Planting Trees, Cultivating Connection: Mini forests as connectors to nature, community, social cohesion and local environmental care

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August 2024

Policy Brief

Urban green space provides crucial environmental and social benefits, such as improved air and water quality, reduced flooding, enhanced biodiversity, and increased well-being. However, these benefits are often inequitably distributed, with marginalized neighbourhoods having less access to green space. The Miyawaki method, an innovative urban greening approach, involves planting dense, multi-layered native forests in very small areas. Although mini forests are valued for their ecological benefits, they also encourage significant community engagement, fostering social cohesion, local environmental care, and civic stewardship, making them a worthwhile investment.

Messages for Planners

- **Emphasize the Process:** The process of planning and planting mini forests may yield more immediate community benefits compared to the less predictable long-term ecological outcomes, highlighting the importance of the process itself.
- **Leverage Volunteer Appeal:** Mini forest planting events attract large numbers of volunteers, offering an opportunity for significant community engagement, procedural representation, new neighbourly connections, and broader social cohesion.
- **Consider Modes of Community Engagement:** Involving the community in the design, siting, and planting process fosters a sense of ownership. This can be an environmental benefit as individual participation can increase local environmental care and potentially catalyze climate-positive behavioural change.
- **Adapt to Local Context:** Tailor mini forest projects to address specific local needs, considering differences in the Global North and South. For instance, in developing countries, integrating economic benefits to boost local incomes or edible plants to increase food security can enhance long-term community stewardship.
- **Equitable Planning Matters:** Identify neighbourhoods lacking green space and consciously site mini forests to create new green space in those priority areas. Incorporate pathways, seating, or gathering spaces to increase access and improve community experience.
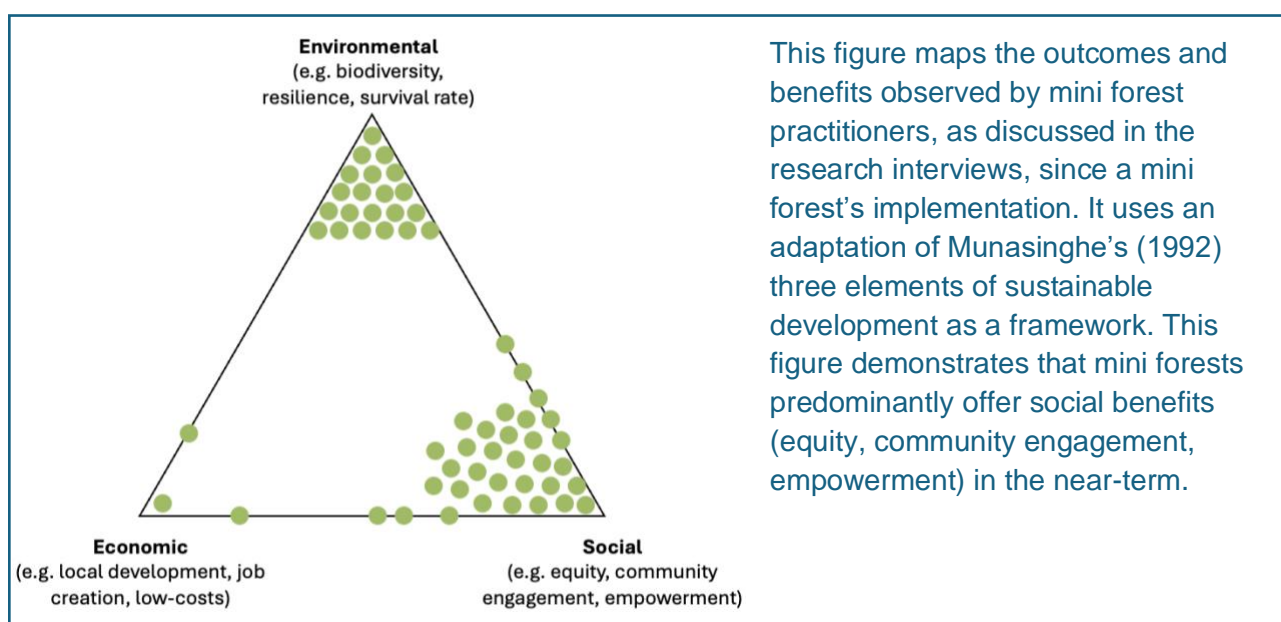
The Problem

Climate change increasingly threatens urban infrastructure, health, and livelihoods, linked to severe impacts such as deteriorating air quality, more frequent flooding, and intensified heat islands. Meanwhile, many cities face social challenges, including disconnection, polarization, and inequity. Rapid urbanization and densification are associated with the loss of urban green spaces, which are crucial for mitigating climate impacts, supporting community well-being, and fostering social cohesion. Disparities in green space distribution further entrench social inequity, with marginalized communities often having less access to green space and heightened vulnerability to climate impacts. While innovative small-scale urban greening approaches, such

as Miyawaki method mini forests, may address these issues by increasing urban green space and community engagement, research on their long-term environmental benefits is sparse.

The Findings

Mini forests offer a connection to nature, by addressing green space inequities, while fostering a connection to community, by encouraging wide participation. Globally, over 75% of mini forests in urban areas contribute new green spaces by planting unconventional sites like school grounds, city squares, and cultural institutions. In Canada, mini forests that create new green space are mainly sited in priority neighbourhoods and incorporate features like pathways and benches to facilitate access and enjoyment. This research found that mini forests not only increase green space access in underserved areas, addressing distributional equity, but also strengthen community ties by involving local residents in their creation, design, implementation and stewardship, thus addressing procedural equity. Significant community engagement and volunteer involvement fosters local environmental care, sense of ownership, social cohesion and may in turn promote other climate-positive behavioural changes. In developing contexts, adapting mini forest projects to local needs – such as incorporating economic benefits to boost local incomes or including edible plants for food security – can promote long-term community stewardship. This research demonstrates that mini forests offer immediate community benefits when planned, planted, and stewarded in a context-appropriate and mindful manner.

This figure maps the outcomes and benefits observed by mini forest practitioners, as discussed in the research interviews, since a mini forest's implementation. It uses an adaptation of Munasinghe's (1992) three elements of sustainable development as a framework. This figure demonstrates that mini forests predominantly offer social benefits (equity, community engagement, empowerment) in the near-term.

The Study

This research employed a mixed-methods approach across two countries from 2023 to 2024, including a global review of 340 mini forest cases, which involved collecting data on project location, size, design, stakeholder involvement, funding, and motivations. Interviews with ten mini forest practitioners provided in-depth insights into their experiences, project costs, and benefits. A social equity analysis of Canadian urban and suburban mini forests assessed the consideration of equity within the mini forest planning, siting, and planting process. Additionally,

first-hand participation in mini forest planting events and ethnographic fieldwork offered a deeper understanding of the sensory and emotional experience of a mini forest. The research integrates these methods to explore the benefits, equity considerations, and individual experience of mini forests, emphasizing their role in fostering an individual's connection to nature and community.

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Introduction

As devastating impacts from climate change threaten cities' infrastructure, security, health, and livelihoods, green spaces act as an increasingly critical element of the modern urban landscape. However, urban growth and densification are causing many cities to lose green space and experience declining rates of canopy cover. This begs the question: How can green spaces be innovatively integrated into densely built urban areas to enhance cities' resilience against climate change while accommodating growth?

Resilience refers to the capacity of people and ecosystems to respond to and withstand climate impacts and hazards while maintaining essential functions (IPCC, 2022). It involves both mitigating impacts and adapting to climatic changes (Cutter et al., 2008). Urban green spaces (UGS) offer a myriad of mitigative and adaptive ecological benefits at all three spatial scales – the city-region, neighbourhood, and site-block. These benefits include atmospheric carbon reduction, improved air and water quality, reduced flooding, increased thermal comfort, and reduced energy use (Demuzere et al., 2014). UGS enhance urban biodiversity (Lepczyk et al., 2017; Sadler et al., 2010), which is essential for ecosystem functionality, health, and long-term resilience (Tilman et al., 2014; Oliver et al., 2015). Moreover, UGS offer health and well-being benefits for city residents, such as reduced stress levels (Grahn & Stitgsdotter, 2003; Ward Thompson et al., 2012), improved physical and mental health outcomes (Barton & Rogerson, 2017; Oikonomaki et al., 2024; Toronto Public Health, 2015), and enhanced social cohesion (Jennings & Bamkole, 2019). UGS also contribute to an increased social and individual coping capacity (Demuzere et al., 2014). Taken together, the combination of social and environmental benefits offered by UGS can enhance climate resilience.

Not all city dwellers, however, have equal access to these benefits. Research finds that green space is inequitably distributed across many cities, with low-income, diverse, and marginalized neighbourhoods having less greenness, vegetation, and tree canopy cover (Gerrish & Watkins, 2017; Landry et al., 2020; Nesbitt et al., 2019; Quinton et al., 2022). This can have a material impact on neighbourhood resiliency to the impacts of climate change, like rising temperatures and more frequent extreme heat events. Research indicates disproportionate exposure to urban heat in disadvantaged neighbourhoods (Hsu et al., 2021; Mitchell & Chakraborty, 2015; Huang et al., 2011), leaving groups already-vulnerable to climate change – low-income renters, new immigrants, the unhoused – at increased risk of heat-related illness and death (Henderson et al., 2022). While increasing UGS in these neighbourhoods can lessen these impacts (Zhou et al., 2021), the often-dense urban fabric makes it difficult to plan and implement new, large-scale green infrastructure projects. Limited available public land results in competing priorities between the provision of new green space and other necessary development, like supportive or affordable housing. Moreover, greening marginalized neighbourhoods can risk community displacement or disruption (Anguelovski et al., 2018; Wolch et al., 2014). Creative, small-scale urban greening approaches – like street trees or pocket

parks – offer a potential solution to making neighbourhoods "green enough" to realize the benefits of UGS for all city residents (Gill et al., 2007; Navarrete-Hernandez & Laffan, 2023).

The Miyawaki method, a novel and innovative approach to small-scale urban greening, is gaining popularity in North America. The tiny forest concept, based on the planting method developed by Japanese ecologist Dr. Akira Miyawaki in the 1970s, encourages planting dense, multi-layered mini forests in areas as small as a tennis court (Bruns et al., 2019). Based on ecological succession, the method plants native vegetation species closely together, encouraging competition and increasing the growth rate, resulting in a mature forest in as little as 15-20 years (Miyawaki, 1999). While popular in Asia and Europe, Miyawaki method mini forests have only recently been implemented in North America. In 2023, the Network of Nature and Green Communities Canada launched the National Mini Forest Pilot program, funding 16 mini forests across the country with the support of the Government of Canada through funding from the 2 Billion Trees program. In partnership with various local community groups and non-profit organizations, the mini forest pilot led to an increased uptake of the method across Canada, with over 40 mini forests planted in the past three years alone.

While mini forests are espoused for their purported ecological benefits, including increased water infiltration and carbon sequestration, little research substantiates these claims. Although a few studies have reported promising results, such as an increase in biodiversity (Ottburg et al., 2017) and carbon dioxide stored in soil (Vineland Research & Innovation Centre, 2024), doubts remain about whether the small size of the forests limit these effects at the city-region scale. Moreover, there are doubts whether these promising findings remain true throughout the lifecycle of the mini forest and especially into its' second decade, when the canopy lifts and young trees die from the ensuing lack of light (Heuch & Thurman, 2024). The value of the method may lie not in its ecological benefits, but elsewhere entirely. Mini forests create an opportunity for individuals to access and connect with wild nature. Given the number of volunteers needed to plant a mini forest, the Miyawaki method is an opportunity for significant community engagement and local participation.

This research asks: What are the benefits of planting mini forests? How is equity considered in the planning and implementation of mini forests? How do people experience this novel urban greening approach? Through this work, I found that the unique benefits of mini forests are often realized in their planning, planting, and stewardship processes rather than solely through quantifiable environmental outcomes. While they may be planned and planted for their apparent environmental benefits, in bringing diverse individuals together into nature, into community, and into civic stewardship, I argue that mini forests build community, catalyse social cohesion, foster socially-resilient neighborhoods, and normalize local environmental care. In so doing, mini forests offer an opportunity for transformative – albeit incremental – change at both the individual and community levels. I argue that these human-social benefits – which can also benefit the environment by catalysing climate-positive behavioural change – make Miyawaki method mini forests worth the financial investment and time commitment.

Methods & Structure

For this research, I employed a mixed-methods approach, utilizing various qualitative and quantitative methods over the period of 2023-2024 and across two countries. I divided the methodological approach into four phases: foundational, investigative, processing, and

experiential. The first phase, termed 'foundational', grounded the work in academic literature on key concepts including: urban green infrastructure; the ecological and human health benefits of urban green spaces; green space inequity; civic stewardship; current and predicted climate impacts for cities with a focus on urban heat; the mitigative and adaptive potential of urban green spaces; and the Miyawaki method – encompassing its history, global application, theoretical underpinnings, and case study observations of Miyawaki mini forests.

Due to the limited case data on mini forests available in the academic literature, a comprehensive case review of planned or implemented mini forests from around the world during the second 'investigative' phase. Most mini forests are planted by private companies or non-profit organizations, with information, insights, and findings shared via website, online database, publicly accessible map, or (occasionally) published reports. The case review involved collecting data on the mini forest site (forest size; location data – continent, city and state/province, city population, hemisphere, and urban/suburban/rural; Koppen climate classification; previous land use; site ownership); stakeholders or actors involved, including information on funding sources where available; mini forest design; a description of the mini forest to understand the project motivations or intentions; community involvement or engagement (including number of volunteers on planting day); and reported impact or outcomes (tree survival rate, tree growth rate, and any qualitative observed impacts on the community, biodiversity, or climate resilience). To address data gaps, news articles and social media postings were consulted as needed. As criteria for inclusion, only companies, non-profit organizations, or community groups with at least two (2) planted Miyawaki method mini forests were included. All mini forest projects initiated by a government body were included. Mini forest projects which did not have forest location or size data available were excluded. The global case review includes a total of 340 cases, representing over 10% of the 3000 estimated mini forests worldwide (Lewis, 2022).

In the third 'processing' phase, I deepened the analysis of select cases from the global review through in-depth, semi-structured interviews with experts. Ten (10) interviews with mini forest practitioners from four (4) continents offered depth to the information publicly available online. The mini forest practitioners interviewed worked for a variety of organization types at various scales, from city-level to multi-national (Table 1). The practitioners work in both developing and developed contexts, although most practitioners interviewed (n=8) work in developed countries. The interview questions included exploratory questions on practitioners' experience, project costs, key benefits, and common barriers of the Miyawaki method, as well as specific questions on the planning process, community engagement and participation, and experiences planting tiny forests in urban areas.

During the 'processing' phase, a social equity analysis was conducted to assess how equity considerations are integrated into the site selection, planning, and implementation of Canadian mini forests in urban or suburban environments. This social equity analysis utilized census data at the census tract (CT) level to determine the socio-economic makeup of the neighbourhood in which the mini forest was planted. A variety of indicators were examined and compared against city-wide data (Table 2). The indicators fell into seven broad categories which together determine an equity-deserving or priority neighbourhood:

(1) population age distribution – whether the neighbourhood had a higher population of children (ages 0-14) and/or senior population (ages 65+)
(2) median income

(3) Indigenous population

(4) household tenure – whether the neighbourhood had a higher percentage of renters compared to city-wide, and if the neighbourhood was renter-dominant (i.e. more than 50% renter-tenure)

(5) Immigrant population – whether the neighbourhood had a higher percentage of immigrants compared to city-wide, and if the immigrant population was mostly First Generation (i.e. more than 40% first generation immigrants)

(6) Visible minority population – whether the neighbourhood had a higher percentage of visible minority individuals compared to city-wide, and if so, whether the dominant minority groups differed from the city-wide dominant group

(7) Education – whether the neighbourhood had fewer post-secondary (Bachelors and higher) degrees, and if the neighbourhood was mostly high school educated or less (i.e. more than 50% with a high school degree or no degree).

After gathering the census data, a point (1) is given if the equity-deserving statement is true (e.g. "CT has a lower median income than the city", "CT has a higher percentage of renter-tenure households than city-wide", etc.). Additional points are given if the difference in CT and city-wide rates is more than 10% (i.e. two points for 10-20% difference, three for 20-30% difference, and four for 30% or more). For income, one point indicates a less than $5k difference in CT and city-wide median incomes, whereas two points indicates a $5-10k difference, three indicates a $10-20k difference, and four indicates a $20k or more difference. For statements which are either true or false (e.g. "CT is mostly high school educated or less") a maximum of one point is given if the statement is true. To determine an equity-deserving or priority neighbourhood, the points are tallied to give a final "social equity score". A CT with less than 5 points is not a priority neighbourhood while 8+ points indicate a priority neighbourhood. Between 5-8 points the score is inconclusive.

Mini Forest Practitioner	Organization Type	Context	Scale of Operation
P01	For-profit company	Developed	Multi-national
P02	Non-profit organization	Developed	Provincial or state-level
P03	Non-profit organization	Developing	National
P04	Non-profit organization	Developed	National
P05	Non-profit organization	Developing	National
P06	Government	Developed	City
P07	Non-profit organization	Developed	City
P08	Non-profit organization	Developed	City
P09	Government	Developed	City
P10	Non-profit organization	Developed	National

Table 1: Organization types, context, and scale of operation of mini forest practitioners interviewed for this study

The final 'experiential' phase involved first-hand experiences with mini forests through active participation in a local planting event and observational ethnographic fieldwork during visits to several mini forests in two countries. Throughout the following report I draw on this experiential research in narrative prose to illustrate the variety of designs, layouts, and

approaches to mini forests, while centering the feeling of a tiny forest. I argue that being within a mini forest is a unique and distinctive experience – and that experience is an important but often overlooked element of a mini forest. In focusing solely on the environmental or technical factors of the Miyawaki method, we forget the sensorial, almost emotional factors which contribute to the appeal and uptake of the method. These narrative sections hope to highlight this intrinsic value of the mini forest.

The combination of methods employed addresses the research questions by integrating first-hand practitioner experiences with publicly available project information and published literature to elucidate the benefits of mini forests. Practitioner insights were integrated with the social equity analysis to explore equity considerations. Lastly, active participation and first-hand experience combined with practitioner insight and online community engagement reports to understand the individual experience of Miyawaki method mini forests.

Two central themes of connection emerged through my work. These themes describe the ways in which tiny forests connect individual participants with something greater than themselves, whether to nature or to their neighbours. In this paper, I describe each connection created by mini forests, drawing from varied research and analysis throughout. Taken together and in my opinion, these two connection points create a third connection: to local environmental care and positive climate action. The themes of connection identified in this report are not exhaustive. They center largely on the human interaction with mini forests. More connections could surely be identified through further research, including potential ecosystem, green network, or wildlife corridor connections. However, due to the limited research timeframe and the relative novelty of the tiny forest concept, these broader ecological themes were neither studied nor included in the analysis. Further research is warranted to assess the ecological and environmental benefits of mini forests across various spatial scales.

Introducing the Mini Forest Concept

Japanese botanist and plant ecologist Dr. Akira Miyawaki developed the Miyawaki method in the 1970s as an ecological engineering method for forest reconstruction (Miyawaki & Golley, 1993). The method centres on potential natural vegetation, an abstract concept which describes the vegetation that would exist within a landscape without (or prior to) human influence. The Miyawaki method comprises five steps:
1) a thorough site survey to determine the natural vegetation, composition of the soil, and degree of naturalness present,
2) species selection based on the concept of potential natural vegetation,
3) growing from seed sourced locally, ideally from a nearby mature forest, the required number of young plants from a list of appropriate species (this process takes 1-2 years),
4) soil preparation – excavating the soil to a depth of 1-meter, mixing soil with appropriate amendments like compost, straw, or manure, and replacing the amended soil on site, and
5) planting to a density of 3 plants/m2 and covering the new mini forest with straw or mulch (Miyawaki & Golley, 1993; Miyawaki, 1999).

Planting a mini forest is labour-intensive because of the high planting density. Miyawaki & Golley (1993) describe the planting day as "a unique environmental education experience for

the local community" (p. 341). After planting, the young forest requires some maintenance for the first 2-3 years, mostly watering and weeding, but subsequently develops into a self-sufficient ecosystem (Miyawaki, 1999).

The method captures the imagination by promising to restore forests and recreate natural ecosystems. However, Miyawaki notes that his technique does not *aim* to recreate natural ecosystems, although a natural ecosystem *may evolve* on the mini forest site. Rather, the intent of the method is to quickly and efficiently create dense forest stands where they are needed (Miyawaki & Golley, 1993). In the age of multiple intersecting crises – significant biodiversity loss, climate change, societal polarization and loss of social cohesion (World Economic Forum, 2023) – the Miyawaki method might seem like a silver bullet, a way to quickly right the wrongs of our ancestors and greedy contemporaries. The method's perceived usefulness in addressing intersecting crises partly explains its' surging popularity in the past decade; however, this explanation would be incomplete without mentioning one industrial engineer from India. Shubhendu Sharma became so captivated by the mini forest concept after meeting Dr. Miyawaki at his workplace, Toyota Bangalore, and participating in a mini forest planting day that he quit his job, started an afforestation company, developed a simplified version of the Miyawaki technique, and published open-source step-by-step instructions online to spread the method worldwide (Afforest, n.d.). Following his 2014 TEDTalk, which has garnered over 1.4 million views (Sharma, n.d.), his vision of tiny forests, everywhere, is beginning to be realized. Over 180 mini forests have been planted in the Netherlands since 2015 (Chaudron, 2022), 200 planted in the United Kingdom since 2020 (Earthwatch Europe, n.d.), and an estimated 3000 planted worldwide (Lewis, 2022).

Companies and non-profit organizations that plant Miyawaki method mini forests often tout the environmental benefits of the method: it's fast growth and high survival rate, the improved biodiversity and habitat formation, the increased carbon capture availability. Although some preliminary research has investigated these environmental claims with positive results (see Ottburg et al., 2017 for results on improved biodiversity; Vineland Research & Innovation Centre, 2024 for soil health and carbon capture), these studies are limited in both scale and timeframe to be statistically significant. Debate persists over whether these small-scale spaces can significantly benefit the environment at the city-region scale, and whether near-term benefits, such as increased biodiversity and carbon capture, persist into the medium and long term when some trees die due to ecological succession. Two professional arborists published an opinion piece expressing significant scepticism, arguing there is little added benefit from the Miyawaki method's characteristic planting density in terms of growth, biodiversity, survival, carbon sequestration, or climate mitigation (Heuch & Thurman, 2024). Scepticism surrounding the method is valid and warranted, given the limited peer-reviewed research available, much of which was conducted either by Miyawaki himself or in-house by organizations involved in mini forest plantings. While I acknowledge the validity of these concerns, my research highlights and demonstrates benefits to individual participants and the community as a whole. Miyawaki method mini forests are unique in providing intersectional benefits to both humans and the environment, and I argue that these human-social benefits justify the added upfront capital investment.

Mini Forests as Connection to Nature

As an urban greening technique, mini forests establish a connection to nature by increasing nature within the city. Unlike other urban greening techniques however, the high planting density rapidly creates a lush – almost overgrown – mini forest, evoking a sense of wilderness. In mimicking the composition of original ecosystems using natural vegetation, mini forests re-wild on a small scale (Lewis, 2022). Buck (2015) describes rewilding as a practice of the "enchanted Anthropocene" – a participatory practice in which humans are not "reduced to simply removing species but reintroducing them" (p. 373). Rewilding aims to recreate ecosystems in areas of the earth depleted and degraded by human activity. By reforesting the city on a small scale, following the 'recipe' of a native forest and using native vegetative 'ingredients', Miyawaki mini forests reconnect people not only with nature but with the concept of ecosystems and the functioning of nature. In turn, the restorative benefits of nature are intensified by the density. This is especially true when planted in areas with low levels of green space or canopy cover. To enhance an individual's connection to nature, they must first have access to it. This can be achieved distributionally, by planting mini forests in green-deprived areas, and procedurally, by involving those with limited access to nature in the planning and planting of mini forests.

Rewilding & Reconciliation

The Miyawaki method demands a shift in our conception of urban green space. Rather than producing tidy, manicured fields with evenly spaced shade trees, Miyawaki mini forests are characterized by their density, overgrown appearance, and wild nature. Over time, natural processes occur within this man-made ecosystem, generating a landscape that is fundamentally different, more messy and unkept than the colonial landscapes North American settlers have grown accustomed to. In so doing, they offer an opportunity for local residents to reconnect with nature and her processes, observe changes as the forest matures, and discover biodiversity and the beauty of native, wild landscapes. There is potential for reconciliation, as these Miyawaki mini forests may serve as a visual reminder of the environmental and cultural losses that have occurred since Europeans first set foot on Turtle Island with their diseases and invasive species.

Although many mini forest plantings in Canada already include opening ceremonies led by local Indigenous elders and leaders, there is potential for mini forests to also serve as a cultural connection for urban Indigenous peoples. This potential is being explored; for example, mini forests planted under the National Healing Forest Initiative incorporate culturally significant plant species, medicinal plant species, among others, to commemorate those human and more-than-human lives lost due to colonization (Morneau, 2024; National Healing Forests Initiative, n.d.). As a person of mixed Métis-Settler heritage who is disconnected from my ancestral community due to a generational process of colonialism, I recognize that it is not my place to say what could be healing for urban Indigenous peoples. Based on my personal experience, mini forests can (re)connect settlers to the land on which they live, and potentially to an Indigenous worldview. By recreating natural ecosystems, these mini forests remind us that ecosystems do not exist separately from humans or merely in service to humankind. Rather, the land is alive as we are, heals us as we heal her, nurtures us as we nurture her. Mini forests remind us that the land, ecosystems, processes, plants, and trees are all our relations.

Although I recognize a potential for rewilding through mini forests to reconnect settlers to our more-than-human relations, I do not focus on the reconciliatory potential of mini forests in this work. While I acknowledge the potential, I also acknowledge that my vision of reconnection through rewilding is shaped by a colonized perspective. Despite my Métis heritage, I grew up in white, suburban, middle-class Canada. Although I have begun the process of unlearning, I recognize that my understanding of mini forests as potential connectors to the land may not be shared by folks of Indigenous upbringings. I also recognize that this work discusses a process of rewilding which demands significant human involvement and manipulation of the land, which may fundamentally conflict with Indigenous worldviews. Furthermore, the concept of rewilding may seem to suggest the land before was "wild" colonial contact, disregarding the long history of Indigenous Nations cultivating the land across Turtle Island since time immemorial (Buck, 2015). The use of this term is not intended to perpetuate this misconception.

Rewilding & Restoration

The dense, overgrown appearance of Miyawaki mini forests does more than simply remind city dwellers of their connection to and role within the earth's ecosystem, it can also have restorative benefits. Depending on an individual's subjective experience of their own well-being, there are certain aspects of a natural environment which can be more supportive than others – a theory known as Supportive Environment Theory (Bengtsson & Grahn, 2014). According to this theory, those experiencing high levels of stress seek out environments which are serene, biodiverse, natural, and seemingly 'untouched' by humans (Devisscher et al., 2023). Devisscher et al. (2023) present a theoretical framework that maps eight perceived sensory dimensions of urban green spaces according to their restorative effects on individuals with low well-being (Figure 1; p.3).
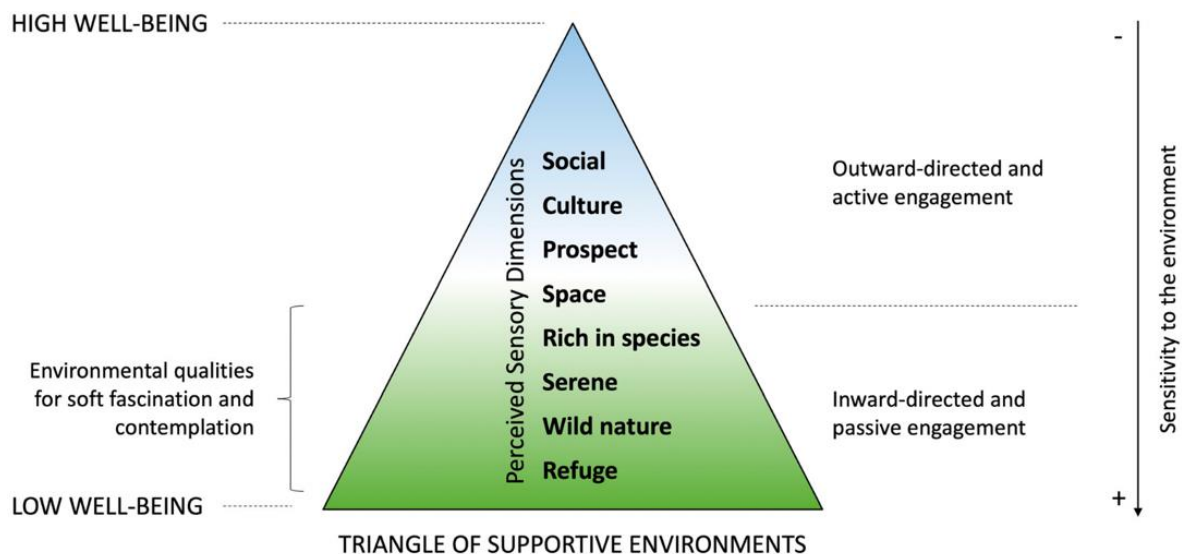

Figure 1: Theoretical framework adapted from Bengtsson and Grahn (2014) with environmental qualities in nature needed by people with low to high experienced well-being (Devisscher et al., 2023)

For individuals experiencing stress and fatigue, the four most restorative aspects of green space are refuge, wild nature, serenity, and species richness. Mini forests address two of these four aspects (wild nature and species richness) due to their characteristic density and high level of biodiversity. The potential exists for one of the remaining aspects, refuge, to be achieved through intentional forest design. For example, placing a bench in the center of the mini forest could create a secluded retreat, thus achieving refuge when the mini forest matures.

Kensington & Chelsea Mini Forests, London, UK

It was a Monday morning in London, England. I waited for my coffee in a line of suits, briefcases, and iPhones with important emails like a fish out of water in my running shoes and jeans. After grabbing my americano, I set off through streets lined with red brick row houses. Passing small community parklets surrounded by wrought-iron fencing and signs denying entry to anyone but the millionaire residents of the surrounding Victorian homes, I arrived at my first destination. One block south of the busy Fulham Road, Serenity Forest is aptly named. Three large steps surround the forest on all sides, creating a raised bed for the forest to grow and seating to enjoy the mini forest. Seven mature trees planted in a row form the center of the mini forest, towering over the square and providing shade from the abnormally hot London sun. The mini forest creates a dense understory beneath the mature trees, the young trees of the mini forest dwarfed as they currently stand only 6' tall. The density is incredible. From where I sit on the southside steps sipping my coffee, I can't see the

Picture 1: Serenity Forest, London, UK (K. Clark, May 2024)

road on the northside of the forest. Without the red gabled row houses on the opposite side of the road, I might have even forgotten I was sitting in the center of a bustling metropolis. I wander around the east edge of the forest, passing people resting on the steps, scrolling social media, smoking, having breakfast. Finding a seat on the northside steps, I realize there is a major hospital only one block east. Traffic sounds begin to overwhelm my senses as cars, ambulances, and motorcycles whizz by. I realize the serenity I had just experienced on the southside steps was not because the forest was tucked away from the chaos, but because the dense forest sheltered me from the noise. With my serenity lost, I rise from my seat and continue my journey.

Walking past the Royal Brompton and Royal Marsden Hospitals, through small streets with boutique shops selling dresses that cost more than my monthly rent, I arrive to Brompton Road. Walking Northeast, I pass designer shops like Dolce & Gabbana and Chanel before reaching the Holy Trinity Brompton Church. An unhoused person rests on the church steps. Another is wrapped in a sleeping bag on the ground. An uncomfortable contrast between the lived reality of the struggling many and the luxury world of the few. I walk to the entrance of the church

close, where two linear mini forests run along either side of the path. On the left side, the mini forest is planted without trees, using only native species found in a traditional English wildflower meadow. Rewilding central London with one of the rarest and most at-risk ecosystems in England, the meadow is dense and lush after only nine months in the ground. The right side mini forest uses a more conventional approach, rewilding the understory beneath a row of mature trees using species of a native English woodland. This side is not growing as impressively as the meadow, with the planted trees reaching barely 2' tall. As I perch on the ledge of the church property's fence, many people wander through the close. People walking their dogs, mothers with baby strollers, couples and small groups of coworkers. It is a well-used space, with many people stopping to read the signs explaining the tenets of the Miyawaki method and the purpose of re-wilding this space. I experience quite a nice feeling of calm; I hear wind rustling the leaves of the trees and the tall grasses of the meadow as doves fly in the canopy overhead. I feel connected to nature. I close my eyes, listening to birds chirping, feeling the fresh air on my face. I almost forget I am in the center of London, until a Lamborghini engine revs past and knocks me from my daydream.

Picture 2: Royal Trinity Brompton English Meadow & Native Woodland Mini Forest, London, UK (K. Clark, May 2024)

Dimensions of Access to Nature

For someone to connect to nature, they must first have access to it. Researchers have found that in many cities around the world, not all neighbourhoods have equal access to green space (Gerrish & Watkins, 2017; Landry et al., 2020; Nesbitt et al., 2019; Quinton et al., 2022). Researchers use different metrics to qualify equitable access to green space. A commonly accepted metric encourages each city resident to live within a safe 5- to 10-minute walk to an urban green space of at least 0.5-hectare size (World Health Organization, 2017). However, recent research proposes that all city residents should be able to see three trees from their home, live within a neighbourhood with 30% canopy cover, and be within 300-metres of a park – known as the 3-30-300 rule (Konijnendijk, 2022). Other research includes equitable representation in the process of green space development, implementation, and stewardship within their definition of urban green space equity (Nesbitt et al., 2018). Here, I characterize dimensions of access to nature as distributional or procedural, where distributional captures who has access to forests and procedural captures their ability to participate in their creation and use.

Distributional

In my review of 340 mini forests around the world, I found that only 26.5% of cases (n=90) are planted in a dense, urban center. Of the mini forest cases in an urban center, 80% create net new green space (n=72) compared to just over half, or 51.2% of all 340 mini forests included in the global review. In other words, over three quarters of mini forests planted in cities are not planted in existing parks, green spaces, or other natural areas to merely increase biodiversity and vegetation density. Rather, these mini forests are planted on elementary school and high school grounds (n=31), empty lots or small urban spaces like parking lots, city squares, or traffic islands (n=19), brownfield sites like former landfills or gas stations (n=9), and on the grounds of civic and cultural institutions like museums, community centres, or places of worship (n=4). Although they are creating net new green space, the most common size of urban mini forests is 200m2 or 0.02 hectares, well below the WHO recommended 0.5-hectare green space size. Moreover, only half include a means of entering or enjoying the mini forest in their design, such as pathways, benches, or gathering spaces (n=36).

      To better understand who directly benefits from the creation of these mini forests, I performed a social equity analysis of Canadian mini forests in urban and suburban centres (n=23). I limited the social equity analysis to the Canadian context for several reasons: (1) the recent surge in popularity of the method in Canada due to the 2023 National Mini Forest Pilot, (2) my familiarity with the context, including indicators of equity-deserving or priority neighborhoods, and (3) limited capacity and data availability for a global analysis. Widening the scope to mini forests in suburban centres was necessary, as only one mini forest has been planted to-date in a dense, urban center in Canada (the TTC Greenwood Yard Pocket Mini Forest in Toronto, ON). As part of the social equity analysis, I collected and analysed census data for various indicators of equity-deserving or priority neighbourhoods and compared this data against city-wide metrics. I organized the indicators into seven groupings: (1) population age distribution, (2) median income, (3) Indigenous population, (4) household tenure, (5) immigrant population, (6) visible minority population, and (7) education.

      Of the 23 Canadian mini forests in urban and suburban environments, 52% create net new green space (n=12). I analysed social equity indicators for 11 mini forests creating net new green space (one was excluded due to a lack of specific location data), and 8 mini forests planted within existing parks or green spaces (three were excluded due to a lack of specific location data). In total, I collected data on 19 neighbourhoods with planted mini forests as part of the social equity analysis (Table 2). Overall, 42% of mini forests are planted within a priority neighbourhood (n=8) and 47% of mini forests are planted in a non-priority neighbourhood (n=9). The most common indicator categories of a priority neighbourhood are low median incomes, high renter populations, high immigrant populations, and more visible minorities. The remaining two mini forests analysed, Garden City Park Mini Forest in Richmond, BC and Manchester Public School Mini Forest in Cambridge, ON, have inconclusive results, each earning 7 points. While these two mini forests did not earn many points, they did have equity indicators in 4 and 5 categories (of 7) respectively, indicating the neighbourhood has multiple intersecting vulnerabilities or equity-deserving characteristics.

      The four highest scoring sites (AMHS Little Forest, Marlborough Tiny Forest, Lake Avenue Park Mini Forest, and Strathcona Heights Mini Forest) each have a substantial difference (>$10k) between the neighbourhood median income and the city-wide median, as

well as a higher percentage of visible minorities (>10% or more) compared to city-wide data. The dominant visible minority in these neighbourhoods is also different from the city-wide data. Three of the four highest scoring sites (AMHS Little Forest, Lake Avenue Park Mini Forest and Strathcona Heights Mini Forest) are in mostly renter neighbourhoods (>50% renter-tenure households) with a difference greater than 20% of renter-tenure households compared to city-wide data. AMHS Little Forest, Marlborough Tiny Forest, and Lake Avenue Park Mini Forest are also in neighbourhoods which are mostly high school educated or below. Two of the highest-scoring sites, AMHS Little Forest and Strathcona Heights Mini Forest are the only two mini forests planted on a social or supportive housing site in Canada.

Digging deeper, of the mini forests which create net new green space in their respective cities, 55% are in priority neighbourhoods (n=6) and 36% are not in priority neighbourhoods (n=4). These statistics are significant when compared with mini forests planted in existing green spaces, where only 25% are in priority neighbourhoods (n=2) and 63% are not in a priority neighbourhood (n=5). Interestingly, I observed that mini forest projects involving a municipal government (n=9) are mostly all sited within existing park spaces (n=7) and non-priority neighbourhoods (n=6) (Table 3). This finding suggests that community groups or non-profit organizations may be more equity-conscious when selecting sites for mini forests. Likely, because these groups or organizations do not usually have their own lands on which to plant, they can be more deliberate when identifying potential sites to maximize impact.

I found that all mini forest projects not located in a priority neighborhood feature only trees in their design, except for one mini forest. The TTC Greenwood Yard Pocket Mini Forest in Toronto did not initially have pathways in the design, but they were added at the last minute due to underground utilities (Mighty, 2024b). In contrast, I observed that all mini forest projects sited in a priority neighbourhood include features which facilitate access and enjoyment, such as pathways, benches, or gathering spaces. These observations suggest that equitable mini forest siting is associated with providing community access to the mini forest.

I found that 53% of mini forests (n=10) are sited within neighborhoods with higher-than-city-average renter populations, with 32% located in renter-dominant neighborhoods (n=6). It is significant that more than half of Canadian urban and suburban mini forests are planted in neighbourhoods where many people do not own land of their own, do not have access to land on which to plant or garden, or may not have the decision-making power to authorize planting or gardening. Community involvement in planting a mini forest becomes more significant in such neighborhoods, where people otherwise lack opportunities to get their hands in the ground.

	Census Tract (CT)	Echouse Mini Forest	AMHS Little Forest	Richmond Secondary School Pocket Forest	Marlborough Tiny Forest	Calgary Centre For Spiritual Living Mini Forest	York Road Park Mini Forest	Lake Avenue Park Mini Forest	Mohawk College Mini Forest	Portsmouth Community Little Forest	Grenville Park Little Forest	Sisters of the Precious Blood Mini Forest	Austin Drive Park Mini Forest	Strathcona Heights Mini Forest	Deauville Park (Pierrefonds-Roxboro) Mini Forest	Terra Nova Rural Park Mini Forest	TTC Greenwood Yard Pocket Park / The Pocket Tiny Forest	Garden City Park Mini Forest	Manchester Public School Mini Forest	Mount Pleasant Cemetary Mini Forest
Mini Forest Information	(CT numbers)	0026.06	0002.00	0147.10	0038.08	0032.00	0003.00	0072.03	0013.00	0004.00	0014.00	0044.02	401.2	0014.00	0515.02	0149.06	0072.02	0147.14	0126.01	0020.01
	Does the Mini Forest create net new green space?	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	NO	YES	NO	NO	NO	NO	YES	YES
Population Age	CT has more children (0-14) than the city	1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	1	0	0
	CT has more seniors (65+) than the city	0	0	1	1	0	0	0	0	1	1	1	2	0	0	0	0	0	2	1
Income	CT has a lower median income than city-wide	1	4	0	3	0	1	3	0	2	2	0	0	4	0	0	0	1	1	2
Indigenous	CT has a higher percentage of self-identifying Indigenous individuals than city-wide	0	0	0	0	1	1	0	0	1	1	0	0	1	0	0	1	0	1	0
Household Tenure	CT has a higher percentage of renter-tenure households than city-wide	1	4	0	0	2	1	4	0	2	3	0	0	4	0	0	0	0	1	4
	CT is mostly comprised of renter-tenure households (>50%)	0	1	0	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	1
Immigrant	CT has a higher percentage of immigrants than city-wide	2	0	1	2	0	0	2	0	1	1	0	0	2	1	1	0	1	0	1
	Immigrants in the CT are mostly first generation (>40%)	1	0	1	1	0	0	1	0	0	0	0	1	1	1	1	0	1	0	1
Visible Minority	CT has a higher percentage of self-identifying visible minority individuals than city-wide	2	2	0	3	0	0	3	0	1	1	0	0	3	1	1	0	2	0	2
	The dominant minority group in the CT is different than the city-wide dominant group	1	1	0	1	0	0	1	0	1	1	0	0	1	1	0	0	1	0	1
Education	CT has fewer post-secondary (Bachelors and higher) degrees than city-wide	1	1	0	3	0	0	1	0	0	1	0	1	2	0	0	0	0	1	0
	CT is mostly high school educated or less (>50% high school degree or no degree)	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Final Social Equity Score		11	14	3	15	3	3	18	0	10	12	1	4	20	4	4	2	7	7	13
CT is a Priority Neighbourhood		YES	YES	No	YES	No	No	YES	No	YES	YES	No	No	YES	No	No	No	Inconcl.	Inconcl.	YES

Table 2: Social Equity Analysis Scores for 19 Canadian suburban or urban mini forests across seven (7) categories of equity indicators

Table 3: Mini Forest design features, stakeholders, and final social equity scores.

Category	Attribute	Ecohouse Mini Forest	AMHS Little Forest	Richmond Secondary School Pocket Forest	Marlborough Tiny Forest	Calgary Centre For Spiritual Living Mini Forest	York Road Park Mini Forest	Lake Avenue Park Mini Forest	Mohawk College Mini Forest	Portsmouth Community Little Forest	Grenville Park Little Forest	Sisters of the Precious Blood Mini Forest	Austin Drive Park Mini Forest	Strathcona Heights Mini Forest	Deauville Park (Pierrefonds-Roxboro) Mini Forest	Terra Nova Rural Park Mini Forest	TTC Greenwood Yard Pocket Park / The Pocket Tiny Forest	Garden City Park Mini Forest	Manchester Public School Mini Forest	Mount Pleasant Cemetary Mini Forest
Mini Forest Information	Census Tract (CT)	0026.06	0002.00	0147.10	0038.08	0032.00	0003.00	0072.03	0013.00	0004.00	0014.00	0044.02	401.2	0014.00	0515.02	0149.06	0072.02	0147.14	0126.01	0020.01
	Does the Mini Forest create net new green space?	YES	YES	YES	YES	YES	NO	NO	YES	YES	NO	YES	NO	YES	NO	NO	NO	NO	YES	YES
Mini Forest Design	Means to enter? (i.e. pathway)	-	YES	No	YES	No	No	-	No	YES	YES	-	-	-	No	No	YES	No	-	-
	Means to enjoy? (i.e. benches, gathering spaces)	-	No	No	No	No	No	-	No	YES	YES	-	-	-	No	No	No	No	-	-
	Trees only?	-	N/A	YES	N/A	YES	YES	-	YES	N/A	N/A	-	-	-	YES	YES	N/A	YES	-	-
Stakeholders Involved	Municipal Government				YES	YES	YES							YES	YES	YES	YES	YES		YES
	Conservation Authority or Other Environmental Agency																YES		YES	
	National Non-profit Organization				YES	YES			YES		YES	YES	YES		YES	YES				
	Community-based Non-profit Organization	YES	YES	YES	YES	YES		YES	YES	YES	YES			YES	YES			YES		YES
	Community Network, Grassroots Organization or Other Small-scale Organization (e.g. health centre, school society)		YES	YES									YES				YES			
	School or University																		YES	
	Final Social Equity Score	11	14	3	15	3	3	18	0	10	12	1	4	20	4	4	2	7	7	13
	CT is a Priority Neighbourhood	YES	YES	No	YES	No	No	YES	No	YES	YES	No	No	YES	No	No	No	Inconcl.	Inconcl.	YES

Table 3: Mini Forest design features, stakeholders, and final social equity scores. Municipal involvement and correlation with net-new green space is highlighted in blue. Non-priority neighbourhood and correlation with tree-only mini forest design is highlighted in orange

Procedural

Following theories differentiating types of justice, a growing body of literature recognizes an additional dimension of urban green equity beyond the equitable distribution of and access to urban green space for all city residents. As defined by Nesbitt et al (2018), recognitional urban green equity includes representation of diverse communities within a fair process that values their participation, while also describing the *desire* and *ability* of those diverse communities to participate in that process (p.245). Achieving urban green equity is thus not simply about increasing access to green space, putting new green spaces in the "right" neighbourhoods, but also doing so in the "right" way, through a community-engaged decision-making, implementation, and stewardship process.

A hallmark of the Miyawaki method or tiny forest approach is the community involvement in the planting and implementation of the mini forest. While some mini forest practitioners described a 'shallow' community engagement process that merely informed and invited the community to the planting day (P01, P06, P09), many others described a more involved process, where the community engaged in site selection, preparation, and even mini forest design (P03, P05, P07, P10). Some examples identified specific groups or communities to prioritize for inclusion, adjusting their approach to ensure they felt comfortable participating. In one example, a dedicated community engagement team identified established community groups or networks to tap for participation. They specifically targeted groups of people typically underrepresented in local decision-making and planning processes. By dedicating preliminary staff time and effort, their mini forest planting events are consistently attended by large volunteer groups representative of the surrounding community (P10). In another example, a municipal government involved in planting the city's first mini forest received an overwhelming amount of volunteer registrants for their planting event. To ensure an equitable and representative implementation process, they decided to extend the planting event across two days. The first day was open exclusively for participants from specific marginalized and often underrepresented groups, while the following day remained open to the entire community (P09). The following section highlights the myriad diverse ways the local community is engaged or involved in planning, implementing, and/or stewarding mini forests across the globe – improving procedural equity in a context-appropriate manner.

Mini Forests as Connection to Community

Despite the focus on the Miyawaki method as a tool for climate mitigation and adaptation in promotional materials, reports, and company websites, I observed significant themes of community – including engagement, co-design and co-creation, participation on planting day, sense of ownership, and stewardship – in my research interviews. When discussing observed outcomes or benefits, mini forest practitioners mentioned benefits to the local community 60% more than environmental benefits (Figure 2). Mapping these responses onto an adapted framework of Munasinghe's (1992) three elements of sustainable development, social benefits (i.e. equity, community engagement, empowerment) comprise 58.6% (n=34) of the 58 total

benefits mentioned, compared to 36.2% (n=21) for environmental benefits (i.e. biodiversity, resilience, higher survival rates). Three of the benefits mentioned (5.2%) were economic benefits, relating to local job creation, new sources of income, or low project costs. Although the environmental benefits of mini forests may become more evident with time and research, benefits to the local community were immediately apparent to mini forest practitioners upon implementation. These benefits included new social connections, environmental education and learning opportunities, increased sense of belonging and place, feelings of empowerment within a process of co-creation, and even benefits relating to basic survival, such as access to a secure food source. The practice of planting mini forests is unique because it works at the intersection of ecology and community, benefiting both.
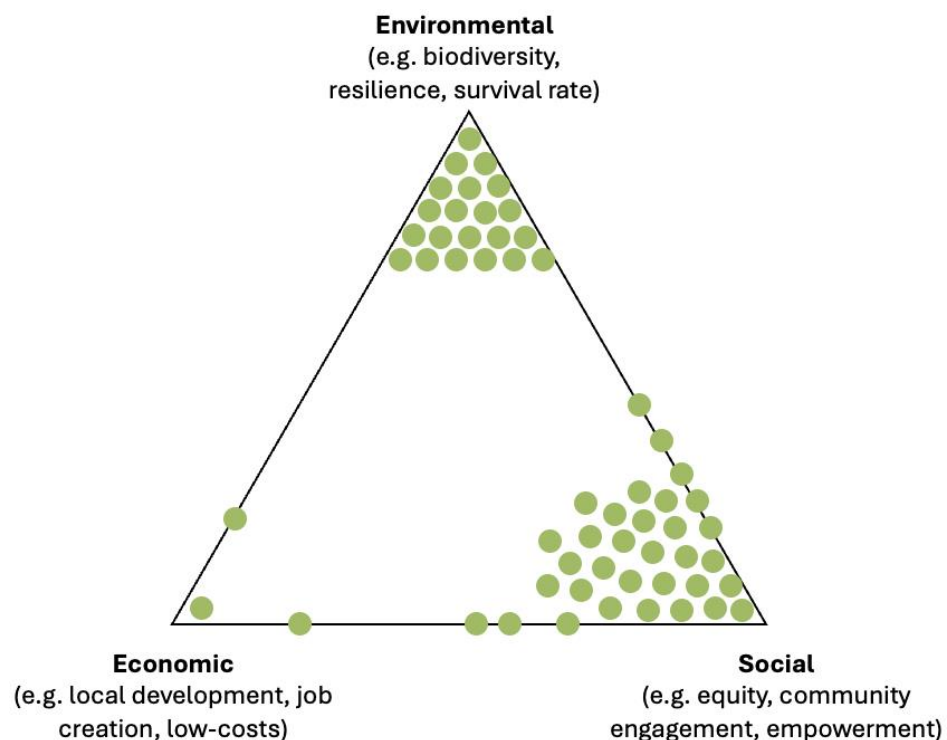
Figure 2: Outcomes or benefits observed by mini forest practitioners since implementing a mini forest, adapting Munasinghe's (1992) three elements of sustainable development as a framework.

Pre-planting: Co-creating with Community

While all mini forest practitioners discussed community engagement to educate the community on the mini forest concept, to raise awareness about an upcoming planting event, or to meet local municipal government requirements, some of the organizations and companies implementing mini forests globally take the preliminary community engagement a step further, actualizing an equitable, community-based process. I highlight two mini forest cases identified in the global case review for their unique community engagement methods. These exemplary cases used a community-engaged co-creation approach, from site selection to design to implementation, to ensure the mini forest meets the needs and desires of the local community.

Co-creation addresses the recognitional dimension of urban green equity and empowers members of the community to be active participants throughout the process.

Case Study #1: La Pacaniere Mini Forest (2022)
Mini Big Forest, Les Jardins de Phine, Ville de la Grigonnais | Grigonnais, France

Approached by the local municipal government at the end of 2021 to develop a plan to rewild a 5,000m2 City-owned site, collaborators Mini Big Forest & Les Jardins de Phine ran four community workshops to define the vision, understand the goals and objectives for the future mini forest, and ensure community involvement in decision-making. Two children's workshops kicked off the co-design process, where children from the local community outlined their dreams for the space, describing their ideas for uses, activities, and even layout. These workshops incorporated visual activities like collaborative mapping and resources like pictures of native species to empower the children to explicitly visualize their ideas. Following the children's workshops, two workshops with adults from the community refined the children's vision into a final working plan. The result was a master plan featuring a series of mini forests designed to address different goals. The master plan included a garden-forest with edible plants for harvesting, a rest and relaxation mini forest with benches, a mini forest 'labyrinth' with meandering paths for contemplative wandering, a mini forest 'sensory journey' zone for education and discovery, and a pond for observing biodiversity. Following the co-design process, multiple planting days engaged the community once more. Some of these planting days were open to all community members, while others were exclusively for the participants of the co-creation process.
(Lester, 2022; Mini Big Forest, n.d.).

Case Study #2: Portsmouth Community Little Forest
Little Forests Kingston, Seniors Association Kingston Region, City of Kingston (land) | Kingston, ON, Canada

In 2022, Little Forests Kingston and staff from the Seniors Association Kingston Region Seniors' Centre began collaborating on a mini forest project on a City-owned vacant lot adjacent to the Seniors' Centre. Little Forests Kingston, seniors' association members, seniors' centre staff, and residents of the surrounding neighbourhood co-created the mini forest. A series of workshops educated the local community on the "traditional Indigenous values that once shaped the sustainable stewardship of the land, the Miyawaki Method of afforestation, design principles of inclusive living systems and the [historical] composition of old growth forests in the area" (Little Forests Kingston, 2023). Following these educational sessions, over 30 community members participated in co-design workshops to finalize a plan for City approval. The final plan proposed three mini forests: re-wilding the understory of an existing tree canopy, a walking forest consisting of native Carolinian forest species, and a "Great Lakes Mixed Forest" consisting of native species which would have been typical in the region prior to their removal through logging and agriculture. Perhaps due to this co-design process, the resulting mini forests have received a high-level of ongoing care and civic stewardship.
(Foley, 2023; Little Forests Kingston, 2023)

Planting Day: Engaging the Community

The labour-intensive nature of the Miyawaki method has lent a high-level of community involvement to the implementation of mini forests globally. From Miyawaki's original conception of the method through to its present widespread implementation, the 'planting day' has been regarded as an opportunity to bring many people together to realize a forest in just a few hours.

Although some organizations face challenges engaging adequate numbers of volunteers to successfully run a planting day, most groups involved in mini forest plantings around the world engage significant numbers of community volunteers. From the global case review, the average number of volunteers participating in a planting day is over 130. In Canada, the average is just over 55 volunteers, a still impressive number considering their relative novelty in the Canadian context. One of the mini forest practitioners remarked during my research interview that the challenge is not engaging adequate numbers of volunteers but figuring out alternative means to meaningfully involve all the volunteers who attend (P04). Community engagement reports included in the global case review detail unique strategies that have been incorporated last minute to manage a significantly high turnout, such as making decorations or signage, subdividing the planting area into smaller quadrants to ensure each volunteer can plant at least one tree, or widening the scope of work to include clearing invasive species from a nearby area.

High turnouts at mini forest planting events demonstrates an appetite for this type of community engagement event. In reflecting on the wide appeal, I offer a few possible explanations. For one, the method's unique charm may draw the community to these events. It could be the method's accessibility, requiring no prior experience and taking only a few hours to plant an entire (mini) forest. From the global case review, I found that most global mini forest plantings have taken place since 2020. The high turnout could thus be explained as people seeking social connection and ways to reduce feelings of isolation following the Covid-19 lockdowns. These mini forest planting events also offer an opportunity for newcomers to a community to familiarize themselves with their new neighbours and place. In one mini forest case in Canada, the Derek Doubleday Arboretum Mini Forest in Langley, BC, newcomers from the Ukraine joined other BIPOC, youth, and Urban Indigenous community members to plant the mini forest (Mighty, 2024a). Before the Russian war, Ukrainians would plant trees together in the fall. Participating in the mini forest planting offered a connection to their cultural tradition and their new community. In my research interviews, one practitioner also noted the participation of new immigrants in mini forest plantings(P02). Again, the lack of access to land on which to plant is perhaps a motivating factor for immigrant participation, but the practitioner noted mini forest planting events are a good opportunity for newcomers to develop a sense of belonging while affecting the place in which they now live.

Throughout my research interviews, practitioners remarked that mini forest planting events are rewarding, with more than one practitioner becoming emotional as they described particularly memorable planting days (P02, P08, P10). In one example, hundreds of volunteers – children, parents, press, local politicians, and more – gathered to plant a mini forest. For many in the group, this was their first experience planting anything at all, even putting their fingers into soil. In the interview, the energy of this particular planting day was described as palpable and

incredible, the volunteers lighting up as they discovered the joys of nature. Struggling to put the magic into words, the practitioner simply described it as a "once-in-a-lifetime" experience (P08). In another example, a practitioner expressed the overwhelming emotion they experienced following a planting day at a social housing site. Crying on their return home from the event, they felt overwhelmed remembering the joy they experienced watching volunteers from deprived backgrounds tangibly connect with nature for the first time ever (P10).

Garden City Park Mini Forest Planting, Richmond, British Columbia, Canada

It was a typical Pacific Northwest morning: grey, cold, and raining. The shades of green of the park were vibrant with the new growth of early Spring. As I approached the tent shielding the refreshments and registration tables, pockets of people under umbrellas were chatting. Between them, neat rows of black plastic nursery buckets were organized according to the plants they contained. The varieties of short single stemmed young trees gathered on the left, next to smaller buckets with shrubs and even shorter stems. Beside them, rows of tiny nursery pots with ground cover plants of greens, reds, and browns. A heaping pile of mulch, as tall as I am, waited for the event to begin. Shortly after signing in, the planting event was kicked off by our host, MLA Henry Yao. He delivered his opening speech explaining the Miyawaki method and its benefits in both English and Mandarin, considering the large gathering of non-English speakers. Representatives from other stakeholder groups, the City of Richmond and Garden City Conservation Society, gave us instructions on how to plant. The audience was captivated by the planting demonstration, some even taking notes. For many, this would be their first opportunity to plant a tree or green their city.

Picture 3: Nursery seedlings waiting to be planted (K. Clark, March 2024)

Picture 4: A newly planted Garden City Park Mini Forest, Richmond, BC (K. Clark, March 2024)

The planting began as we volunteers grabbed our shovels and first tree. The organizers had flags marking each tree planting location. They instructed us to use our forearm to measure the distance for planting the understory in a radial pattern around the tree. Young children, no more than four years old, planted alongside their parents and elders, delighted after each tree or plant was patted safely into the ground. Most of my fellow volunteers did not speak English. Others, in broken English, told me their temple had advertised the planting event and encouraged their congregation to participate. The planting event was intergenerational and multi-cultural, bringing people together for a common purpose. In only two hours, we planted 300 trees as a collective of

diverse people – stakeholders, children, grandparents, newcomers to Canada, and tree enthusiasts. As we completed the planting, spreading the last of the mulch around the base of the new mini forest, a sense of satisfaction spread among the crowd. We had done something good for the city, for the planet, and for ourselves, all before lunch.

Post-planting: Fostering Civic Stewardship through Context-appropriate Framing

To grow successfully, a mini forest requires some initial maintenance and monitoring in the first few years of life. Civic stewardship is when non-governmental organizations, civic groups, or community members manage, monitor, conserve, and maintain their local ecological and socio-economic environments (Caggiano et al., 2022). Civic stewardship is an important aspect of a mini forests' long-term success; however, it requires significant volunteer time and capacity to steward a community green space. It requires volunteers to commit to caring for the mini forest after the excitement of the planting event fades but before the canopy lifts, the mini forest matures, and the (potential) environmental benefits are fully realized. Fostering civic stewardship must necessarily differ across contexts to appropriately relate the significance of the mini forest to the local community.

Developed Contexts

In the global case review, I observed a typical approach to mini forest stewardship in the Global North is stakeholder stewardship, where one of the stakeholders involved in the implementation undertake the site's maintenance thereafter. This could mean the Parks department includes the site on their municipal watering route, or the community group or non-profit organization who initiated the project continues to steward the site thereafter. In the latter case, the group or organization will sometimes host a maintenance event, inviting members of the local community to volunteer and engage in stewardship for a few hours. These maintenance events can reinforce ties established during the planting event, offer the community an opportunity to get their hands dirty, and invite potential long-term stewards into the maintenance practice. One mini forest practitioner noted that community uptake of civic stewardship in the Global North is boosted in dense, urban environments where the mini forest is the only local green infrastructure. When it is the only green feature in a concrete landscape, local community members feel an increased sense of ownership over their mini forest. "People really give a f*** about trees" and will care for those planted in their community, especially when an initial connection is established through a community-engaged process (P10).

Another observation from the global case review is that engaging local school children in mini forest maintenance and monitoring is an increasingly common approach to mini forest stewardship in developed contexts. This offers an educational opportunity for children to learn about ecosystems, ecology and biodiversity. Mini forests are commonly planted on school grounds as it can be mutually beneficial both for the children and for the forest, as there is a committed and engaged group to steward the mini forest year-after-year. Because of the diversity of ages and skill levels in a school, the work can be easily subdivided amongst the grade levels, with younger children taking on more simple monitoring, weeding, and watering

tasks and the older children conducting more rigorous experiments. Nearly 25% of the 250 mini forest cases in the Global North are planted in primary or secondary school grounds (n=59).

Developing Contexts

In the Global South, where economies are developing and many struggle to meet their basic needs, civic stewardship can be more difficult to foster. To engage the community in the stewardship of mini forests, the community needs to have a personal motivation to maintain the forest's health. In developing contexts, issues of day-to-day survival – economic concerns, hunger, water scarcity – eclipse longer-term concerns relating to environmental health or climate change. In my research interviews, mini forest practitioners working in developing contexts discussed the importance of appropriately framing the issues addressed by the mini forest, going beyond explaining potential ecological benefits to adapt the method itself to meet the needs of the local community.

In one example, mini forests planted to reforest a local water catchment were promoted to the local community as a water management technique rather than an urban greening approach (P05). In the four years since planting the mini forests, the groundwater has noticeably recharged and local water levels have increased to a point where they are now able to supply water to two additional neighbourhoods. In turn, the community has developed a sense of responsibility towards and ownership over the mini forests, given their intimate and direct relationship to the health and well-being of the community.

In another example, the Miyawaki method was adapted to plant not only native species, but also plants with high-value seeds which can be processed into oil. As part of the community engagement process, training was provided to local women to teach them to harvest and process the seeds. In so doing, the mini forest contributes to the local economy and generates a new source of income for the community. This economic benefit has empowered the local community, addressed immediate concerns, and incentivized long-term civic stewardship of the mini forest. Following the success of this project, the practitioner now incorporates local economic development in all their mini forest projects. They do so by either designing the mini forest to provide additional sources of income, or by creating new local jobs by training members of the community to gather local seeds, grow native tree and understory species, and establish a plant nursery. These local nurseries then supply plant seedlings to local mini forest and other afforestation projects. Because word spread regarding the success of these economic-environmental mini forest projects, the practitioner noted that they are seen as a "development partner in the eye of the community," planting mini forests while contributing to the local economy, improving incomes, and building capacity within the community (P05).

Similarly, a mini forest practitioner working in neighbourhoods of extreme deprivation in a Global South megalopolis adapts the method to better address the immediate issues facing those communities (P03). The practitioner adapts the method to incorporate edible plants and fruit-bearing trees into the mini forest planting scheme, addressing local food scarcity. Rather than planting the mini forest for environmental purposes, the practitioner uses mini forests as part of a months-long educational program for the children of the community. This educational curriculum teaches children about native ecology, biodiversity, and climate change, while incorporating life skills including how to grow seeds, care for plants, harvest food, cook

nutritional recipes using fresh produce from the mini forest, and more. A tangible, mutually beneficial connection between the community and the mini forest is established, whereby stewarding the forest and maintaining its health directly maintains the health (nutrition) of the local children. The practitioner also hires a local educator from the community, who can help relate macro-level environmental concepts to children facing hunger, abject poverty, domestic violence, gang-related violence, and/or drug abuse at home. In other words, the curriculum is designed to make environmental learning accessible to those who "don't have the privilege of being concerned with reforestation". Outdoor classrooms are incorporated into the design, facilitating access and usability. The mini forest thus becomes a place of refuge, a space where the children feel invited to retreat. A place where they are free to interfere, care, and shape the environment to meet their physical, emotional, and spiritual needs. "Just breaking the ground and allowing the community to plant and harvest how they want" is a transformative act, demonstrating to these children that they can "shape the area" and make change.

Mini Forests as Connection to Resilience & Transformation

This research investigates the global implementation, impacts, and experience of Miyawaki method mini forests using a mixed-methods approach. In conducting a case review of 10% of global mini forests, a social equity analysis of Canadian urban and suburban mini forests, and in-depth interviews with ten mini forest practitioners working in various contexts, I identified two primary themes of connection established in planting mini forests: to nature and to community. I found a connection to nature is established by the dense, overgrown nature of Miyawaki mini forests, evoking a sense of wilderness, and by distributing mini forests in an equitable manner. A connection to community is established in a myriad of meaningful, context-appropriate ways through the planning, planting and stewardship process. I observed that adjusting the planting approach to the needs and desires of the local community, especially in the Global South, is necessary for encouraging long-term stewardship and a sense of ownership.

The practice of planting mini forests connects individual community members with nature. As seen in the global case review, most mini forests planted in urban centres create new green spaces. In the Canadian social equity analysis, most mini forests in urban or suburban centres that create net new green space are also planted in priority or equity-deserving neighbourhoods. In increasing access to green space for all city residents, and especially in those neighbourhoods with lower levels of greenness and vegetation, mini forests provide health and well-being benefits to underserved communities. All urban green spaces increase social and individual coping capacities, helping people to manage stress, stressful life events and major change (Demuzere et al., 2014). In addressing the inequitable distribution of urban green spaces in cities, mini forests can increase the coping capacity of residents living in marginalized neighbourhoods. In other words, more neighbourhood green space, especially in deprived areas, can lead to more resilient individuals and neighbours.

Planting or stewarding urban green space can also increase an individual's feeling of ownership and sense of belonging within their neighbourhood. A stronger attachment to place can lead to climate-positive behaviour, as people are more likely to act carefully and respectfully in places they value (Gifford, 2008; Demuzere et al., 2014). The practice of planting mini forests is an opportunity for individuals to take direct, hands-on climate action. One mini forest

practitioner reported that planting mini forests eased climate anxiety for individual volunteers, noting that making climate-positive change (like planting a new urban green space) is more appealing and empowering than merely limiting climate-destructive behaviour (P02). The more people are invited into practices of caring for their local environment, the more that local environmental care will filter into other behaviours. It is possible the practice of planting mini forests might affect climate-positive behavioural change in other areas of an individual participants' life. Across the global practice of planting mini forests, children play an integral role in the design of mini forest programs, and their implementation and stewardship. This focus on educating the next generation about ecosystems, ecology, and the joys of nature could have long-term, generational impact and transformation.

Beyond addressing the inequitable distribution of green space in cities, the practice of planting mini forests is an opportunity to improve procedural equity in urban greening. By engaging large numbers of diverse volunteers – on average over 130 volunteers per planting event – the practice of planting mini forests offers a unique opportunity among urban greening techniques to bring large swaths of the community together. By connecting communities through a community-engaged planning, implementation, and stewardship process, mini forests can be seen as a social infrastructure. Social infrastructure consists of physical spaces which invite people into the public realm and facilitate interactions between them, offering an opportunity to build social capital and cohesion (Klinenberg, 2018). According to a staff person at an addictions and mental health centre with a recently planted mini forest:

> "When you have space for people to do stuff alongside one another, they actually build more relationships…Last week, I caught someone (at a group class in the garden) giving someone else like a little toffee and birthday card. Those people wouldn't have really met otherwise!" (Goulem, 2022).

Social cohesion is an essential building block of neighbourhood resilience to the impacts of climate change, and research shows it translates into higher levels of trust, more widely shared financial and non-financial resources, and a deeper sense of responsibility to the community post-disaster (Aldrich & Meyer, 2014). In their implementation and thereafter, mini forests foster social ties and build social cohesion, and in so doing, increase neighbourhood resilience.

I argue that mini forests are an example of transformative incrementalism. Because of their small scale, the perceived barriers to access are lower for individuals and communities, making people feel more welcome to become involved. In making local environmental care accessible, manageable and approachable; in normalizing civic stewardship of green spaces and the places in which we live; in bringing people into nature month-after-month, year-after-year, to watch "their" tree (that they planted) grow, these mini forests create incremental behavioural and societal change. It is not the mini forest itself, but the practice of planting mini forests that transforms the individual, the community, and incrementally, the world.

Terra Nova Rural Park Mini Forest I & II, Richmond, British Columbia, Canada

Picture 5: Terra Nova Rural Park, Richmond, BC (K. Clark, July 2024)

Between the tall grasses and young trees, I stand, feeling immersed in nature. Mature trees edge the overgrown field. The mini forest is young, only six months old, and yet already the trees are reaching taller than my knees. A low-flying plane slices the blue dome sky overhead, bringing hundreds to visit the city where the mountains meet the sea. In the wake of the planes noise, nature is quiet for only a moment. Soon, I hear the bees buzzing, insects trilling, birds chirping, something rustles in the leaves of the understory. Looking to my left, the elder mini forest, planted just over a year ago, is so dense that I can't see what creature runs through. Birds dart by, almost too fast to be perceived, perching on a tree branch at eye level in front of me. I stand, between the two mini forests, feeling nature's aliveness. I hear an orchestra of all different species. I see every shade of green. I smell the decomposing matter under foot. A reminder of the million processes happening in the soil below. As I walk out along the gently trodden path someone had made before me, back to the wood chip trail to take me back to the parking lot, the sounds quiet. I listen for it, but the orchestra has finished. A few birds fly between the tree canopies above, another flies in the opposite direction, returning to the sanctuary from which I came.

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