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CONTENTS

Abstract. Background: The field of urban forestry encompasses many dimensions, of which that of visual-spatial perception, addressing the spatial relationship between city and trees, has received little attention. Analyzing the urban forest from a visual-spatial perspective is needed to understand relationships between different components as well as site-specific qualities. Methods: Tree configurations describe the relationship between form and space, determined by the relative disposition of the trees which result from an interaction between design and the development over time. Based on field observations, with the city of Delft in the Netherlands as a case study, 35 generic tree configuration types have been defined. With this "vocabulary," specific tree configurations and their relations are researched, describing the urban forest from an eye-level perspective as an essential level on which the spatiality of the urban forest can be understood. Results: Unraveling the urban forest components by comparing two emblematic ensembles of tree configurations allows an understanding of their heterogeneity as well as their coherence and dynamics. Conclusions: The relationship of the tree vocabulary with the specific location exposes their role as an ordering structure and a carrier of the identity of Delft, and their differentiation and site-specific qualities, revealing a composition of wooded areas each with their own characteristics, shows both urban and forested areas as equivalent components of an urban forest mosaic. This differentiation can be used as a tool for strengthening relations between the different components as well as diversity and heterogeneity in urban forests.

Keywords. Site Specificity; Tree Configurations; Tree Vocabulary; Visual-Spatial Characteristics.

Abstract. Background: Urban forests are increasingly recognized as important tools in climate change mitigation and adaptation, prompting many cities to set tree canopy cover targets. However, current gaps in knowledge include understanding relationships and the feasibility of maximizing benefits between urban greening and other climate actions, such as densification. This study offers a data-driven and manageable framework for assessing current and anticipated future urban forestry conditions using spatial tree and built-form models. Methods: We spatially modelled 4 planting scenarios for increasing tree canopy cover by 2050 in a densifying neighbourhood in Vancouver, Canada, with low (< 10%) existing tree canopy. Results: Based on mortality assumptions, we aged out and replaced 1,853 to 2,445 trees since 2020. We added 6,079 to 11,726 trees across the 4 scenarios (10,228 to 15,823 total), increasing canopy cover from 7% in 2020 to a maximum of 16% by 2050. Despite rigorous tree planting, we were unable to achieve a 30% canopy cover target at neighbourhood scale. Tree replacement due to mortality was a major contributor to decreased canopy cover and volume in future scenarios. The 31% to 34% reduction in future canopy cover due to the replacement of aged-out trees was driven by changes on private parcels. Conclusion: Our systematic framework for generating and spatially modelling trees in a simulated future neighbourhood provides an opportunity for iteratively assessing multiple potential tree planting configurations. Future work for this project includes investigating social-ecological, outdoor shading, and building energy implications of various modelled urban forest strategies.

Keywords. Canopy Cover; Future Simulation; Proxy Model; Tree Planting; Urban Densification.

Abstract. Background: The importance of urban trees and their benefits to society are increasingly recognized. However, cities are a challenging environment for trees to grow and thrive. Current knowledge on tree vulnerabilities to existing urban stressors remains scarce and available only for a limited number of species and specific stressors. Methods: Using the Delphi method with urban forestry experts familiar with the

studied area and a closed-ended questionnaire, we sought to elucidate the tolerance of commonly planted urban tree species in northeastern North America to multiple urban stressors—air pollution, soil compaction, de-icing salts, insects and diseases, strong winds, ice storms, snow, drought, and extreme temperatures—as well as to assess which characteristics may capture a species' ability to cope with these stressors. Results: *Ginkgo biloba*, *Gleditsia triacanthos*, *Quercus* spp., and *Ulmus* spp. were rated by urban forestry professionals as the most tolerant species in northeastern North America to the studied stressors. No species was listed as tolerant to all stressors. Furthermore, respondents disagreed on how a given species was likely to be affected by or respond to a given stressor. Conclusions: Our study provides a powerful approach to gaining difficult-to-obtain information on trees' vulnerabilities to environmental stressors and identifying the gaps that remain unaddressed. Our findings fill some of the gaps in our knowledge of city trees' vulnerabilities, which makes the approach useful in practice to inform the choice of tree species that could be planted across our cities to build more resilient urban forests.

Keywords. Delphi Method; Expert Knowledge; Resilience; Stress Tolerance; Tree Management; Tree Vulnerability; Urban Forestry; Urban Trees.

Abstract. The importance of urban tree diversity for improving resilience is increasingly understood by decision makers. Urban foresters want to prevent the overrepresentation of species on their streets and in their city, which could result in a significant loss of canopy cover in the event of a large-scale disturbance such as a drought or an exotic pest or disease. Although numerous software and tools exist to visualize tree inventories and plan tree maintenance work, only a few offer support for increasing tree diversity. After reviewing the existing tools available for urban forest managers, we present SylvCiT, a novel decision-support and open-source software available on a web platform designed to consolidate information related to the urban forest in one place and facilitate decision-making at different scales. While the first interfaces provide the user with a spatially explicit portrait of the urban forest (species richness, functional diversity, structural diversity, i.e., diameter classes) and associated ecosystem benefits (e.g., stored carbon, ornamental value), the software is designed to produce a list of functional groups and appropriate species to plant considering tree species already present. Based on an artificial intelligence algorithm, SylvCiT identifies the types of trees (species and functional groups) that are absent or underrepresented at different scales to make recommendations that increase species and functional diversity to improve resilience to global change. SylvCiT will continue to be developed to evaluate other ecosystem benefits and integrate criteria such as site characteristics into the recommendation algorithm.

Keywords. Functional Diversity; Plantation; Software; Urban Forests; Urban Trees.

Abstract. Background: This paper traces the changing dynamics of forest management on privately owned land in southern Ontario, Canada, using the conceptual lens of state legibility to highlight how incentive programs are creating new ways of seeing and engaging in stewardship. Specifically, the Managed Forest Tax Incentive Program (MFTIP) and its corresponding Managed Forest Plan are investigated as a means through which a diversified field of knowledge has been activated to enable climate-conscious adaptive stewardship across the region. Methods: This case study uses a qualitative approach, incorporating document analysis, semi-structured interviews, and direct observation. Similar patterns and relationships within and across sites are identified to build theory and shed light on the socio-ecological context of private forest management. Results: Set within southern Ontario's history of forest management and the rise of neoliberal environmental governance, this paper contributes theoretically to scholarship on state legibility. The results illustrate a shift in stewardship on private lands through a rescaling of management responsibility that embraces different perspectives and builds place-based practical knowledge of forest systems. By mapping and building knowledge networks, diverse approaches to management have proliferated at the local and regional levels. These approaches have been influenced by previous management experience, different professional backgrounds, knowledge of participants, and the motivation of landowners to engage in active stewardship. Conclusion: The process of developing a management plan plays a key role in making landscapes legible to all stakeholders. The document also serves as an instrument of the state to build private landowners' and forest consultants' knowledge and capacity. This has set in motion a socio-ecological landscape strategy to address encroachment, invasive species, and climatic challenges in this increasingly urbanizing region.

Keywords. Environmental Governance; Forest Stewardship; Incentives; Legibility.

Abstract. Background: Trees are a critical part of urban infrastructure. Cities worldwide are pledging afforestation objectives due to net-zero targets; however, their realisation requires a comprehensive framework that combines science, policy, and practice. Methods: The paper presents the Green Urban Scenarios (GUS) framework for designing and monitoring green infrastructures. GUS considers weather, maintenance, tree species, diseases, and spatial distributions of trees to forecast their impacts. The framework uses agent-based modelling (ABM) and simulation paradigm to integrate green infrastructure into a city's ecological, spatial, economic, and social context. ABM enables the creation of