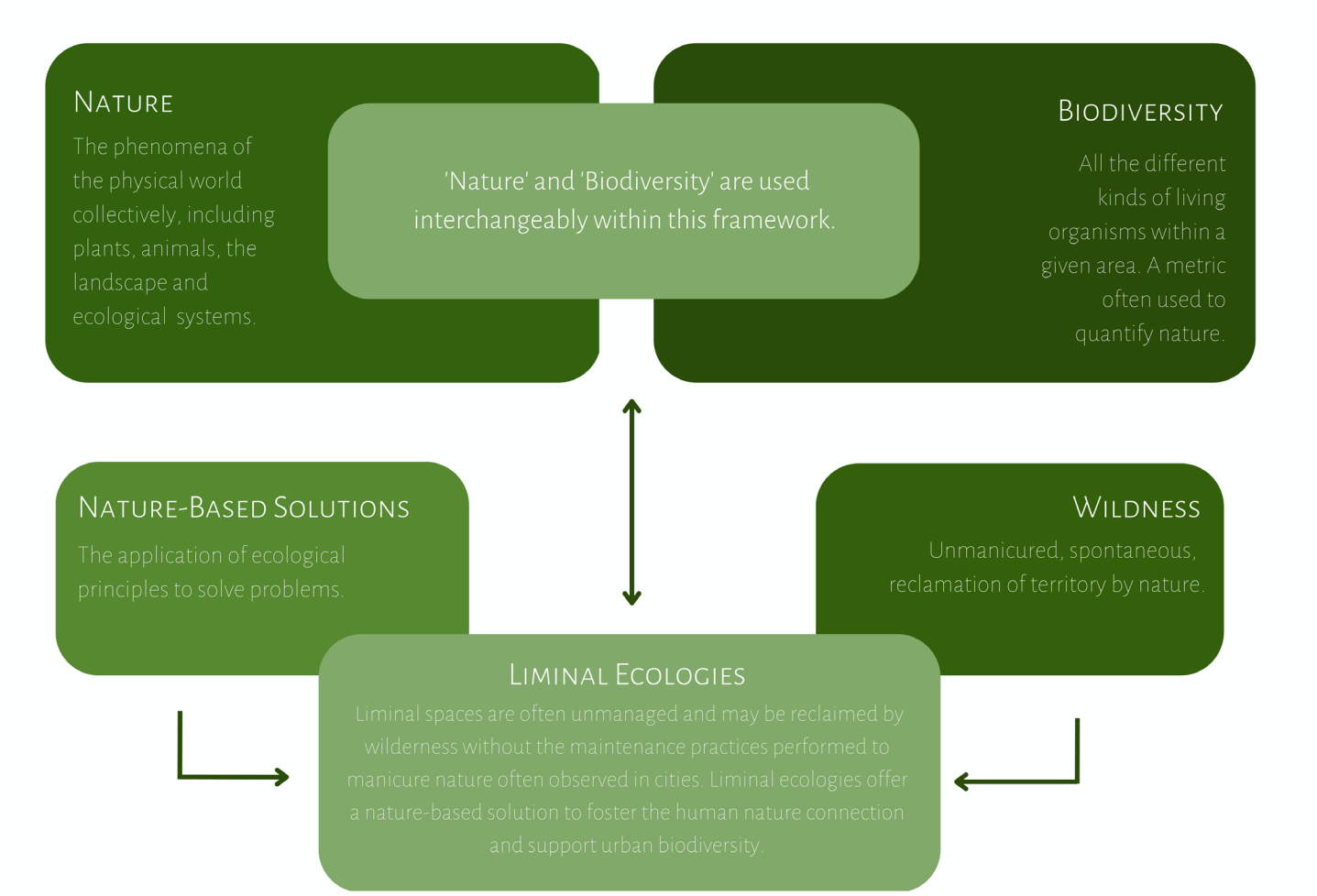

Figure 1: Diagrammatic linguistic positioning of nature, biodiversity and wildness in this work

2.0 The Human Nature Connection

It is common for people who reside in cities to feel disconnected from nature (Soga & Gaston, 2016). When the places you interact with are not conducive to the experience of nature it can be difficult to invest in advocating for environmental issues such as biodiversity loss and the mitigation of Global Climate Change (Colding et al., 2020). This disconnection is intensified by the divide that urban residents may have from the agricultural and global ecosystems that support their existences. Such environmental paralysis does not protect people from the consequences of degrading global ecosystems. Therefore, the perceived disconnection from nature does not distance urban dwellers from the realities of the climate crisis. For example, urban vegetation has significant implications on air quality and urban cooling. The quantity and diversity of tree species may influence the quality of life, and physical health of individuals in a city (Marselle et al., 2021; Lindley et al., 2019). Regardless of whether an individual is located in a dense urban center or a rural community, and despite their feelings of connection to or disconnection from nature, biodiversity has significant implications on their health and well-being.

Environmental protective behavior has been correlated to the connection that people feel to nature (Whitburn et al., 2020; Soga & Gaston, 2016; Giusti, & Samuelsson, 2020). Fostering the urban nature connection is therefore a strategy of resistance against biodiversity loss and global climate change. Reconnecting people with nature on an individual and community wide level has been proposed as an opportunity for transformational change to the environmental resilience of urban form (Abson et al., 2016).

2.1 The Colonial History of the Disconnection between Culture and Nature in North America

Connecting communities to nature requires analysis of normative relationships of nature and biodiversity within urban systems to understand the origin of this division. Western ideology dictates that domination over nature is a sign of power and wealth (Geisinger, 1999; Coates, 2013). This colonial perspective that nature is an exploitable asset, has seeped into the cultural

and institutional relationship that North American cities have to wildness. In North America, design of and engagement with nature in cities is often highly manicured, strictly controlled, and has the effect of fragmenting and isolating people from biodiversity. For example, the prevalence of manicured front lawns is an aesthetic standard upheld culturally and legislatively (Murphy, 2019).

Nature is manipulated to maintain uniformity, homogeneity, and an orderly aesthetic. This relationship implies that nature is something to be controlled and is not favourable to the flourishing of biodiversity within cities. A perceived dichotomy between culture and nature is the basis for this conservation strategy. Bridging this divide to bring nature into cities will require an analysis of the systems of valuation for biodiversity ingrained in policy and culture that determine the places for wilding.

The western dichotomy of nature and society has influenced our perception of what constitutes nature (Merchant, 1980; Geisinger, 1999; Kaplan, 1983). Wild spaces are perceived as separate from urban spaces because of the belief that the only true nature is that which is untouched. The model of "fortress conservation" grounded in the science of conservation biology has dedicated institutional powers to keep large ecosystems separate from people, and is rooted in an ideological perspective of nature as isolated from humans (Merchant, 1980; Cronon, 1995). This colonial power dynamic of 'pristine' nature disregards indigenous cultures (Braun. 2002). Colonial relationships to conservation and nature have expelled Indigenous people from their land and disrespected their self-determination (Schmidt et al., 2009). The North American National Parks systems were founded on this ideal, with Yellowstone in the US and Banff in Canada being the first such parks established with railways and industrial expansion into the west at the height of the Victorian colonial era in 1872 and 1885 respectively (Bossen, 1982; Finkelstein et al., 2007).

Figure 2: Manicured Lawn

Figure 3: Manicured Nature in the City of Toronto

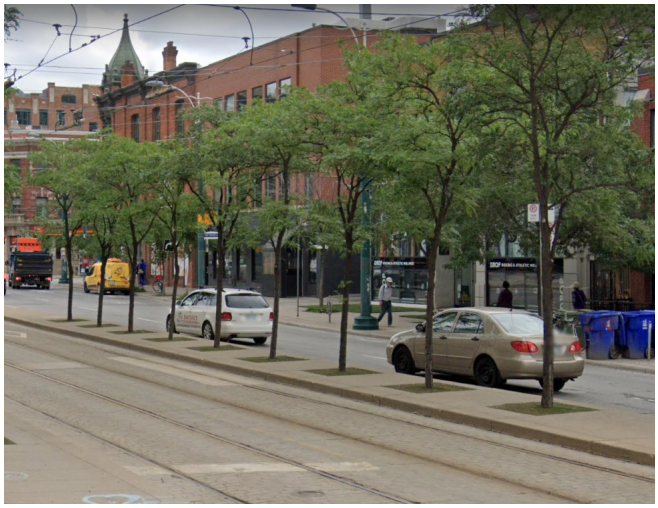

Figure 4: Manicured Nature in the City of Toronto

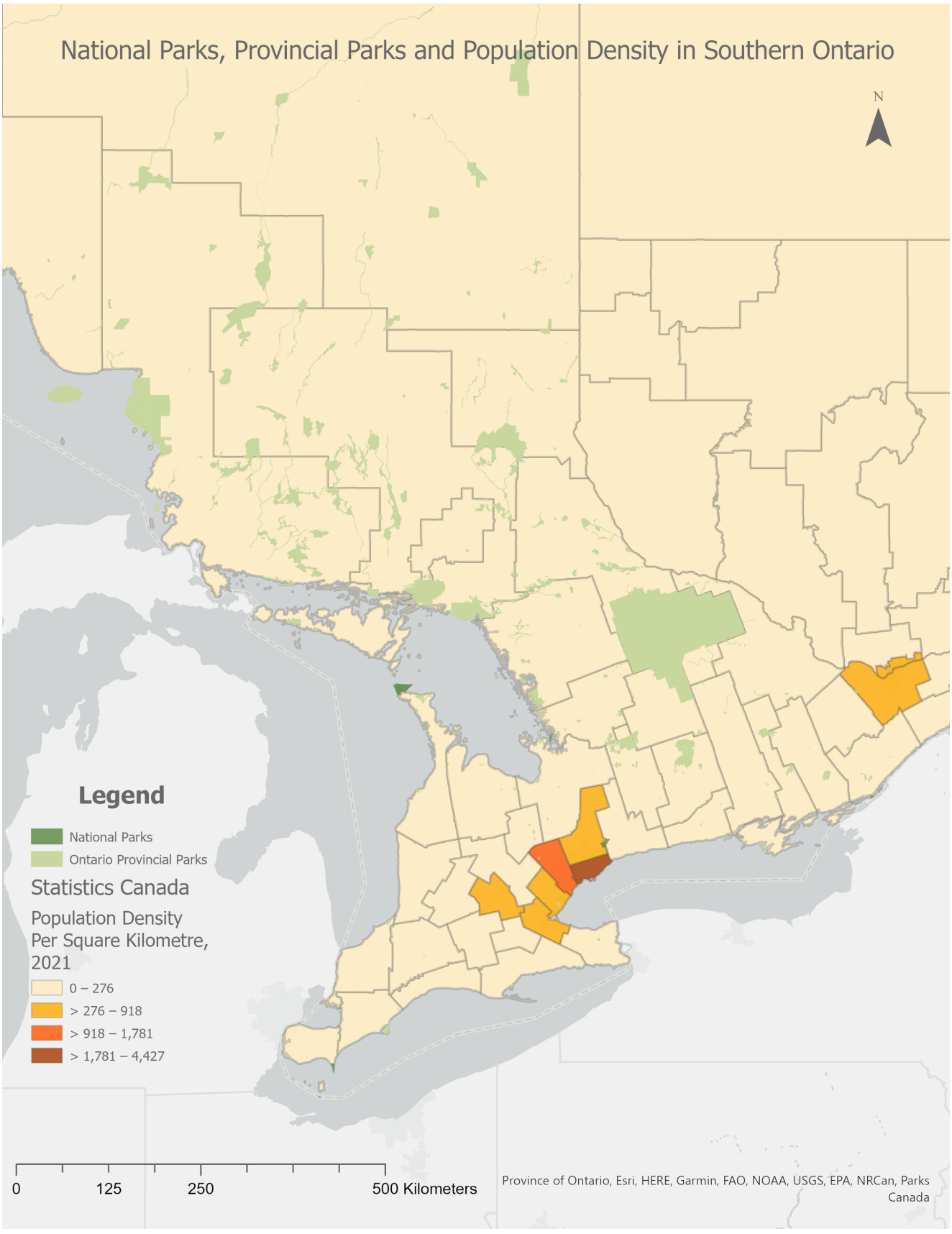

Figure 5: National Parks, Provincial Parks and 2021 Census Data on Population Density in Southern Ontario.

In Canada, National and Provincial Parks are often far from densely populated areas. Many urban dwellers do not have the means to explore the “great outdoors” that is so far from their homes. Canada’s tourism advertisements have for many years capitalized on the notion of pristine wilderness, as isolated and separate from urban culture (British Columbia, 2023). By making this experience of nature inaccessible to urban residents, the fortress conservation model further reifies and mystifies nature. Instead of recognizing that nature is an essential part of the human experience and is necessary for our health and well-being, we have institutionally segregated wild spaces. Conservation that physically and institutionally isolates nature, and perpetuates the colonial myth of humans as separate from nature is neither supportive of human engagement in its protection nor adaptive to the realities of modern life.

Urban biodiversity can look very different from National Parks due to the restricted scale, the surrounding land uses, and unfavourable conditions (Del Tredici, 2014). However, in order for the environmental, social, physiological, spiritual and intrinsic benefits of nature to be experienced by communities, nature needs to coexist in built form as well as in wilderness. An example of the application of this duality of landscape to be both wild and integrated into the fabric of cities is Rouge National Park. Located in the Greater Toronto Area, Rouge National Park is the largest urban park in North America (Livingston et al., 2018). This new conservation strategy in a peri-urban area was motivated by a revaluation of connecting nature to cities and the people who reside in them (Parks Canada, 2022).

Figure 6: Rouge National Park (Parks Canada, 2022)

2.2 Landscape Connectivity

Connecting large natural areas is necessary to facilitate the movement of species to and from habitats (Correa Ayram et al., 2016). Isolated populations are vulnerable to degradation of genetic diversity, environmental hazards and exclusion from critical habitats (Noss, 1991). To avoid the harms of isolated populations, landscape connectivity must be fostered to facilitate safe movement of species. From the largest migrations to the smallest habitat niches, landscape connectivity is integral to ecological thriving. Urbanization and extreme weather events have increased the fragmentation of habitats and the isolation of ecological communities. As climate change progresses, the ranges and migrations patterns of species may adapt to fit the new climatic conditions (Mawdsley et al., 2009). The unpredictable nature of these changes means that protection of existing landscape connectivity infrastructure and the promotion of further landscape connectivity strategies should be prioritized as a means of protecting biodiversity (Lister, Brocki, Ament, 2015; Mawdsley et al., 2009).

The application of landscape connectivity theory to the practice of urban planning is found in prioritized land use controls identified in the Ontario Planning Act. Under section 34, local municipalities are empowered to protect natural features and areas. Land use designation can be determined by local councils that may:

"prohibit any use of land and the erecting, locating or using of any class or classes of buildings or structures within any defined area or areas,
i. that is a significant wildlife habitat, wetland, woodland, ravine, valley or area of natural and scientific interest,
ii. that is a significant corridor or shoreline of a lake, river or stream, or
iii. that is a significant natural corridor, feature or area."
Planning Act, R.S.O, 1990, 34 (3.2)

Natural Heritage planning requires the study, identification and protection of significant natural environments and features. A key element of Natural Heritage Planning is connecting these designated areas. The Ontario Provincial Policy Statement prioritizes connectivity and stating that:

"The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features (Ministry of Municipal Affairs and Housing, 2020)."

Some municipalities have a more comprehensive approach to landscape connectivity and biodiversity conservation in their natural heritage planning. For example, the City of Edmonton has captured the ethos of landscape connectivity with a transformative approach to valuing ecology in the city. The Edmonton Breathe Network was developed with the themes of ecology, celebration and wellness that prioritizes the functionality and accessibility of greenspace in Edmonton (City of Edmonton, 2017). This plan considers how spaces of ecosystems, celebration and urban infrastructures are interconnected systems in the city that in collaboration can facilitate equitable access to nature and ecosystem resilience.

The Formalized Landscape Connectivity Network in Toronto is composed of City Parks, Natural Heritage and Environmentally Significant Areas. This connectivity network is formalized in Toronto municipal policies. The priorities of protecting the Natural Heritage System and landscape connectivity are represented in legislation. Toronto's Formalized Landscape Connectivity Network systems recognizes the importance of connecting landscapes and permitting recreational uses within some of these natural areas.

Nature in the City of Toronto is not confined to the Natural Heritage System. Private naturalized

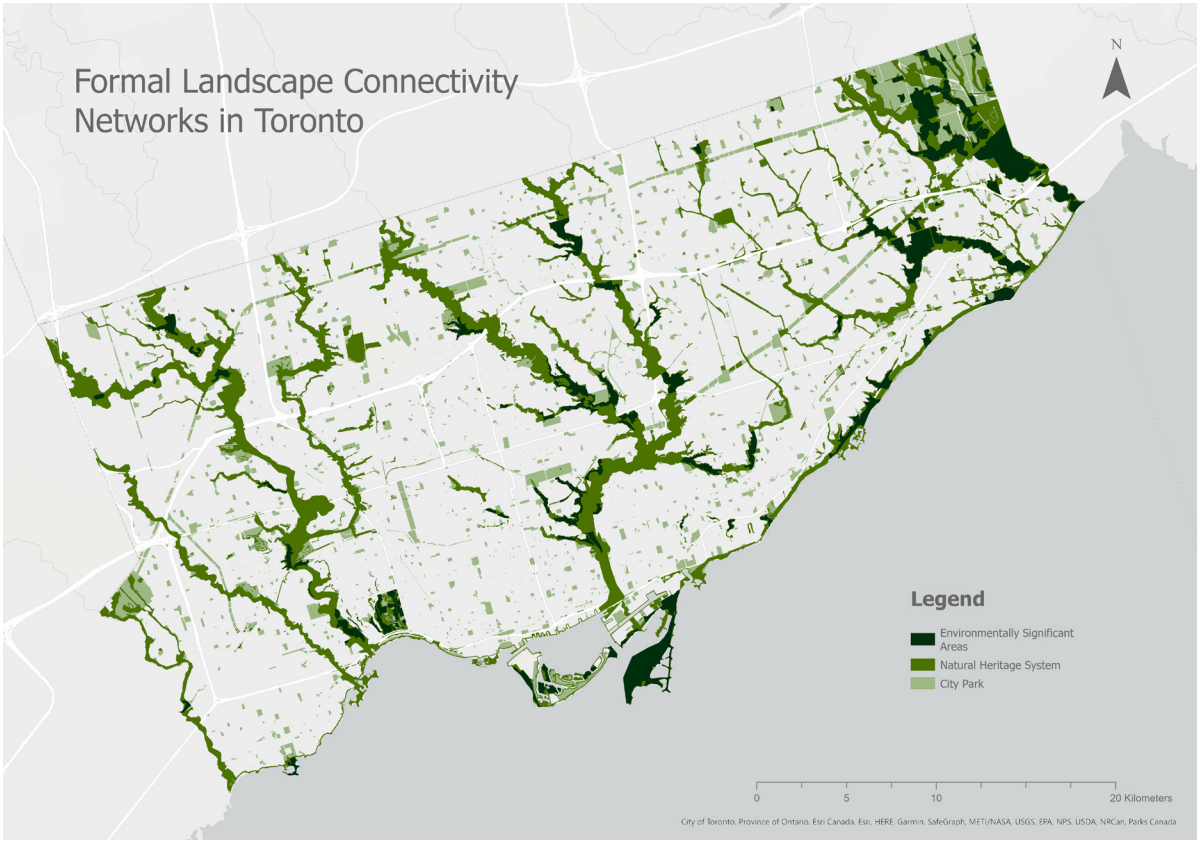

Figure 7: Formal Landscape Connectivity Networks in Toronto

gardens, trees, green roofs and the ecologies in unclaimed spaces support landscape connectivity in the city. These greenspaces can be formalized in legislation that supports their thriving. An example of the City of Toronto Green Roof Bylaw adopted in 2009, or the Private Tree Protection By-law (City of Toronto, 2009 ; City of Toronto, 2013). These policies help to protect biodiversity on private property and help to further extend landscape connectivity beyond the boundaries of the Natural Heritage System.

There are still gaps in policies that support landscape connectivity. Research has shown that private yards have the potential to provide a significant increase in tree cover to reduce the fragmentation of canopy cover in the urban landscape (Ossola et al., 2019). These habitats in urban areas can influence the success of pollinator populations (Gren et al., 2018; Silva et al., 2021). Spontaneous, unmanicured vegetation was found to account for 9.5% of the surface area of Somerville, Massachusetts which exceeds the city's parkland (Del Tredici, 2014). No similar assessment has been conducted in the city of Toronto to understand the ecologies found in the liminal spaces of the city.

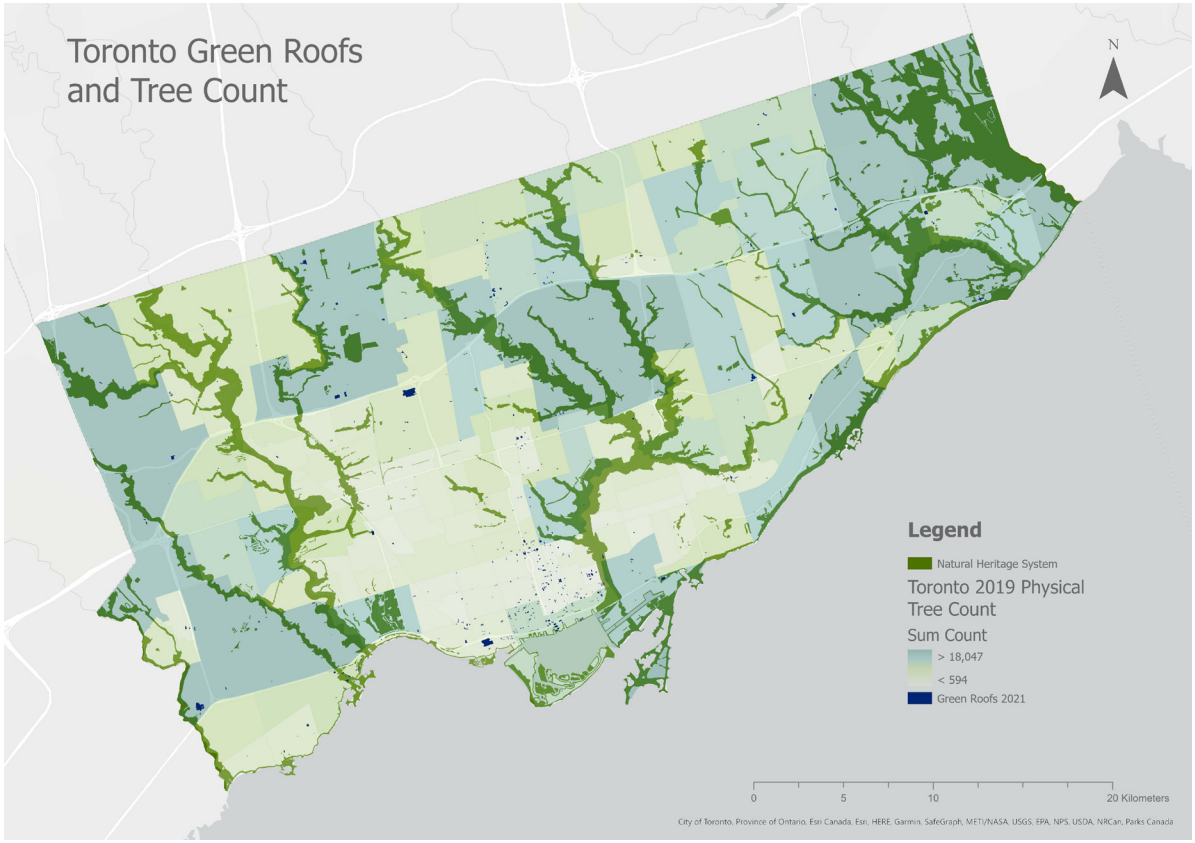

Figure 8: Toronto Green Roof and Tree Count Map in relation to the Natural Heritage System

3.0 *Terrain Vague*

Terrain Vague was first used to describe the in-between spaces of landscapes by architect Ignasi de Solà-Morales (2013). This term combined the latin and french semantics to create a frame of reference for the design of what Morales deemed vacant and non-productive spaces (de Solà-Morales, 2013). Early literature on terrain vague aimed to identify and optimize so-called wastelands by first naming them and beginning a field of study dedicated to investigating their potential as valid landscapes. Since the term was coined, literature on terrain vague has grown increasingly robust, supporting a field of study which analyzes the diversity and range of marginal spaces and ways in which communities may interact with these spaces (Mariani & Barron, 2014).

Terrain Vague is understood as the leftover or unplanned places in the urban fabric. For example, the exodus of industry from North America left many abandoned factory sites behind. These sites, which were once industrial hot spots, are seen as places-in-waiting as they now have the potential for future reinvention. This transformational quality situates terrain vague as not only a condition but also a process (Mariani & Barron, 2014). This process sets the stage for informality. *Terrain vague* often falls outside a clear jurisdiction of public or private which limits the supervision and manicuring of these landscapes. As sites in a transitory state between past and future uses, these landscapes offer the potential for nuance and ephemeral reclamation. This reclamation of *terrain vague* can be performed by individuals, communities or nature. Continued study of *terrain vague* has found that it is rare for spaces to truly be abandoned. These landscapes are often spaces of resistance, shelter and community for marginalized communities (Gandy, 2021; Kim, 2019). Engaging with the design or change of terrain vague requires recognition that these in-between spaces may already be important community infrastructure for equity seeking groups and to 'restore' them would serve to further marginalize communities (Foster, 2010).

Building on the transitory nature of *terrain vague*, the concept of liminal space is used to conceptualize change and occupation. Derived from the latin *limen* which means threshold, Liminal is defined as, "between or belonging to two different places,

states, etc" (Cambridge Dictionary, n.d). Liminal spaces fall outside the scope of manicured nature and may be reclaimed by wilderness without the maintenance practices performed to manicure nature often observed in cities. This process of wilding within urban landscapes speaks to the resiliency inherent to ecosystems.

A well-studied precedent for liminal ecology is an abandoned railyard in Berlin, Natur-Park which was reclaimed by wilderness (Kowarik & Langer, 2005). Positioned near the urban core but largely inaccessible to the public, this landscape went largely forgotten. Within a decade the woodland density increased from 37% to 70% (Kowarik & Langer, 2005). It was determined that this area would be protected and managed to facilitate both conservation and recreation. In this regard, the park space was not highly manicured and meant for entirely recreation as typical park spaces are. Instead, the design of this park space used variable management techniques to allow for continued wildness in Natur-Park.

The liminal quality of Natur-Park facilitated wilding and altered the standard that wilderness could exist in Berlin. Unplanned and transitional habitats are therefore liminal ecologies that may influence social and cultural understandings of nature and its place in the city. In this regard, liminal ecologies are uniquely positioned to motivate future reinvention of ecological coexistence in urban space. The threshold for change of these in between spaces could very well be a past where we do not value nature and a future where we recognize its value and make room for it in our cities. Canadian examples of liminal ecologies can be found in Toronto's Don River Valley between the revitalizing Portlands and Evergreen Brickworks, and in Montreal's Champs Des Possibilities (Lister, 2010; McSwiney & Michaud, 2014).

Figure 9: Natur Park (Welt, 2020).

Figure 10: Evergreen Brick Works, Toronto

4.0 Valuing Biodiversity

4.1 Environmental Value

Established by the United Nations Convention on Biological Diversity in 1992, an accepted international-policy definition of biodiversity is as follows:

"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems (Díaz & Malhi, 2022; CBD)."

Biodiversity is fundamental to the maintenance of healthy ecosystems. As ecological monitoring is highly complex, biodiversity is often implemented as a metric to understanding the health and state of ecological systems (Duffy et al., 2009). A loss of biodiversity may increase the risks of disease, functional change or extinction of vulnerable species (Díaz & Malhi, 2022). Global climate change and anthropogenic habitat infringement have led to a decrease in global biodiversity that threatens global processes and cycles like carbon sequestration and pollination (Díaz & Malhi, 2022; Di Sacco et al., 2021). There is an interdependence between biodiversity and climate change mitigation. This relationship means that increased biodiversity resilience may decrease the risk of extreme weather events and their threat to communities. This means that vector borne disease, extreme heat, wildfires and flooding risk may increase as biodiversity decreases (Lindley et al., 2019). Many researchers also define biodiversity at multiple scales to include human cultural and linguistic diversity, as well as genetic information (Lister, 1998).

4.2 Public Health Value

Human health is inherently linked to natural environments. Contamination of the air we breathe and the water we drink have bearings on our long-term health outcomes. As biodiversity has bearings on the efficacy of ecosystem function and the provision of ecosystem services, it is a determinant of public health (Cook et al., 2019). Studies have shown that nature in urban environments may influence air quality, promote physical activity, increase social cohesion and reduce stress (Hartig et al., 2014). Research has identified the diversity of species influences the degree to which these physiological benefits are derived (Hartig et al., 2014; Cook et al., 2019).

Preventative health care is a significant practice in modern medicine. This approach to mitigate future health risks is beginning to consider the role that nature and biodiversity may have to improve public health. These public health strategies to encourage access to greenspaces are recognized by Toronto Public Health (Kingsley & EcoHealth Ontario, 2019). Fundamental to the application of these findings in urban design is ensuring equity in access to greenspace and its relation to health outcomes.

4.3 Mental Health and Spiritual Value

In addition to the role that nature may have in providing physical ecosystem services like carbon sequestration and stormwater management. Work by Bratman et al., has suggested that a less recognized ecosystem service of natural areas is the support of psychological well-being.

Proximity and quality of green space has been shown to support the psychological well-being and happiness of individuals at various stages of their lives (Kabisch, 2019; Bratman et al., 2019). Research conducted during the COVID 19 pandemic observed that access to urban nature was a coping mechanism and form of resilient infrastructure in a time of crisis (Venter et al., 2020).

Spiritual well-being has become increasingly considered as a facet of human health. Literature connecting the relationship between recreation-based wilderness and spirituality is well documented. Even the practice of star-gazing may have implications on our feelings of wholeness, connectedness to the world and spirituality (Irvine et al., 2019). As practices of recreational wilderness and stargazing are often inaccessible to urban residents, spiritual well-being in relation to biodiversity in the city needs to be further explored.

4.4 Intrinsic Value

Respect for the rights of nature to flourish and thrive have deep ties to Indigenous ways of knowing and being. The Indigenous concept of All Our Relations holds the natural environment, and species to the highest esteem as equals and family (LaDuke, 1999). The complex social ecologies of Indigenous peoples have informed strategies of stewardship and environmental philosophy (Barnett, 2021). The Deep Ecology movement of the 1970s advocated for a shift in our perception of nature as having value independent of utility (Naess, 2009; Sagoff, 1974).

Independent of the many benefits that biodiversity provides to the environment and communities that experience it, nature has a right to thrive and flourish (Bilof, 2018). This right has been recognized not only in theory but in judicial practice, as the legal personhood of ecosystems has been granted to protect against anthropogenic infringement (Bilof, 2018). Regardless of the services and benefits they provide, nature and wild spaces have the right to exist without their indirect or direct consumption. Though the direct benefits of biodiversity are powerful tools to argue for the conservation of natural spaces, it should be acknowledged that ecosystems have intrinsic value that far supersedes their worth to communities (Sagoff, 1974). The experience of biodiversity opens our minds to the potential of alternatives (Shiva, 1993).

> *"Uniformity and diversity are not just patterns of land use, they are ways of thinking and ways of living… Monocultures are not just reducing the rich biological diversity. They are reducing the way diverse societies organize themselves politically, diverse ways in which they produce and consume goods and services, and the diverse ways in which they seek knowledge and innovate." (Shiva, 1993, pg. 238)*

There are many ways to value biodiversity, a subsection of which have been summarized above. A multidimensional framework to acknowledge these relationships is required to promote cultural and political prioritization of biodiversity in city building. The time of only recognizing the environmental benefits of nature is past. The extensive research on how well-being can be supported when biodiversity is brought into our daily lives needs to be represented in policy and urban planning. To recognize this growing body of literature, the City of Toronto's current relationship to biodiversity must be analyzed by assessing the valuation of biodiversity in municipal policy. These valuations will represent the scope and intention of the prioritization of biodiversity in the city and the integration of nature into the lives of Toronto residents.

5.0 Methodology

This paper is an integrated synthetic literature review (per Sikorska et al., 2020; Rupprecht & Furuya, 2018; Ferreri, 2021; Abson et al., 2016; Colding et al., 2020; Whitburn et al., 2020; Soga & Gaston, 2016; Foster, 2010; Shiva, 1993; Lister, 1999) that combines secondary research analysis in terrain vague, urban biodiversity and temporary use. This research has included a qualitative meta-analysis of municipal policy in Toronto pertaining to biodiversity, conservation and green infrastructure. The Official Plan, Zoning By-law, Urban Design Guidelines, Biodiversity Strategy, Pollinator Strategy and Ravine System Strategy were analyzed due to their relevance to biodiversity objectives and legislative authority. For each policy, keyword searches were conducted with the following terms: 'nature', 'ecosystem', 'greenspace, 'biodiversity', 'resilience', 'natural heritage/system'. This inventory coded the use of these terms under the valuation categories of biodiversity (1) Environmental Value, (2) Public Health Value, (3) Mental Health and Spiritual Value, (4) Intrinsic Value. When appropriate, definitions were coded into multiple categories. A qualitative positioning of the relationship these policies have to concepts of 'nature' is fundamental to the analysis of the perceptions, goals and objectives for biodiversity in the City of Toronto.

A lexicon and preliminary inventory of liminal ecologies in Toronto was established using the typology of informal greenspaces developed by Rupprecht & Byrne in 2014 and taxonomy of urban infrastructure by Peter Del Tredici in 2011. These frameworks were expanded based on the unique geography and policy context of the City of Toronto to support a comprehensive lexicon. An accompanying preliminary inventory gathered from Google Earth provided evidence of these ecologies in the City of Toronto.

6.0 Where Policy Meets Biodiversity in the City of Toronto

6.1 Municipal Powers

The acknowledgement of climate change and the valuation of biodiversity are themes that have come to be represented in policy. Commitments to a more sustainable future exist on international, federal, provincial and municipal levels of governance (Dalby, 2019). The structure of Canadian governance has delegated many public services and infrastructure to the jurisdiction of municipalities. In Ontario, the Planning Act empowers municipalities with legislative authority over infrastructure investment, design and daily maintenance of public services like transportation and waste management (Ministry of Municipal Affairs and Housing, 2020). Municipal governments may utilize regulation, taxation, subsidy or moral suasion to encourage or discourage action (Bemelmans-Videc et al., 2017). These policy tools therefore inform the experience of the city. With growing recognition for how nature may improve quality of life, these policy tools may be activated to support biodiversity in urban space.

Municipal governments are responsible for developing an Official Plan in collaboration with residents to determine the objectives of the municipality and their goals to meet the future needs of their community. Policies in Official Plans outline permitted uses, and requirements for successful application of land designations. Zoning Bylaws are legally enforceable regulatory policies based on the objectives set forth in an Official Plan, such as the requirement to construct a green roof on a new development (City of Toronto, 2009). The adoption of the green roof bylaw in Toronto in 2009 encouraged the emergence of similar legislation in Vancouver, Chicago and New York City (DiNardo, 2019).

When deciding if a change should be made in the urban landscape, urban planners and municipal decision-making bodies are required to consider the Official Plan and Zoning Bylaw legislation to determine if approval will be in alignment with the vision set out in these documents. Municipalities and through them, the tools of the Official Plan and Zoning Bylaws have significant influence over urban form. Other types of policy do not hold the same weight in the scheme of municipal decision making. These secondary forms of policy can be

utilized to report on findings, inform decision makers and recommend action but they are not legally binding. This distinction is important because knowing that not all policy is enforced equally is necessary to understand the legislative commitments made by municipal governments.

6.2 Strengths of Toronto's Current Biodiversity Policies

In the City of Toronto nature-based solutions have been recognized through the prioritization of green infrastructure and access to greenspace in the Official Plan and Zoning Bylaws. Additional policies have been adopted that represent an acknowledgement by the municipality that action needs to be taken to protect biodiversity as well as reconsider how we engage with biodiversity in the city. These policies include but are not limited to the Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy. This section will consider the strengths of these strategies to meet their objectives and support biodiversity in the City of Toronto.

Adopted by the City of Toronto in 2019, the Toronto Biodiversity Strategy is progressive in its respect for nature and its place in the city. The vision of this strategy is founded on recognition of the social, cultural, economic and intrinsic value of biodiversity. This strategy calls for further integration of nature into the City of Toronto, offering specific actions to protect, restore, design and engage with nature. The Biodiversity Strategy is supported by science, precedents and public engagement to model how biodiversity, connectivity and ecological valuation can shape communities (City of Toronto, 2019).

"Second Principle of the Biodiversity Strategy: Biodiversity has intrinsic value.
Biodiversity is essential to life on earth and must be respected and protected regardless of its value to humans"-Biodiversity Strategy, 2019

Similarly, the Pollinator Strategy acknowledges a need to integrate habitat into the city to create a framework for coexistence with pollinators. This strategy acknowledges the role of native pollinators in sustaining ecosystems and sets goals to prioritize habitat creation and connectivity. Enhancing urban biodiversity requires consideration of how these habitats can become part of the Toronto landscape.

"Toronto's Pollinator Protection Strategy was created to support the vision of our city being home to diverse pollinator communities that contribute to resilient ecosystems and enhance urban biodiversity."
- Pollinator Strategy, 2018

The Toronto Ravine System Strategy represents an example where the definition of nature and what was worthy of conservation evolved (City of Toronto, 2017). The Toronto Ravine system was a terrain vague forgotten landscape. Its rough terrain made this network of 11,00 hectares unfavourable for development (Ramsay-Brown, 2020). The proximity of the ravine system to the city makes it a space with a long and ongoing history of settlement by marginalized communities (Bonnell, 2010; Bonnell 2014). The lack of recognition of these ravines by the city led to the proliferation of wildness in the heart of Toronto (Ramsay-Brown, 2020, Bonnell, 2014).

An environmental movement to protect and restore the habitats of the Toronto Ravine System began in 1990 (City of Toronto, 2017). The recognition of these habitats as ecologically significant facilitations of biodiversity and ecosystem services led to the formalization of these previously liminal ecologies.Through the adoption of the Toronto Ravine System Strategy and Natural Heritage designation, the connectivity and biodiversity of these systems were supported by policy. These formalizations of previously informal space are evidence of how land designation can evolve to consider more expansive forms of habitat and nature. With this growth comes the activation

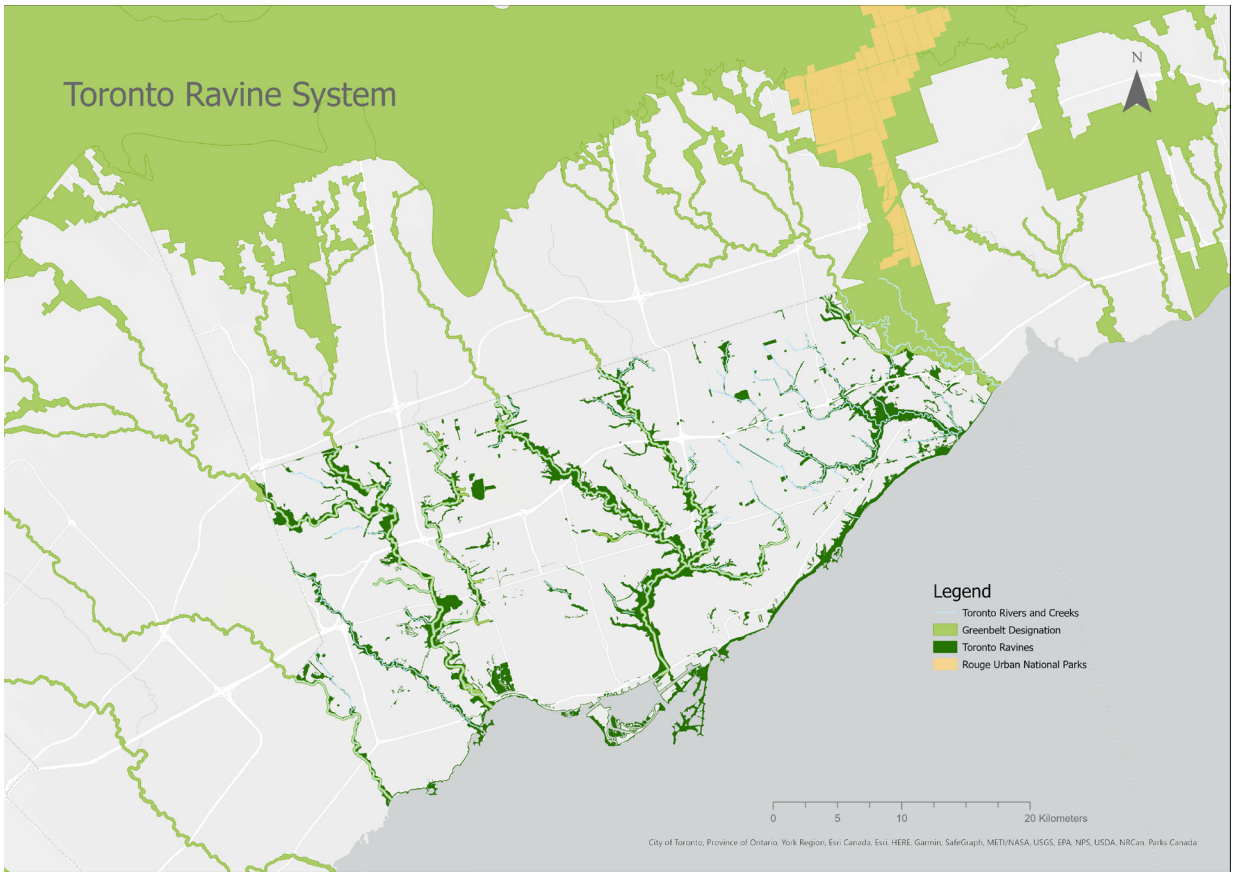

Figure 11: Map of the Toronto Ravine System

of policy and municipal governance to support ecologies in these liminal spaces.

The Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy are three municipal policies that center the enhancement of urban biodiversity. All three of these policies acknowledge the importance of the human nature connection. They speak to the need for connecting the community to these restoration and protection projects to generate care. This engagement of the community is necessary to support the emotional investment of residents into the prioritization of urban nature, biodiversity and climate change mitigation (Whitburn et al., 2020; Soga & Gaston, 2016; Giusti, & Samuelsson, 2020). The Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy all look to the public to foster respect for, and celebration of the wildness within the City of Toronto.

"In a dense, busy city like Toronto, our ravines are an important way to connect to nature and in so doing, understand how to care for and conserve it."
- Toronto Ravine Strategy, 2019

6.3 Opportunities for Policy Reform to Support Biodiversity in the City of Toronto

The progressive relationship that Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy have to conceptualizing and supporting biodiversity is encouraging. These ideals speak to a will by the city and the community to reimagine a greener city. Despite their will to foster biodiversity and the human nature connection, there are opportunities for growth to effectively actualize the vision set forth in these policies.

6.3.1 Legislative Powers

The Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy do not have the same authority that legislation has. Regardless of the lack of legal authority and the perception of reduced power, progress has been made to move forward recommended actions set out in the Biodiversity Strategy. A notable theme in these actions were review of existing bylaws and zoning ordinances that may be inhibiting biodiversity within Toronto.

"Action 8. Review policies and bylaws for opportunities to support biodiversity.
Undertake reviews of: Zoning Bylaw soft landscaping requirements for properties adjacent to ravines; and Property Standards and Grass and Weeds Bylaws for additional opportunities to support biodiversity. Continue to develop policies to support biodiversity in area-based planning studies, secondary plans and site and area specific policies. Review opportunities to further protect migratory and breeding birds from hazard related to development adjacent to natural features."

In 2022 the City of Toronto reformed their Grass and Weeds Bylaw to enable the cultivation of a natural garden without the requirement for an exemption. The reform was suggested as an action in the Biodiversity Strategy but further manifested by the growing number of private homeowners who have contested property standards bylaws. A notable recent case is that of an urban meadow on the property of urban ecologist and planning professor Nina-Marie Lister (Pfeiffer & Cooke, 2022). Action 8 outlined in the Biodiversity Strategy is significant for reevaluating how biodiversity may be supported by legislation. Legislative reforms can reinvent spaces of turf grass or concrete to be adapted to support ecological thriving. Continued evaluation of how legislation may be reformed to reflect the environmental values and priorities expressed by the public and supported by policies like the Biodiversity Strategy is required. Until the priorities of the Biodiversity Strategy and Pollinator Strategy are reflected in legislation, policy will continue to be a missed opportunity to the reimagination and reintegration of nature and its place in urban spaces.

6.3.2 Reframing the Valuation of Biodiversity in Policy

Academic and cultural understandings of biodiversity consider multidimensional systems of valuation (Shiva, 1993; Lister, 1999; Kingsley & EcoHealth Ontario, 2019). These complex understandings are engaged within the Biodiversity Strategy, the Pollinator Strategy and the Ravine System Strategy. These policies consider the environmental, social, physiological, spiritual and intrinsic value of biodiversity. In contrast, expansive considerations of biodiversity are not found in the Official Plan and Zoning Bylaws of Toronto. These policies, which hold more legislative authority over shaping the future of the city, do not consider the multidimensional nature of biodiversity and its benefits.

The City of Toronto Official Plan Section 3.4 on the Natural Environment speaks to the mitigation of harm and hazards as well the maintenance of

existing natural heritage (City of Toronto 2002). The scope of which natural heritage is understood evaluates environmental considerations and by extension environmental hazards. Systems of valuation determine the relationship to and respect for nature in urban systems. The significance of the physiological, mental health, and intrinsic value of biodiversity are recognized in policy put forth by the City of Toronto however, this nuance is not acknowledged or represented in legislation.

Recognition of only the environmental utility of biodiversity creates a reductive framework for understanding nature. When biodiversity is purely valued abiotically for stormwater management or the mitigation of environmental hazards it furthers the culture nature divide. This disjuncture is problematic for several reasons, not least because it fragments the treatment, protection and opportunities for biodiversity between public and private lands across the city. Policy must value the public health, mental health, spiritual and intrinsic benefits of biodiversity to support these outcomes. A more expansive valuation of biodiversity will facilitate policy that integrates nature into urban landscapes rather than isolating it. This framework shift will challenge the current standard of sequestering nature to only the areas of the city that are permitted to be wild.

6.3.3 Reevaluating the Definitions of Nature in the City

Land designations in the City of Toronto recognizes City Parks, Natural Heritage, Open Space and Environmentally Significant Areas as greenspaces. These categories are effective in upholding normative models of conservation. They speak for large greenspaces instead of recognizing the potential for nature to be interspersed more thoroughly in the fabric of the city. The current designations and terms used in municipal policy to understand nature in the city limit the potential for cultivating biodiversity. The words we use to identify and protect habitats are significant in ensuring they are permitted to thrive in the city. The Official Plan accompanying text states that:

"The biodiversity found in small green spaces, street trees, green roofs, community gardens, hydro corridors, cemeteries, and backyards also play an important role in our urban ecosystem (City of Toronto, 2002)."

This sentiment for recognizing the importance of smaller green spaces is represented in the legislation of the city's Official Plan policies and Zoning Bylaws. Though land designations and

zonings can be confining, they represent respect for and acknowledgement of places in the city. The term street tree means something in urban planning policy. A unified recognition and definition allows for communities to advocate for this type of green infrastructure and have their valuation of this form of nature be represented in policy. There is a need to name liminal ecologies in order to identify them, and advocate for them in resilient city planning.

There is currently a gap in municipal biodiversity policy as the small, in-between ecologies of Toronto are not currently recognized or protected. The Pollinator Strategy and Biodiversity Strategy have the objectives of integrating nature into the city and promoting urban biodiversity through landscape connectivity. What these small urban habitats may look like and how they are protected in municipal legislation is unclear. In order to achieve the objectives set out in these policies, the smaller connective ecologies of the City of Toronto need to be identified and represented in legislation. This shift to formally protect liminal ecologies has been observed in Toronto. The Toronto Ravine System is a liminal ecology that benefits from legislative designation and protections. The recognition of the Toronto Ravine System represents an expansion of the definitions and designations of nature acknowledged by the City of Toronto. The City of Toronto needs to continue this expansion of recognized nature to consider small, in-between, and liminal ecologies. Liminal ecologies have the potential to integrate nature into the fabric of the city, fostering biodiversity and the human nature connection. In order to realize this potential, recognition, protection and further study of these spaces is required.

7.0 Lexicon and Preliminary Inventory of Liminal Ecologies in Toronto

Hydrology, contamination, and disturbance in urban ecosystems impede ecological thriving in the city (Del Tredici, 2014). Urban ecology and Natural Heritage Planning are often highly managed to mitigate the challenges ecologies face sustaining themselves in such unfavorable conditions. Somewhat surprisingly, spontaneous, unmanaged habitats are observed and documented as spaces that support biodiversity in urban space (Del Tredici, 2014; Rupprecht and Byrne, 2014). Studied as cosmopolitan ecologies, informal green spaces, spontaneous habitats and more, this lexicon intends to integrate existing works that have named these spaces to push forward their recognition and role in the city. Liminal ecologies are currently natural spaces in the city that are not included in the City Parks System, or managed by private owners. Examples of liminal ecologies are municipally managed boulevards or hydro corridors. These spaces are often turf grass with some native plants that may have spontaneously reclaimed territory. These ecologies often exist without intervention and even in spite of manicuring practices. Their existence speaks to the resilience of nature and its propensity for thriving in unfavorable conditions.

Activating liminal ecologies requires legibility, that is, the ability to name, recognize and develop a common understanding and shared value for these spaces. In her development of the Bay Lexicon, Jane Wolff speaks to the importance of standardizing accessible language to further public discussions. This work is necessary to reduce the silos between experts, policy makers and everyday people to engage in conversations about nature and the city (Wolff, 2021).

"Whatever our roles in transforming the landscape, our actions depend on what we argue for, and our arguments for change emerge from our ways of describing the places we know now. Vocabulary shapes the way we see the world: its power as a lens turns the compilation of a landscape lexicon into a reckoning with hybrid ecologies (Wolff, 2021)."

A lexicon is necessary to understand the nuances of liminal ecologies and make the argument for change accessible. A lexicon and preliminary inventory of liminal ecologies in Toronto will be established using the typology of informal greenspaces developed by Rupprecht & Byrne in 2014 and new infrastructure taxonomies

discussed by Peter Del Tredici. This lexicon was expanded based on literature and the unique geography of the City of Toronto. An important note is that the lexicon definitions that will be used are not mutually exclusive. As informal spaces, with incredible nuance, some of these ecologies may fall under multiple lexicon definitions. The intent of this work is to provide language that can be used to further understanding of these spaces and their role in the city. An accompanying preliminary inventory gathered from Google Earth will provide examples of the existence of these ecologies in the City of Toronto. This evidence is intended to substantiate the claim that this lexicon is relevant to landscape connectivity and biodiversity in Toronto as well as identify the potential of these spaces to support biodiversity. Some of the typologies are not particularly biodiverse, but are nevertheless included to recognize that pollinators or natural habitat could flourish in these spaces if supported through a reimagination of urban design.

Figure 12: Microsite, (Del Tredici, 2020)

Microsite:

Pavement Flora, Growth through the cracks of construction. As a niche, pavement crack habitats occur, “whenever you have two types of paving material coming together, you have a seam, and the different materials expand differentially in response to summer and winter temperature to create a crack. We tend to think of pavement cracks as stressful habitats, but in fact, as the water sheets off the pavement, it flows right into the crack, making it a rich site in terms of its ability to accumulate moisture and nutrients. With oil from cars as a carbohydrate source available for decomposition by fungi and bacteria, cracks can develop significant microbial diversity (Del Tredici, 2014).”

Figure 13: Microsite Ecology in Toronto (1)

Figure 14: Microsite Ecology in Toronto (2)

Figure 15: Microsite Ecology in Toronto (3)

Structural:

Integration into infrastructure, habitat that utilizes infrastructure as a foundation to grow, crawl and propagate. Structural liminal ecologies also include when infrastructure is utilized by mammals or other species seeking shelter. Further classification may be utilized to describe the material of the structure that is supporting the liminal ecology. For example, Peter Del Trechi discussed how various materials may inform the species that can thrive on various structures. Stone walls and Chainlink fence habitats are examples of further sub designations of structural liminal ecologies (Del Trechi, 2014).

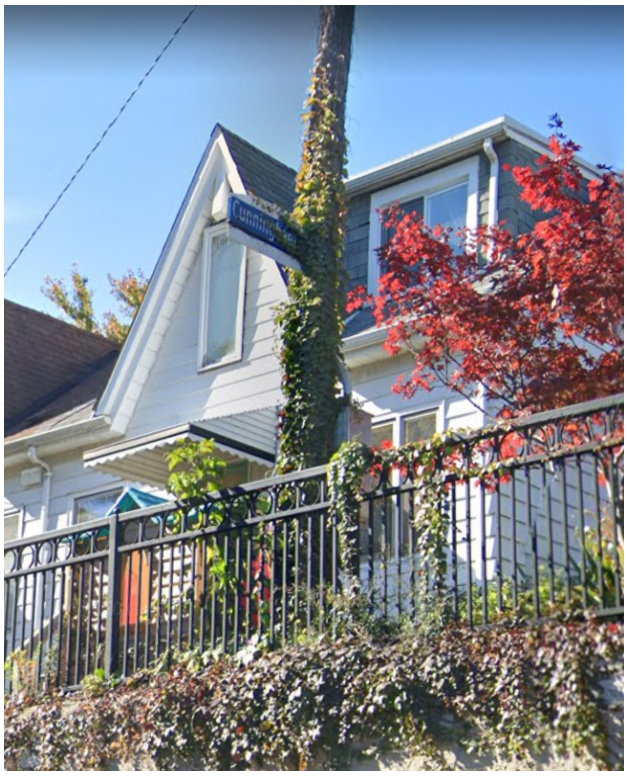

Figure 16: Structural Ecology in Toronto (1)

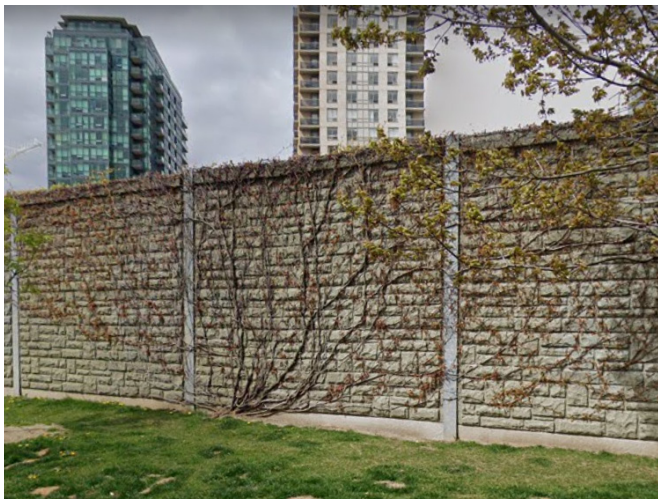

Figure 17: Structural Ecology in Toronto (2)

Figure 18: Structural Ecology in Toronto (3)

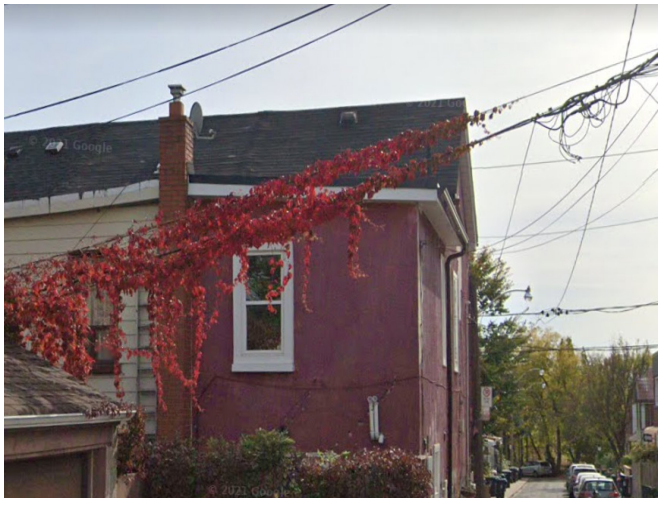

Figure 19: Structural Ecology in Toronto (4)

Gap:

The physical space between buildings or fences. Alleyways and laneways are common examples of gap liminal ecologies in Toronto. Gap ecologies are often uncontested spaces without clear jurisdiction. Gap ecologies often develop from microsites.

Figure 20: Gap Ecology in Toronto (1)

Figure 21: Gap Ecology in Toronto (2)

Figure 22: Gap Ecology in Toronto (3)

Street Verge:

Ecologies adjacent to streets, for example; boulevard strips, right of ways, traffic calming interventions or roundabouts. These spaces are municipally owned and sometimes privately managed. This management practice h as been defended through the boulevard garden of Douglas Counter (Counter v. Toronto, 2003).

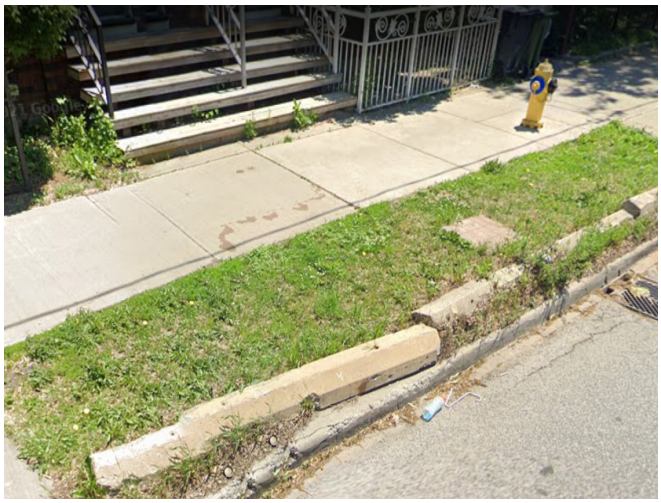

Figure 23: Street Verge Ecology in Toronto (1)

Figure 24: Street Verge Ecology in Toronto (2)

Figure 25: Street Verge Ecology in Toronto (3)

Streets are necessary infrastructure in cities. It's both a reasonable and opportune proposition to include the naturalization of the spontaneous green spaces adjacent to streets, and to include support for these in urban design. An emerging example is the City of Toronto's Green Streets Guidelines (City of Toronto, 2017). Maintaining driving sightlines and accessible sidewalks when naturalizing street verges is paramount. As these spaces are municipality owned there is potential to support street verges as liminal ecologies formally through the city or informally by communities. Figure 27 is an example of how informal and formal prioritization of biodiversity can function collaboratively. Toronto's Green Street Guidelines offered a liminal ecology to be further cultivated as a community garden.

Figure 26: Street Verge Ecology in Toronto, Green Streets Guidelines

Figure 27: Green Streets Guidelines, Community Garden

Lots:

Vacant lots, Abandoned lots, Lots at intermittent stages of development. These spaces are often reclaimed by nature in the short or long-term when forgotten in the landscape of the city. Specifically, city-owned vacant properties or pre-development sites may support ecologies in the city. This short-term or long-term potential for habitat in fluctuating landscapes can occur organically or be supported by strategic planting during gaps in the development timeline. These lots could be brownfield sites with legacy contamination from past industrial uses.

Figure 28: Lot in development, Toronto

The Bowery Project is an example of how vacant lots in the City of Toronto have been activated through temporary use for community and ecological benefit. The Bowery project is a non-profit organization that advocates and empowers communities to cultivate food on vacant lots of the city. Using mobile urban agriculture infrastructure, this project prioritizes flexibility as vacant lots may have subsequent uses (Bowery Project, n.d). Temporary use in the interim is a powerful planning and design tool to support food resilience and in the city.

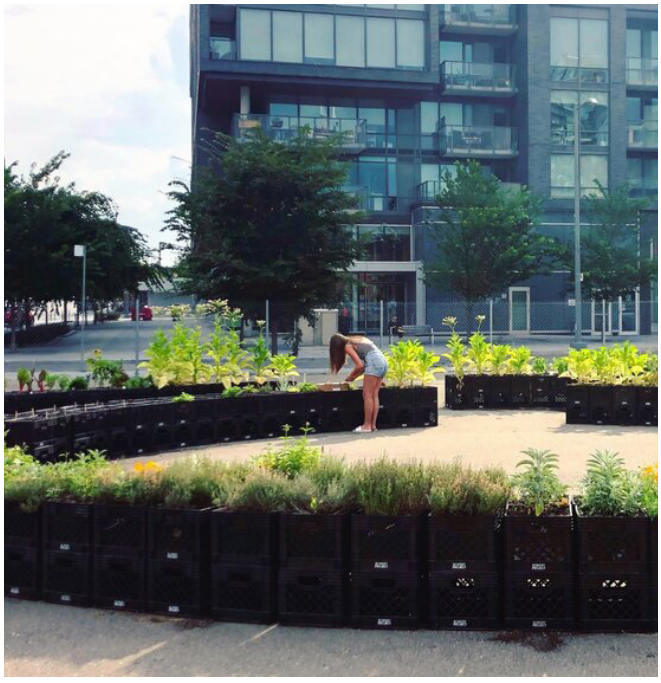

Figure 29: Canary District Toronto (Bowery Project, n.d)

Passageways:

Continuous linear or meandering corridors such as railways, hydro corridor or ditches. As the Toronto Ravine Network is an established corridor, I propose the term passageways to describe informal corridors that facilitate the movement of species and the connection of habitats. These landscapes fall under public or private management but are often wild.

Figure 30: Passageway Ecology in Toronto (1)

Figure 31: Passageway Ecology in Toronto (2)

Figure 33: Passageway Ecology in Toronto (3)

Waterside:

Proximal to or semi-aquatic habitats such as; vernal pools, ponds, streams, wetlands, rivers or lakes. These liminal ecologies can be temporary and appear based on season or precipitation.

Figure 33: Waterside Ecology in Toronto

Although the preliminary inventory above explores examples of current liminal ecologies in Toronto, not all of these examples have the same capacity for biodiversity or landscape connectivity. The inclusion of examples of monoculture turfgrass emphasize how these spaces exist in Toronto and have the capacity to be transformed into supportive habitats. Through the reform of our valuation of nature and policy systems that are born from it, we can reimagine what nature in the city may look like and how these liminal spaces could be activated to foster ecological resilience in urban form.

8.0 The Temporary as a Means of Transformation

Liminal spaces are on the precipice of change. This means that the ecology of these spaces may not have the time to proliferate and provide sustainable habitat. Despite this deviation from the typical conservation model, there is immense value in temporary occupation by liminal ecologies. Temporary use of public space is a powerful mechanism for transforming the city (Oswalt et al., 2013). When novel opportunities to engage with the city are provided, residents can experience and participate in the potential futures of urban design. This offers the opportunity to critique the status quo and push the boundaries of the narratives we tell ourselves about the city (Ferreri, 2021; Oswalt et al., 2013).

Integrating nature into urban form, even if it is temporary, provides an opportunity for communities to evaluate their connection to wildness. Supporting the experience of nature in public space may increase the human nature connection felt by individuals and communities. Though liminal ecologies may have reduced influence over the physical landscape, these ecologies have the potential to shift the social and cultural understanding of nature in the urban settings. With these shifts in valuation of nature, transformation of the temporary to permanent becomes possible through a reimagination of the coexistence of nature in urban space.

Temporary uses of space are also mechanisms of empowerment for communities to participate in design (Oswalt et al., 2013). This bottom up approach to creating place allows for engagement with nature by communities and for communities. Unsanctioned cultivation has a colonial history as enslaved people performed it to claim space, maintain identity and provide food for themselves (Sackey, 2022). Environmental justice and access to greenspace are pervasive concerns in urban centers. In particular racialized and marginalized communities may face barriers in access to greenspace and park spaces (Wolch et al., 2014). Temporary nature activated by the communities have the potential to address the unmet needs by traditional planning and foster environmental justice. The Bowery Project in Toronto is an example of community led activation of temporary spaces to meet the needs of the local community (Bowery, n.d).

The term guerilla gardening is thought to have originated in the 1970s with a collective called the Green Guerillas in New York. This group utilized gardening to reshape public space and question the public private divide. Vacant lots were converted into greenspaces as a means of redefining place through gardening. These liminal ecologies activated and supported access to greenspace, local agriculture and the means to encourage environmental values in these communities (Sackey, 2022).

"Guerilla gardens influence people's perceptions of their environments and themselves. Unexpected flowers in unanticipated places invite passers-by to reconsider the beauty of their urban environment and reevaluate their relationship to it (Todd, 2016, p.175)."

Figure 34: Guerilla Gardening, (Vox, 2021)

Guerilla gardening is an informal practice of environmental activism that allows for reallocation of land use. This redistribution of greenspace has the potential to grow into permanency within the city. Guerilla gardening provides individuals and communities with the agency to manifest change in their environments. Though guerilla gardening is not inherently occurring in liminal space, it does engage with the capacity of space in transition. Guerilla gardening and the Bowery Project represent temporary use as a form of acknowledging systemically unmet community needs. Though temporary and liminal ecologies are not a solution to inequitable access to nature, they represent a course of action that may be taken by communities to facilitate the experience of nature and biodiversity in the city. This experience may shift cultural, policy and societal valuations of nature to question the status of manicured, inaccessible urban nature. Therefore, the in-between quality of liminal ecologies can activate the power of temporary use to alter the future potentialities through reimagining ecological thriving in the city.

9.0 Next Steps

Western ideological understandings of nature have informed conservation practices and natural heritage planning in Ontario. The separation of nature and culture have been enforced through legislation to distance what is considered wild from the city. Policy has begun to bridge this gap to address the growing body of literature on the public health and well-being benefits of engaging with nature in daily life. To better support nature and biodiversity in cities, we need to reimagine how we engage with nature and what we consider to be 'nature'. To do so in municipal legislation may facilitate adaptive urban ecological design strategies to support biodiversity and foster the human nature connection.

People shape the city, but policy facilitates the barriers and opportunities of this collective growth. Reducing policy barriers to urban biodiversity will allow for the thriving of more expansive definitions of nature. Analysis of existing policy in the City of Toronto grounded three recommendations for how municipal legislation could further support biodiversity and urban resilience in the city. These recommendations included:

1) Increasing the legislative power of biodiversity policies, as not all policies hold the same authority over municipal decision making. Therefore, increasing the capacity that supporting biodiversity be represented in legislation in the City of Toronto is necessary.

2) Expanding systems of valuing biodiversity in policy as a means of bridging the culture nature divide in urban design. Recognition of the public health, mental health, spiritual, environmental and intrinsic value of biodiversity could help in encouraging urban planning that further supports biodiversity and daily interactions with nature.

3) Expanding the definitions of nature protected in the city to recognize liminal ecologies.

Enacting these recommendations to municipal policy in the City of Toronto has the potential to unlock the temporary and permanent potential of liminal ecologies. These policy reforms are opportunities for the City of Toronto to foster the human nature connection, support biodiversity and increase urban resilience.

In order to further identify, study and protect liminal ecologies, the lexicon and preliminary inventory were developed to further understanding. Providing accessible language to describe these spaces is necessary to advocate for the potential of these ecologies in the City of Toronto. Informal and temporary uses of spaces by communities through actions like guerilla gardening fall outside the realm of policy. Community empowered tactical urbanism to reclaim liminal spaces can be explored as a means of resistance to actualize a city that represents collective valuations of nature. Temporary uses may be instrumental in working alongside institutional movements for biodiversity to continue questioning the representation of nature in the city. The power of the temporary can continue to push forward the opportunity of policy change and generate an urban environment that reflects a community's valuation of nature.

The gap between nature and the city can be bridged by liminal ecologies. Supporting the thriving of these in-between spaces offers a threshold of unexplored wildness in the city. Liminal ecologies offer an opportunity to increase equitable access to experiencing nature. Furthering the connection that residents feel to nature may increase well-being and facilitate the collective reimagining of a more resilient Toronto.

Figure 35: Waterside Liminal Ecology in Detroit (Del Tredechi, 2020)

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Glossary

Abiotic

An abiotic factor is a non-living part of an ecosystem that shapes its environment. In a terrestrial ecosystem, examples might include temperature, light, and water. In a marine ecosystem, abiotic factors would include salinity and ocean currents (National Geographic, 2022)."

Biotic

Biotic Factors are the living aspects of the environment. They consist of other organisms, including members of the same and different species.

Ecosystem

"An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity. Every factor in an ecosystem depends on every other factor, either directly or indirectly (National Geographic, 2022)."

Ecosystem Services

"Ecosystem services are defined as the direct and indirect contributions of ecosystems to human well-being, and have an impact on our survival and quality of life. There are four types of ecosystem services: provisioning, regulating, cultural and supporting services

Habitat

Habitat is the physical environment in which a species lives and to which it is adapted. A habitat's features are determined mainly by abiotic factors such as temperature and rainfall.

Human Nature Connection

The relationship that exists between people/ communities and nature

Liminal

Between or belonging to two different places, states, etc

Natural Heritage

"Natural heritage features and areas: means features and areas, including significant wetlands, significant coastal wetlands, other coastal wetlands

and significant valleylands, habitat of endangered species and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area (Ministry of Municipal Affairs and Housing, 2020)."

Niche

A niche refers to the role of a species in its ecosystem. It includes all the ways that the species interacts with the biotic and abiotic factors of the environment. Two important aspects of a species' niche are the food it eats and how the food is obtained.

Resilience

'the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity of self-organization, and the capacity to adapt to stress and change." (IPCC, 2007)

Terrain Vague

"Ambiguous spaces of the city – the places that exist outside the cultural, social and economic circuits of urban life" (de Solà-Morales, 2013)

Temporary Use

Ephemeral use of space, flexible planning for the short term, often activated by communities

Thriving

In order to thrive, something must be able to do more than just survive. Thriving, and the right to thriving has been explored in recent literature