OCTOBER 2018

SITELINES

Landscape Architecture in British Columbia

Managing for Future Urban Forests

Urban forestry: enhancing people-tree connections | All the Trees: A Public Art Project | It starts with soil: how to increase the resilience of urban forests | Emerging biotic and abiotic issues facing BC communities | Subdivisions and Second Growth | Protecting Vancouver's Urban Forest | CSLA Fellow: Adrienne Brown

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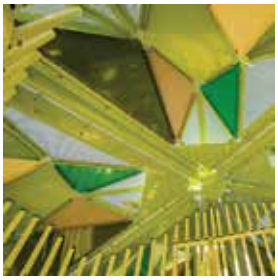

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MANAGING FOR Future Urban Forests

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Trees and forests contribute to placemaking. An urban forest is not just a stand of trees, it is all the vegetation in the interstitial spaces between buildings and roads, a completely unique ecosystem that has yet to be fully understood. As well as spanning private and public ownership domains, urban forests exist along a continuum from highly urbanized, peri-urban (suburban or lower density) environments, and finally to the wildland-urban interface (WUI). All types hold a range of cultural, ecological and economic benefits valued by society, underlining why they are so important and infinitely intriguing.

The geographer, Edward Relph who has contributed significantly to place-making theory in landscape architecture has written extensively about how landscape, urban and built landscapes in particular, are thought about, lived in and experienced. He states that, "landscapes are more than aesthetic objects to be observed and appreciated; they are transcriptions of cultures and individual endeavor" (Relph, 1979).

With the majority of North America's population living in urbanized environments; urban forests are considered essential components of sustainable cities for the range of ecosystem services they provide. As dynamic and self-optimizing living organisms, trees are the emblematic symbol of urban forests due to their large size and significant effect on natural processes including the (re)cycling of nutrients, water, and biomass. Consequently, forests are the focus of management decisions, therefore, preserving and enhancing this natural resource through sound stewardship decisions is important to maintain their benefits now and for future generations. The management of natural resources is complex and involves input from a diverse range of professionals who must consider a range of scales including spatial (single tree to regional) and temporal (establishment phase to 80+ years). As natural resource managers, landscape architects work in tandem with allied professionals, citizen scientists, the public, government agencies, and myriad others whose decisions impact trees and their living above- and below-ground parts during the land and infrastructure development process. This reality necessitates collaboration between decision-makers at the community planning level that considers maintenance and tree care over the full life cycle of a tree or a stand to ensure their long-term health and viability.

This issue of Sitelines presents a balance of artistic, ecological, social, and practical approaches in an effort to portray urban forest's inherent seen and unseen complexity, and highlight this evolving area of landscape architectural practice.

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In this Issue:

Terres des Hommes – Luncheon on the Grass Credit: Peter Sickert

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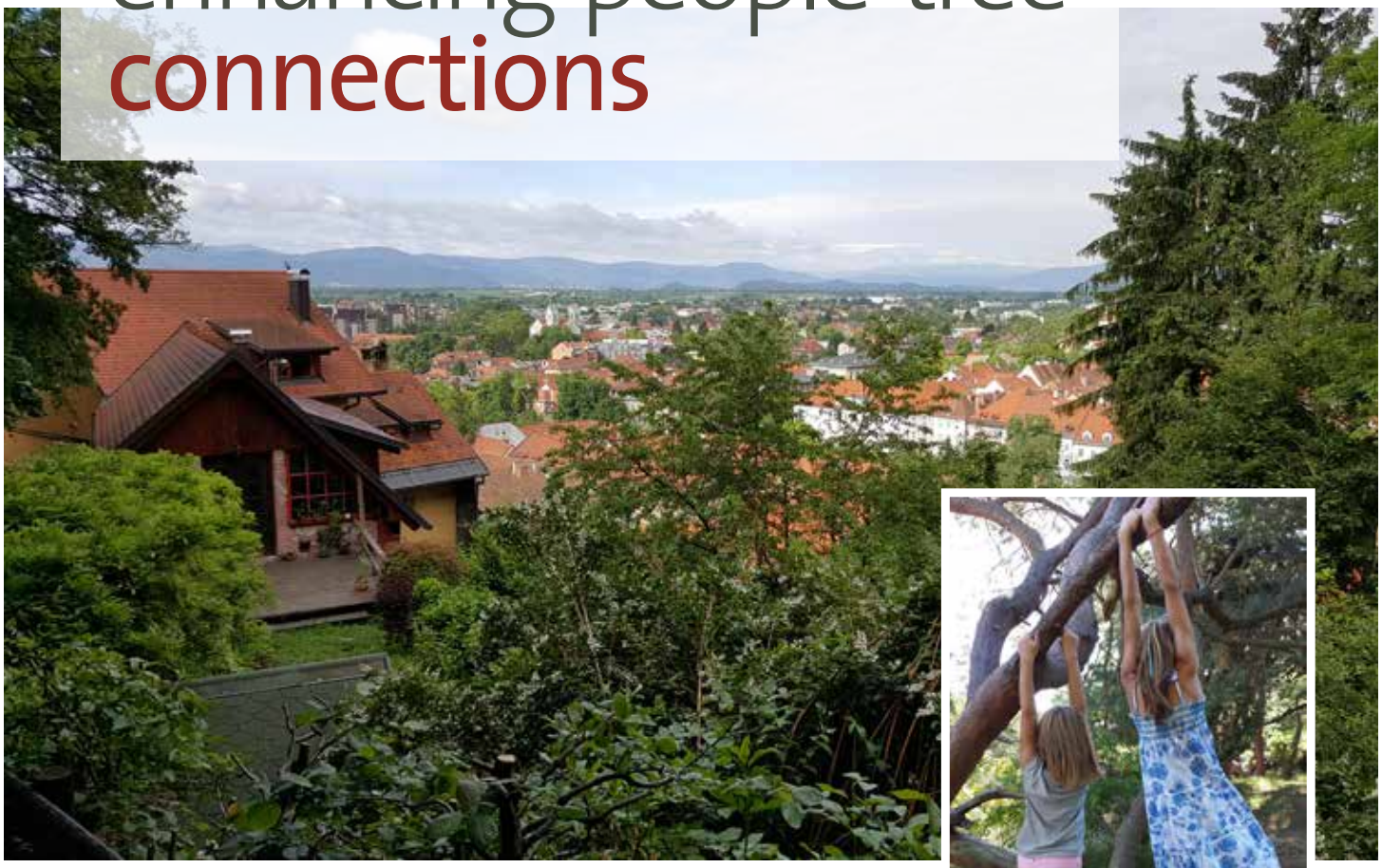
— Cecil Konijnendijk, Professor of Urban Forestry,
Department of Forest Resources Management,
University of British Columbia

URBAN FORESTRY: enhancing people-tree connections



In the North America of the mid-1960s, urban forestry started its journey as an interdisciplinary field when University of Toronto professor Erik Jorgensen first defined the concept. Since then, urban forestry has gained global recognition as the planning and management of forests, trees and associated vegetation in urban areas (Ferrini et al., 2017). From its very start, urban forestry has drawn upon, and involved a wide range of disciplines, with a strong role for both foresters and landscape architects. The field aims to optimize urban forest benefits for cities and urban communities. This article highlights the important socio-cultural values of urban forests, and introduces urban forest governance as a new and important domain of research and practice.

About people and trees

We value the presence of trees in our lives. For different reasons, trees and forests mean a lot to us. We have our personal stories and 'tree histories', as well as our personal favourite trees. Trees in our garden or street remind us of the rhythms of nature. Research has shown that urban forests play a crucial role in adapting cities to the impact of climate change, for example by cooling the air and by regulating stormwater runoff. Trees affect our health by making cities more liveable during heatwaves, but also by capturing air pollutants. An ►

Page 5, photo: A city's urban forest include all of its woods, trees, and associated vegetation. Ljubljana, Slovenia.

Page 5, inset: Urban forestry's prime mandate is to connect urban people and urban trees.

Image left: Urban forest governance in countries like China focuses on large-scale tree planting to fight pollution, poor public health, and the impacts of climate change. New forest park in Beijing.

All images: Cecil Konijnendijk

exciting line of research has provided us with strong evidence of the importance of trees and green space for our health and well-being. In a recent bestseller, American writer Florence Williams (2018) compiles some of this compelling evidence.

"We feel better among trees, for different reasons.

My own research has focused on the connections between people and urban nature (Konijnendijk, 2018). Work we did in Denmark showed, for example, that urban forests are important 're-treats' and sources of inspiration for creative professionals. We also found that forest environments can stimulate children's learning, play, and social skills. Research in different European and Asian countries taught us that people's preferences and even fears in relation to urban green space vary widely, for example based on socio-cultural background."

Urban forest governance

Sound urban forestry requires understanding of the many, often close relationships people have with trees. Thus, a key aspect of urban forestry is the need to understand people's preferences and needs, and to cater for these. This will only be possible if we engage and involve people in policymaking and management, for example. Strategic decision making for urban forests by often complex networks of people and organisations is the domain of 'urban forest governance'. Recent years have seen the emergence of a subfield of research. However, we still know little about successful governance approaches and methods, also because 'good' governance is very specific to the local situation.

In the past, we did some interesting work in Sweden on co-management of an urban woodland zone in a residential area, with local residents taking a leading role in designing and managing their local woodland. In a large European project, we studied hundreds of local governance arrangements for green spaces, with varying roles of local communities, businesses, and different governance actors.

Urban forest governance research has also started in Canada, with work being done on e.g., public engagement. In a new study, we are studying the role of different urban governance arrangements in Canadian cities, in particular in response to what we call 'urban forest calamities': events that cause great and often sudden damage or distress to urban forests. Canadian cities have been facing an increasing number of such calamities, for example in the form of fires, pest outbreaks, and ice storms. One could even argue that extreme and fast-paced urban development and construction can be a calamity. In the project carried out by our Urban Forestry Research in Action (UFORIA) lab at UBC, we will analyse past and present governance in Prince George and Surrey (BC), Fort McMurray (AB), an Oakville (ON).

Perspective

Urban forestry is still a young field, but it has been gaining traction, also in BC and Canada. The success of UBC's Urban Forestry Program is an example of this, with currently over 180 students involved in the undergraduate program. Vancouver's hosting of one of the largest urban forestry conferences ever (under the title 'The Urban Forest: Diverse in Nature') is another example.

Urban forestry research and practice should continue to involve a wide range of disciplines and fields. While forestry and ecology can bring in theories and methods related to, for example, ecosystem functioning and long-term natural resource management, landscape architecture brings in an important design and visualisation perspective, as well as well-established routines for involving different stakeholders in design and planning processes. SL

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All the Trees: A Public Art Project

— Holly Schmidt, BFA, BEd, MFA

Left: A Shore pine along the shoreline of Jericho Beach bench in Jericho Park. Top right: A Catalpa tree that receives many messages because of it's striking appearance. Bottom right: All the Trees tag on a maple tree near Jericho Beach All images: Nigel Laing

Walking along the pathways of Jericho Park, it's easy to appreciate the beauty of the trees and the shade they provide on a hot summer day. *All the Trees* is an invitation to pause and more fully consider human relationships with trees.

The form of the project was inspired by a 2013, City of Melbourne program that involved tagging local trees with ID numbers and email addresses to encourage residents to report disease or damage. Against expectation, people emailed personal notes to express their love and admiration for the trees. This prompted me to wonder, what would people in Vancouver have to say to the trees and how might the trees respond?

In my role as the Vancouver Park Board's Artist in Community at West Point Grey Community Centre, I was granted permission to select and tag twenty-five trees around the community centre and nearby Jericho Park. The tags are bright red aluminum plates, similar to those used in arboretums or botanical gardens. They are engraved with an ID number and an invitation to start an exchange with the tree. Five tags have been held in reserve so regular park visitors can nominate trees to be tagged as the project unfolds between August and December 2018.

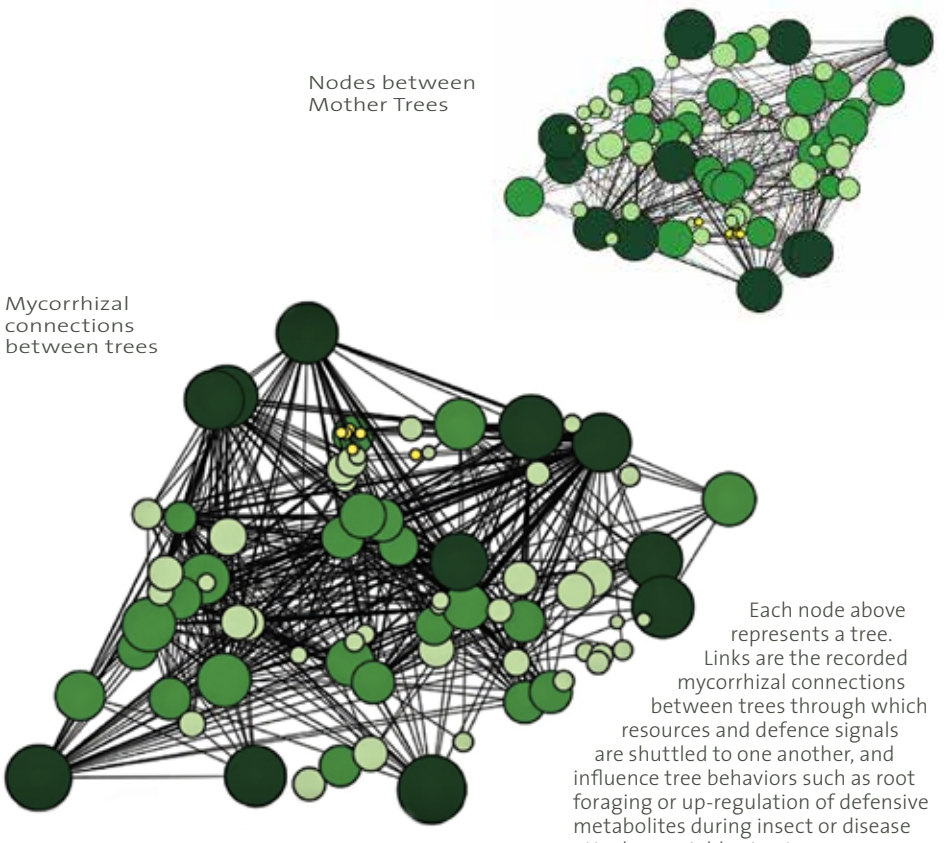
Trees were selected throughout the park in order to convey the diversity of trees, histories of human intervention and complex ecosystems. Deciduous trees such as cottonwoods and willows thrive around the marshes, while the contorted Shore Pines grow in response to the salt, air, and fierce winds blowing in from the Salish Sea. Some of these trees are self-seeded while others have been planted to create picturesque scenes and large shade canopies. All of the trees have interesting stories and connections to life in the park.

This is made apparent by a curated group of respondents on behalf of the trees. When a visitor to the park sends an email to a tree, one of the respondents sends a message based on their area of disciplinary knowledge and practices. This group includes: me as the local artist-in residence, historian John Atkin, horticulturalist Egan Davis, poet Rahat Kurd, and indigenous herbalist Lori Snyder. Emails to the trees and the responses are shared on the project website **www.beatapath.ca**

All the Trees is taking place in Vancouver, BC, on the unceded and ancestral territories of the Musqueam, Squamish, and Tseil-Waututh First Nations and we express our gratitude for our on-going presence. This project was made possible with the support of the Artist in Communities program through the Vancouver Park Board, West Point Grey Community Centre, the Jericho Stewardship Group, and Queen Mary Elementary School. SL

IT STARTS WITH SOIL: how to increase the resilience of urban forests

— Eva Snyder / Suzanne Simard, RPF PhD



Each node above represents a tree. Links are the recorded mycorrhizal connections between trees through which resources and defence signals are shuttled to one another, and influence tree behaviors such as root foraging or up-regulation of defensive metabolites during insect or disease attack on neighboring trees.

Graphics: Suzanne Simard

All land tells a story. In forests the biggest, oldest trees, also known as 'dominants', play a pivotal role in both the visible structure of the forest as well as aboveground functions such as provision of shade or scaffolding for biodiversity. Dominant trees have also recently been called "Mother trees" (Simard 2017) because they can nurture and protect offspring and other plants by sharing resources and information through underground fungal connections. Mother trees are the hubs of these regenerative, cohesive resilient communities, much like mothers in human families. This way of seeing forests, as connected, relating communities, resonates with indigenous knowledge systems. Only recently have forests been viewed in this way by western science, which has begun to recognize forests as complex adaptive systems comprised of biological hubs and links that are central to their resilience.

Part of the reason for the lag in scientific understanding of forests as connected, facilitative communities is because some of the mechanisms take place below-ground, invisible until more recent technological advances. In this below-ground world, mycorrhizal fungi form mutually beneficial, obligatory relationships with trees (and plants), where the trees provide the mycorrhizal fungi with photosynthate (sugars) in exchange for nutrients the fungus acquires from the soil. The mycorrhizal mycelium is not only integral to soil resource uptake, it also provides a source of fungal inoculum for regenerating plants and links individual plants together in intricate networks. Through the fungal connections, Mother trees transfer resources (carbon, nitrogen, water), defense signals to surrounding trees, plants and seedlings, with more going to those that are related or in need. The tree connections have been mapped (Figure), with trees represented as nodes and fungi as links, and the pattern has been found to resemble biological neural networks. Notice in this image the exceptional connectivity of some trees. These are the Mother trees – the oldest and most connected trees in the forest. Young seedlings, represented by the lighter, smaller nodes, have regenerated within this nurturing network of the Mother Trees.

While comparatively less is understood about mycorrhizal fungi colonization in the urban environment, emerging studies have indicated similar benefits. For instance, when comparing deciduous tree plantings that were inoculated with mycorrhizal fungi with those that were not, Tonn et. al. (2016) found greater survival of hickory and oak seedlings in the colonized group. Additionally, the presence of mycorrhiza has been shown to vastly improve the ability of urban plants to access nutrients and water in soil (Newbound, 2010). There is also an improvement in retention of soil nutrients during extreme weather, such as drought or floods (Martinez-Garcia, 2017). This advantage will be of increasing importance as adverse weather becomes more commonplace as climate changes.

Unfortunately, the conditions for mycorrhizal connectivity are not well emulated in urban spaces. Many new developments place trees in isolation, planted in construction fill with limited biotic activity, neither conducive to root nor mycorrhiza growth. Trees in urban environments can become colonized by mycorrhizal fungi through a number of pathways: spores can travel from adjacent forests or be applied artificially, and fungal mycelium may migrate from living soil or neighboring trees. However, widespread fragmentation of urban areas can slow or halt the ability of mycorrhizal fungal spores to colonize the soil (Bainard, 2011).

Additionally, soil and atmospheric pollution can be toxic to the fungi already present, as can elevated nutrients from runoff or fertilization (Newbound, 2010). These negative site-level effects on pH and nutrient content may inhibit mycorrhization as much as landscape scale urbanization features (Newbound, 2011). Fertilization in particular may cause plants to

Typical urban soil profile showing imported and native soils Photos: Judith Cowan

Tree roots affected by excavation for new utility infrastructure

shed their natural mycorrhizas and instead increase their dependency on repeated nutrient application. Use of mycorrhizal inoculants in place of fertilizer, by contrast, has reduced the need for fertilizer and increased the sustainability of agricultural operations (South Dakota State University, 2016).

More can be done to promote below-ground connectivity in urban environments. The following four recommendations are intended as starting points from this discussion.

Connectivity can be prioritized across scales through local, regional and municipal land-use planning and design. For example, street trees can be planted in boulevards with sufficient space for root growth and connection between trees.

Legacy (Mother) trees could be protected in urban woodlands not only to regulate and support ecosystem services, but also as sources of mycorrhizal spores and mycelial networks.

Local soils and organic materials can be protected and reserved as inoculant for future landscapes. When native soils are no longer available, commercial inoculants can be used.

Species can be chosen for complementarity in community. Native species can be worked in when appropriate, and existing trees should (again) be protected.

To conclude, attempts to tame the wild landscape throughout western colonial history has followed the winner-take-all paradigm, where trees have been cut and planted under the notion that only competition for limited resources matters. While there is enormous resistance to changing practices, the sustainable management of our forests will require that we recognize and manage them as complex adaptive systems whose resilience depends on nurturing the multiplicity of interaction types in forests. This paradigm shift is also taking place in urban environmental planning, design and management. We recognize that urbanized trees and plantings, like forest ecosystems, have the potential to function as complex adaptive systems — with emergent properties of enhanced survival, resilience to disease and pests, cycling of water and nutrients, storage of carbon, and adaptability to environmental changes. In the urban fields, this type of systems thinking will be critical for encouraging greater ecological resilience in an intensifying, changing climate. SL

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EMERGING BIOTIC AND ABIOTIC ISSUES FACING BC COMMUNITIES —

Mount McLean Urban Interface Wildfire

planning for sustainable urban forests

— Bruce Blackwell MSc, RPF, RPBio

The definition of urban forestry spans the full range of native and ornamental vegetation types within an urban environment – streets, parkland, brownfield and greenfield sites, riparian corridors, forest remnants, private land, and residential yards. The focus of this article is on forest ecosystems that are within or adjacent to urban areas, aptly named the wildland urban interface (WUI).

Over the past twenty years British Columbia's forests, including those in urban environments, have been heavily impacted by a range of disturbance types including abiotic (drought, wildfire, and wind), biotic (insect and disease), and human-caused (land development). These disturbances have occurred both in coastal and interior ecosystems and have impacted public safety and economic, social and environmental values. From an ecological perspective, disturbance is neither positive nor negative.

Communities are investing millions of dollars trying to increase and manage urban green spaces. Canopy cover targets, the accepted metric for rating the overall health of urban forests, and their prescribed benefits are not achievable without considering disturbance ecology. Within urban and community landscapes, more attention is required to maintain resilient forests that are less vulnerable to abiotic and biotic disturbances, while managing the impact from human activities.

Resilient forests are healthy and stable with the capacity to tolerate disturbance. Often the term disturbance is framed negatively when humans are affected by the consequences. For example, the 2006 Stanley Park windstorm, while devastating for the citizens of Vancouver to witness, was a storm event typical for the region's historic natural range of variability and is expected to occur once or twice every century.

Resilient forests are generally comprised of tree species and stand densities appropriate for the various sites that describe the local ecology. Forest resilience planning is predicated on the regional and local climate, ecosystems, and natural disturbance conditions unique to the community specifically and the region in general. While historically these conditions have been projected from past conditions, with the advent of climate change, forest management must take into consideration future climate scenarios and the likelihood of larger and more intense disturbances, such as the 2017 and 2018 wildfires that have threatened communities across BC.

Key considerations for forest and vegetation management, regardless of changing environmental conditions must focus on an increase in the resiliency to wildfire; actions to improve forest health and structure; plant establishment and subsequent drought tolerance; and the restoration of those areas that have been previously impacted from disturbance.

To further enable communities to adapt to risks shaped by existing and future biotic and abiotic disturbance events, clearly defined management objectives and achievable action plans are imperative. Forest resilience planning encapsulates these objectives and actions

which can be integrated into communities' risk management strategy and emergency response preparedness. Plans must contain a basic structural model for adapting environmental management practices to foster resilient forests. A key consideration is tree species selection to manage stand composition into the future. All decisions and actions undertaken must be consistent with managing public safety (*i.e.* public trails, parks, homes adjacent to the forest interface), and the protection of sensitive ecosystems to preserve natural capital.

By managing for forest resilience, many other values benefiting people such as ecosystem services will be maintained and enhanced. The Provincial Biogeoclimatic Ecosystem Classification (BEC) System provides the cornerstone upon which any sound forest resilience plan rests. Forest resilience planning should be structure around six key objectives;

Gathering an inventory of resource values so they can be integrated into strategic planning as they relate to climate change, forest health, wildfire and stand tending;

Visioning desirable future forest stand conditions. This establishes the baseline from which all forests, as they mature along their existing successional trajectory, can be monitored and managed now and into the future. This allows targets to be set, predictions to be adjusted, and the capacity for organizations to respond to emerging, unexpected scenarios (*i.e.* disease or insect outbreaks) when designing and implementing management regimes;

Designing a risk assessment framework to ensure forests around high-risk areas such as steep slopes and water resources, and next to high use public areas are prioritized and become the focus of management activities.;

Developing tree diversity programs at the stand level (rather than the individual-tree level) is needed to inform and guide operations. Stand density must be within a certain range to avoid overly dense stands (high fuel loads) and not too open (outside the range of natural ecosystem conditions) affecting structure and overall forest health;

Establishment of a cost analysis – to determine whether the goals and objectives are achievable within stated budget thresholds or whether the plan will be compromised when funding shortfalls occur; and

The integration of monitoring frameworks to compare actual stand conditions post-implementation, rate the effectiveness of stand-tending and planting initiatives, and adjust management actions so they remain consistent with the goals and objectives of the forest resilience plan which will most likely be nested with higher level strategies within the Official Community Plan.

Above: The Wildlife Urban Interface
Below: Wildfire impact on communities

All images Bruce Blackwell

Forest resilience planning is an iterative process and fundamentally, an acknowledgement of forest ecological processes in the face of any disturbance. The more connected the visioning, planning, implementation and monitoring phases are with one another, the more success a forest resilience plan will be to manage for disturbance, and achieve the economic, social, and ecological goals communities have for their urban forests and green spaces. SL

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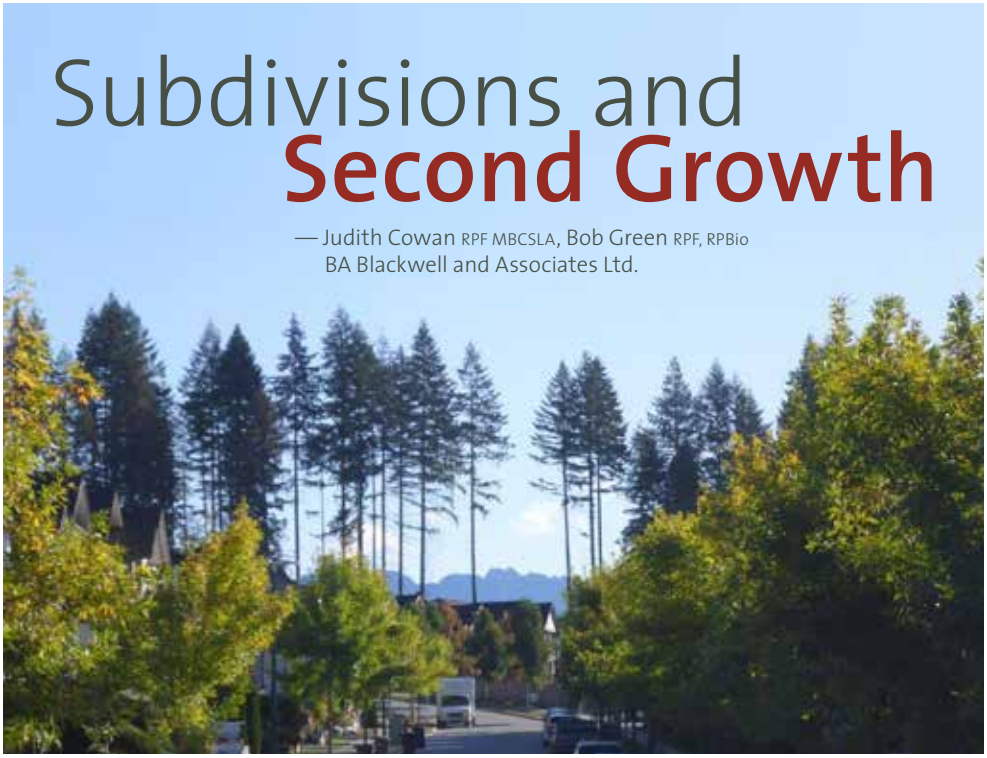
Subdivisions and Second Growth

— Judith Cowan RPF MBCSLA, Bob Green RPF, RPBio
BA Blackwell and Associates Ltd.



Recent development patterns across Metro Vancouver are expanding into second-growth forests with resulting residential communities occurring adjacent to remnant natural areas exposed to new wind patterns and increasing the risk to public safety and property damage. Urbanization represents a permanent change to the landscape. Ecological processes such as existing patterns of hydrologic flow, nutrient cycling, soil formation, and fire, are drastically altered or eliminated completely. Subdivision development planning on the foothills of Burke Mountain in Northeast Coquitlam in BC's Lower Mainland, began in 2005 with incremental build-out starting in 2009. Streamside Protection and Enhancement Areas (SPEAs) were set aside along three major creek corridors: Hyde Creek, Smiling Creek and Burke Mountain Creek.

To accurately frame windthrow issues in the urban context, it is important to understand how cities manage their municipal land base. The use of private property is regulated by a suite of bylaws and policies which place restrictions on the encroachment of proposed developments in and near natural areas. Natural areas within cities, including riparian areas, are environmentally sensitive habitats. The ecosystem services they provide include stream function and water flow, fish and wildlife habitat, recreational values, and aesthetic values of forested landscapes attractive to many residents.

Urban development into established forests of Coquitlam is very similar in process to forest harvesting operations in that closed forests are cleared leaving newly exposed forest edges. Trees that were windfirm as part of a closed forest, are suddenly exposed to new wind forces they are not well adapted to because of their form (tall, narrow, short crowns). Most windthrow following exposure occurs in the first 3-5 years. The major difference between windthrow in harvesting operations and that in urban settings is in the consequence component of risk. While the consequences in harvested blocks typically involve degradation of habitat or loss of forest value, those in an urban setting potentially involve damage to structures and injury to people.

Prior to subdivision development, these areas were previously occupied by 90-year-old stands dominated by western hemlock with minor components of western redcedar and Douglas-fir. Logging in the 1900's influenced the development of a forest with an even-aged stand structure. Of the three main tree species, hemlock is the least windfirm because of its naturally shallow root system that lacks a well-defined taproot (as in Douglas-fir), even on deep well-drained soils. Some western hemlock trees are infected with dwarf mistletoe, a parasitic plant that contributes to internal decay in tree stems, making them more structurally weak and prone to breakage. Overall western hemlock is the least stable species in relation to windthrow. Trees left in these reserve areas are less windfirm than the original stands because of increased wind exposure and their tall, slender form. Therefore, the design of setback width and orientation to prevailing wind patterns is an important consideration. The riparian reserve areas along the three stream systems are perpendicular to the wind which increases the probability of windthrow.

High wind events in 2015 and 2016 resulted in significant windthrow in the Northeast Coquitlam SPEAs damaging private and public property which raised concerns about their stability.

To address the risk posed by potentially unstable trees, a two-part process was utilized to determine the windfirmness of different stands along the three riparian corridors. Hazard trees were assessed using the Interna-

Above: Burke Mountain, wind firming project map
Facing left: Residual veterans, post-treatment
Facing right: Exposed trees with tall stems and small tree crowns
Facing bottom: New subdivision at the forest interface

All images: Judith Cowan

tional Society of Arboriculture's (ISA) tree risk assessment methodology, and stand level windthrow using the BC Ministry of Forests Windthrow Manual (2010), which was originally developed for planning and harvest operations in commercial forestry and provided the basis for assessing wind patterns, residual forest structure and characteristics, terrain and soil, as well as a review of the regional climactic and wind patterns affecting Northeast Coquitlam. Both methods use the concepts of probability (likelihood of an event occurring) and consequences (the effects or outcomes of an event) to evaluate the overall risk from tree failure and understand forest stand dynamics to predict windthrow behavior.

In 2016, BA Blackwell conducted extensive hazard tree and windthrow risk assessments and prescribed the removal of approximately 1000 trees, the majority of which were western hemlock. Tree and debris removal operations began in December 2016 and were completed in November 2017, immediately followed by restoration planting with a vision to develop a long-term stable stand composed of western redcedar and Douglas-fir as these trees have historically been dominant species capable of establishing well-developed root systems adapted to the endemic wind patterns.

This project demonstrates that these issues will continue to persist in the absence of long-term planning initiatives and also highlights the need for a professionalized forest management approach to manage windthrow in urban and peri-urban environments. SL

Bill Stephen BSc(F) Cert Arb TRAQ
Urban forester, Vancouver Park Board

PROTECTING VANCOUVER'S URBAN FOREST:

a public tree perspective

Top: Street trees in autumn on Carrall St. near the Gassy Jack sculpture

Middle: Mature ornamental flowering cheery tree in Queen Elizabeth Park

Bottom: Title slide from Vancouver's Urban Forest Strategy presentation

The City of Vancouver is developing an Urban Forest Strategy to plan for, enhance, and preserve its urban forest resource. The City utilizes an ever-improving suite of actions within a regulatory framework for tree protection. Its essential elements are: transportation and land use policies, tree protection bylaws, development regulations, and street, parkland and remnant woodland management. This primer introduces the last of these elements: street tree, park tree, and remnant woodland management within the public realm. The City of Vancouver is situated in a coastal climate noted for forest productivity. It is a city of change, rapidly reinventing itself to suit the needs of its growing population on its settled land base. Leafy streets and verdant gardens make up its character—also pockets of magnificent remnant forest.

Vancouver's urban foresters use a variety of metrics to measure its value. They have learned that Vancouver's trees provide around $2.14 million dollars in air quality services, that there are 168,000 ornamental trees in parks and along streets, and that the tree canopy intercepts 118 million litres of storm water annually. While the overall canopy has declined from 20% in 1995 to around 18%, the public tree canopy been increasing due to street tree growth and reforestation projects. Canopy over private property has decreased, largely because greater density of the built environment has put pressure on available aerial and root spaces.

Actions to protect and enhance the public urban forest canopy must be responsive to baseline conditions. The land base for Vancouver's public trees is stable, showing signs of increase. Opportunities for trees in parks and golf courses remain plentiful. Low soil disturbance bodes well for these lands, as does the Park Board's commitment to biodiversity and recreational space. Thoughtful plantings in forest restoration sites, such as at the New Brighton and Everett Crowley parks, are starting to show results. Thousands of kilometres of street right-of-way tree strips form a substantial portion of the urban forests. They have been wards of the Park Board for over a century and reflect the changing cultural and technological landscape. Scattered evenly throughout the city, they provide beauty and ecosystem services. Root and crown conflicts with the built infrastructure in this shared space have always been problematic, and are expected to increase as trees compete with increasing land use density.

As the City develops, new opportunities for public trees are available. Land use conversion from industrial uses, such as those around False Creek or in the Arbutus corridor, bring renewed economic vitality which affords opportunities for new plantings through integrated design.

Vancouver's forest is under threat from two effects of climate change. First, summers are longer, hotter and drier. Many native and ornamental species are acclimated to moderate conditions, and it is likely summer stress symptoms will increase to the point of mortality as is observed on native trees in forest margins and species growing in confined spaces along arterial roads. Established trees in unirrigated medians are dying off at a particularly accelerated rate. The second anticipated effect is the reality of more frequent and intense winter storms, delivering elevated

levels of wind and precipitation. Trees with minor structural defects, and those with brittle 'tear away' branches are going to make front page headlines.

In response, the Park Board is planting trees in unoccupied and suitable habitats and spaces where growing conditions are likely to remain favourable despite the new climatic regime. Massive amounts of organic waste from pruning operations are being incorporated into marginal soils. The Park Board also uses biodiversity corridors to link fragmented green areas to promote wildlife and seed dispersal. Opportunities are sought to retain western red cedar trees that are dying from the top down to preserve this iconic tree species and assist in their adaptation to summer drought. A number are exhibiting lower, multi-branched profiles part of this species' natural retrenchment strategy.

To help new trees in areas of increasing density, structurally supportive mixes of rock and soil are required under hardscapes where soil loss would otherwise occur. Such mixes not only provide water holding capacity, sites of nutrient exchange, and micro flora and fauna habitat—they also encourage roots to spread. An extensive root habit enhances stability in winter winds and encourages natural foraging behaviour conducive to restrained but balanced growth.

Developing proper species selection criteria is necessary ensuring the health of the future urban forest. Metro Vancouver's Climate Adaptation Strategy lists many commonly available tree species and their anticipated adaptation to future conditions. The Vancouver Park Board has participated in the regional report development process and regularly consults it for plant acquisition and is well-received by the BC nursery industry. To assist in tree establishment, the Park Board continually integrates new structural pruning practices (as espoused by Dr. Ed Gilman) so young trees receive formative care that will significantly increase their resilience against summer branch drop and winter storms. A few well-placed cuts at the right age can double the life of a tree.

The City of Vancouver and the Park Board owe a debt to the landscape architect community for its energy and innovation. Keep on reading, keep on learning from the trees themselves, and keep on bringing your innovations and ideas to the urban forest project of which you are all a part. SL

PROFILE OF CSLA Fellows

Adrienne Brown

Adrienne, tell me a bit about your background, and your reasons for choosing to pursue a career in landscape architecture.

When I was born, my father had been working for two years for Muirhead & Justice Landscape Architects in Kerrisdale. So, I always knew about the profession, and thoroughly enjoyed a childhood that included weekend trips to the office, and to job sites all over the lower mainland. I grew up with a continuing interest in the way our cities are designed, built and maintained. And this led to my decision while still in high school, to pursue a career in landscape architecture.

Since you were elected as a Fellow under the Service to the Profession Category, can you describe your contributions, and how you became involved?

I served as Registrar of the BCSLA from 1997 to 2000, and again in 2004 when computer versions of the LARE were being introduced. I also served as President in 2001, and then served for two years on the CSLA Board of Governors. Over that time, I learned a great deal about how to push initiatives forward in a world where nearly everyone is a volunteer. During my time on the CSLA Board, I took on the Reciprocity file and began to understand the structural issues that continue to confound landscape architecture as a profession. Some of these are being resolved over time as generational succession leads to new attitudes, but others – like the questions around how to test competence in a field where the knowledge base and areas of practice are so broad – remain a challenge. I also contributed to the creation of the new BCSLA bylaws, launched in 2002, and to the preparation of the Request for Legislation a year later. The latter asked the BC Government to consider strengthening the terms of the existing Title Act; a goal that remains unrealized, although it is in the current BCSLA Strategic Plan. Each of these projects provided me with valuable insights into what an organization responsible for professional self-governance faces in the world at large.

What changes have you seen in the profession since you began working?

In the 1960s my father's office was filled with boxes of new elastic bands and circle templates, and he used lighter fluid to blend Prismacolors with a tightly rolled paper stick. A decade later, he began painting the reverse side of drawings printed on mylar for framed renderings and slide shows. When I began working for the firm in 1981 we drew on vellum, although plastic sheets with rows of metal pegs (registration bars) along the top appeared soon after. Surprisingly, some projects still required the use of the Leroy lettering Set which relied on a pantograph to trace the characters just before the appearance of the fax machine. I began working with Vectorworks in the late 1990s, and today I enjoy exploring ways to combine scanned hand drawings with computer generated materials.

On the matter of how projects are managed, things haven't changed as dramatically. For example, municipal governments remain distinctly uneven in how they review and approve landscape architectural documents. Because of this, it remains a key priority to lobby for requirements that are well integrated with the development process.

Can you think of a specific achievement in your work that are you are particularly proud of?

While working on a Private Public Partnership (P3) as part of the Owners Representative team, I proposed to the provincial agency that landscape architecture be moved to the beginning of the Output Specification next to civil engineering. This was accepted, and the project went forward with the site development defined along with the engineering component. This gave the winning proponent's landscape architect a mandate to work closely with the latter on stormwater management. I was proud of having advocated for this, because such changes in the structure of contract documents make it possible for landscape architects to make a much more effective contribution to a given project.

In a few words, what inspires you?

I'm inspired by design that captures the ineffable, while addressing the biophysical aspects of a site and its surroundings. It is the creation of spiritually compelling spaces using living materials despite the many challenges presented by an established development industry which is ill-equipped to protect resources such as trees and natural topsoil.

Parting comment.

A recent episode of the excellent CBC Radio show, Ideas focuses on the philosophical proposition that all material things have an element of individual consciousness. Although this realistically doesn't include absolutely everything; we might consider including concrete on the living side! With natural systems shifting and losing their stability due to climate change, such an approach has never been more important to mankind. And while the challenge in playing a meaningful role indefending the environment remains daunting, landscape architects have long understood what this may require. SL

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