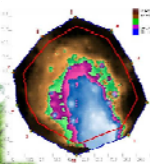


**SUSTAINABLE URBAN FOREST
MANAGEMENT PLANNING
USING
CRITERIA AND INDICATORS**

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SPEAKER PROFILE



Philip van Wassenauer



Speaker Profile



Urban Forest Innovations, Inc.

Since 1994, we have specialized in the preservation, enhancement and management of the urban forest through a research and science based approach.

Expertise in:

- Advanced risk assessment
- Ravine stewardship
- Appraisals and valuations
- Tree preservation planning
- Urban forest inventories
- By-law and regulation development
- Tree injection methods and materials
- Strategic urban forest management planning

Speaker Profile





INTRODUCTION



The Objective of Urban Forest Management

To optimize the leaf area of the entire urban forest by establishing and maintaining a canopy of genetically appropriate (adapted & diverse) trees (and shrubs) with minimum risk to the public, and in a cost-effective manner.

- Dr. Andy Kenney

Objectives

Urban Forest Benefits

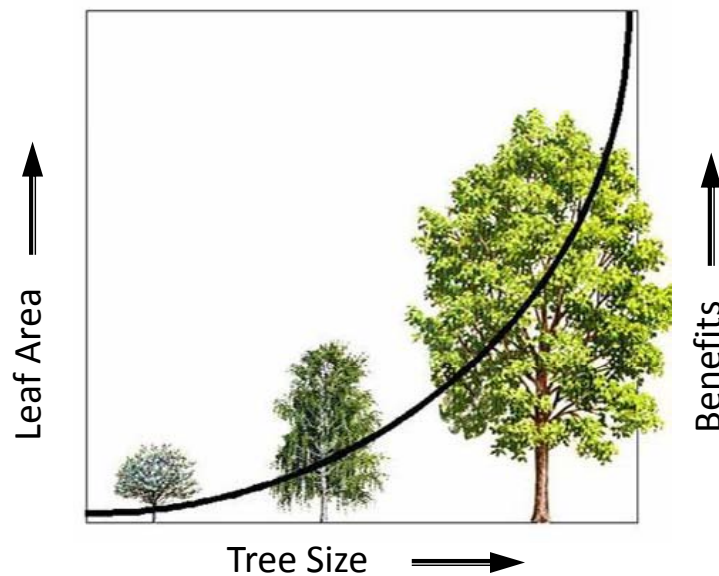
The urban forest provides a wide range of services such as:

- Improved air quality
- Micro-climate effects (e.g. shading)
- Property value & Aesthetics
- Storm-water attenuation
- Energy conservation
- Noise reduction
- Wildlife habitat
- Physical & Psychological wellbeing
- etc.

Objectives

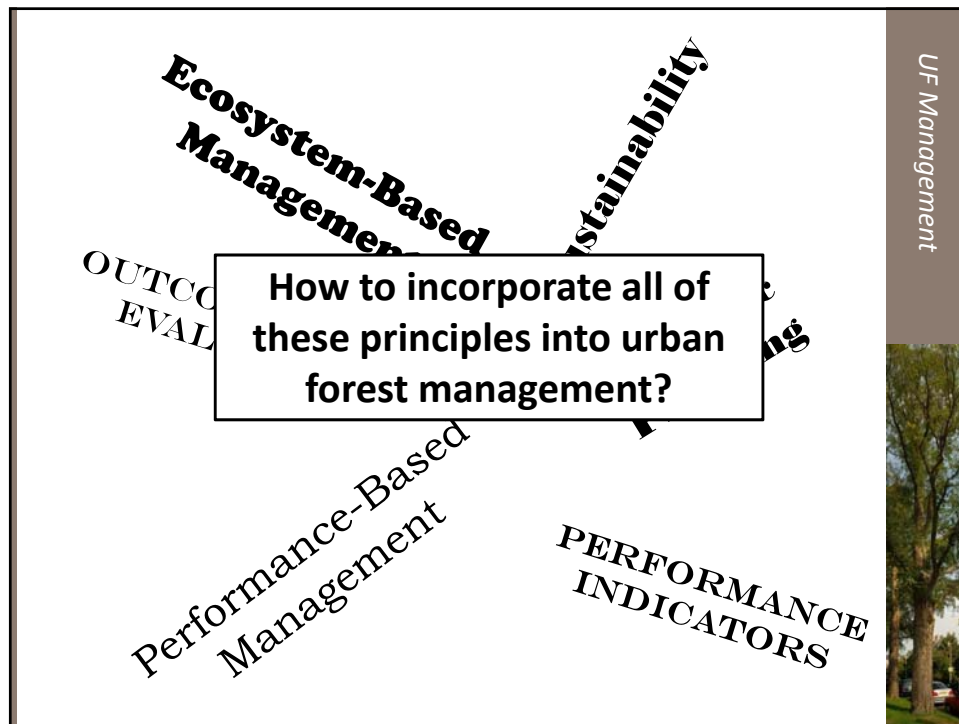


Maximizing Leaf Area



Objectives






The Objective

To present a proven effective model to help you develop and implement a long-term, sustainable and proactive ***strategic urban forest management plan*** for your community.

Approach



The Approach

- A model for *strategic urban forest management planning*.
- Criteria and Indicators (C&I)
 - What are they?
 - How do they fit into management planning?
- Criteria and Indicators in urban forest management – a case study.

Approach



URBAN FOREST MANAGEMENT PLANNING



A Model for Urban Forest Management Planning

- van Wassenauer, Schaeffer and Kenney (2000) and van Wassenauer and Kenney (2001) proposed a conceptual model for sustainable urban forest management planning.
- In response to the need for redefinition of urban forestry as more than just daily street tree management.
- All about combining needs of growing urban centres with ecosystem viability and sustainability.

Management Planning



A Model for Urban Forest Management Planning

Strategic planning for the urban forest is an 8-stage process:

1. Identification of urban forest attributes
2. Assessment of relevant resource data where it exists
3. Creation of vision reflecting community values
4. Determination of the current status of various components
5. Identifying gaps between vision and current status
6. Creation of administrative vehicle to close the gaps
7. Formulation of operational plan incorporating vision and goals
8. Implementation and monitoring of the plan

Management Planning



The Question of Planning Horizon



While an urban forest management plan spanning 50, 100, or 1000 years would be ideal, *the changing realities of politics, economy and society do not make such planning horizons realistic.*

Conversely 1, 5 or 10 year plans do not provide enough time or continuity to make meaningful changes towards improved management and UF sustainability.

Management Planning



A 20-Year Framework

A 20-year **strategic** framework, supported by a series of 5-year **management** plans and annual **operating** plans enables continuity and ongoing improvement and adaptation.



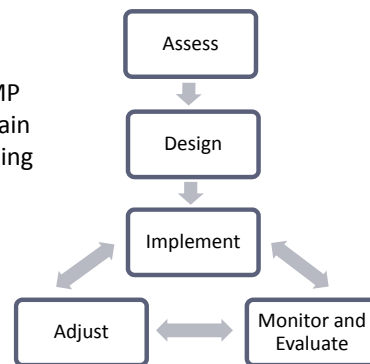
Management Planning



Adaptive Management

UFs are complex entities, particularly with addition of a human element. Changes and unforeseen events (e.g. droughts, pest infestations, disease) must be accommodated without forcing changes to strategic goals and objectives.

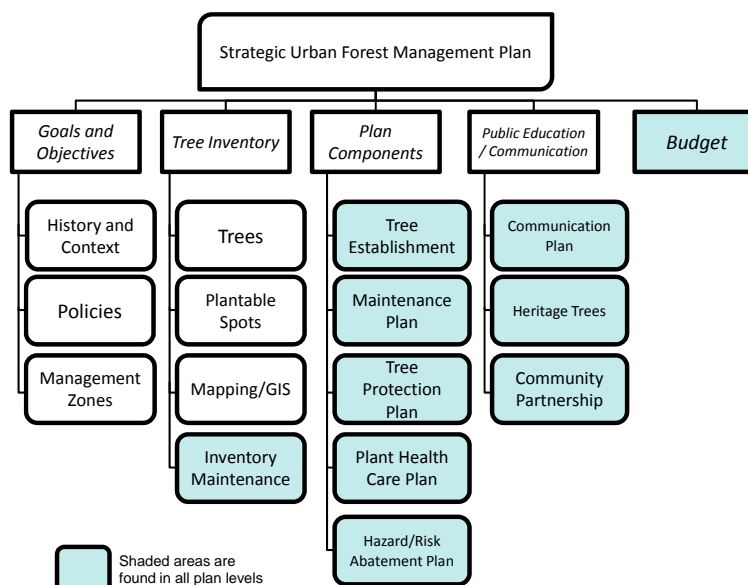
Adopting this principle into a UFMP will enable a community to maintain continuity across the whole planning horizon, and beyond.



Management Planning



Strategic Plan Components



Management Planning



Plan Components



These components are proposed. Based on the needs and values of the community, some can be omitted and others can be added.

Implementation of these components will enable a community to work proactively to achieve true urban forest sustainability.

Management Planning



CRITERIA AND INDICATORS



Evaluation & Control

The implementation of a strategy must be monitored and adjustments made as needed. This is also called “**evaluation** and **control**”.

Evaluation and control consists of the following steps:

1. Defining parameters to be measured.
2. Defining target values for those parameters.
3. Performing measurements.
4. Comparing measured results to the pre-defined standard.
5. Making necessary changes.

Source: <http://www.quickmba.com/strategy/strategic-planning/>

Criteria and Indicators



Criterion

A **category** of conditions or processes by which sustainable forest management may be assessed.

A criterion is characterized by a set of related **indicators** which are monitored periodically to assess change.

Source: http://www.rinya.maff.go.jp/mpci/criteria_e.html

Criteria and Indicators



Indicator

“A measure of an aspect of the criterion. A quantitative or qualitative variable which can be measured or described and which, when observed periodically, demonstrates trends.”



Source: http://www.rinya.maff.go.jp/mpci/criteria_e.html

Criteria and Indicators



Sustainable Forest Management

From the Montréal Process:

“The criteria and indicators ... are intended to provide a common understanding of what is meant by *sustainable forest management*.”

“They also provide a common framework for describing, assessing and evaluating a country's progress toward sustainability at the national level.”

Source: http://www.rinya.maff.go.jp/mpci/criteria_e.html

Criteria and Indicators



C&I and Urban Forest Management Success

Criteria and Indicators first promoted as a tool for successful urban forest management by Clark *et al.* (1997).

Developed a list of C&I that considers:



- the *Vegetation Resource*
- the *Community Framework*
- the *Resource Management Approach*

Criteria and Indicators



How C&I Work

Each **criterion**

Criteria	Performance Indicators				Key Objective
	<i>Low</i>	<i>Moderate</i>	<i>Good</i>	<i>Optimal</i>	
Species mix	No assessment	Street tree inventory	Public-private sampling	Included in a city-wide GIS	Provide for uneven species distribution.
Neighbourhood action	No action	Isolated and limited no. of groups	City-wide coverage and interaction	All neighbourhoods organized and cooperating	At the neighbourhood level, citizens understand and participate in UF management.
City-wide management plan	No plan	Existing plan limited in scope and implementation	Government-wide plan, accepted and implemented	Citizen-government-business resource management plan, accepted and implemented	Develop and implement a management plan for trees and forests on public and private property.

From Clark et al. (1997). A Model of Urban Forest Sustainability. Journal of Arboriculture 23(1).

Criteria and Indicators



Vegetation Resource

“The engine that drives urban forests.”

A sustainable vegetation resource provides continuous, high level of benefits across the entire community.

Example Criteria

Canopy cover
Uneven age distribution
Species diversity
Native vegetation



C&I for Urban Forests



Community Framework

“All parts of the community share a vision for their forest and act to realize that vision...”

The community must agree on what UF benefits are and act to maximize them.

Financial burden must be shared, and private landowners must recognize the public benefits of their trees.

Example Criteria

Public agency cooperation
Involvement of large private and institutional landholders
Neighbourhood action
General awareness of trees as a community resource



C&I for Urban Forests



Resource Management Approach

Not simply management of the resource,
but also *“the philosophy of management”*

Specific policies as well as acceptance and
development of shared vision among gov’t
and constituents.

Management approaches will vary as a function
of the forest resource and its extent.

Example Criteria

Funding
Protection of existing trees
Standards for tree care
Citizen safety



Criteria and Indicators in Strategic Planning

C&I are still rarely used in
strategic urban forest management planning.

Can C&I be better positioned as planning tools?



C&I and Management Planning

How do C&I's fit into management planning?

Remember the 8 steps to UF management planning?

4. Determination of the current status of various components
5. Identifying gaps between vision and current status
8. Implementation and monitoring of the plan

C&I for Urban Forests



CASE STUDY – THE TOWN OF OAKVILLE



Oakville – SUFMP Background

Oakville (pop. 166,000) is situated on Lake Ontario, just west of Toronto.

A response to concerns about increasingly poor air quality and an expanding suburban population.



Step 1: Identifying urban forest attributes

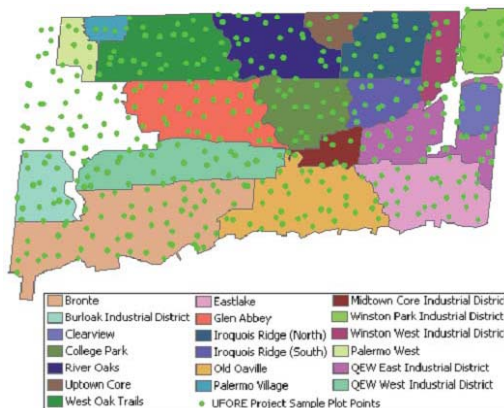
- Capital funding apportioned for a UFORE study - the third Canadian municipality to do such a project.

Oakville – Case Study



Oakville – SUFMP Background

372 plots measured in all land use type areas.



Oakville – Case Study

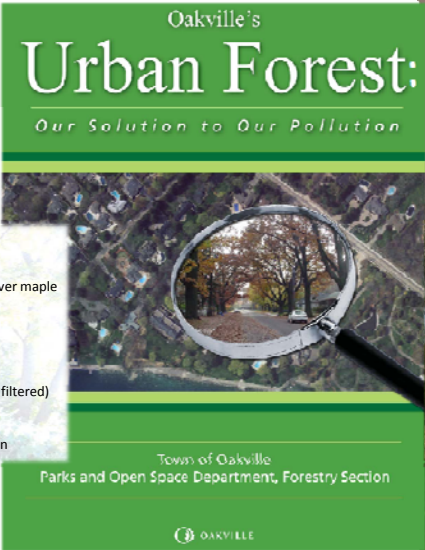


Oakville – SUFMP Background

The result:

2005's ***Oakville's Urban Forest: Our Solution to Our Pollution***

FEATURE	MEASURE
Number of trees in Oakville	1.9 million
Number of trees owned by the Town	820,000 (43%)
Top 3 species by leaf area	sugar maple, Norway maple, silver maple
Average Urban Forest Canopy Cover	29.1%
Urban Forest Canopy Cover in 2046	40%
Replacement value of the urban forest	\$878 million
Carbon sequestration	6,000 tonnes/year (\$141,000)
CO2 filtered by all trees	22,000 tonnes
CO2 filtered by Town trees	6,300 tonnes (28% of total CO2 filtered)
Criteria pollutants removed	172 tonnes (\$1.12 million)
Energy savings	\$840,000
Major pest damage threat	Emerald Ash Borer, \$86.1 million



Town of Oakville
Parks and Open Space Department, Forestry Section

OAKVILLE


Oakville – Case Study

Oakville – SUFMP Background

In 2006, Council approved capital funding to incorporate the project results into a 20-year ***strategic urban forest management plan***.

Prepared by Urban Forest Innovations Inc. and associates, the Oakville SUFMP applied the 20-year framework model, and showed how **Criteria** and **Indicators** can be effective at all stages of the planning process.

Oakville – Case Study



URBAN FOREST
STRATEGIC MANAGEMENT PLAN
TOWN OF OAKVILLE:
2008 - 2027

Prepared by:
Urban Forest Innovations Inc. and Dr. Andy Kenney
with input and amendments by Town of Oakville Forestry staff

MARCH 2008

Urban Forest Innovations Inc. 2007 Page 1

Oakville – SUFMP Background

The planning team suggested several **additional criteria** and revised indicators, based on the work of Clark *et al* (1997), for the Oakville plan.

Oakville – Case Study



Example Additional Criteria

Vegetation Resource

<i>Additional Criteria</i>	<i>New Key Objectives</i>
Species suitability	Establish a population of trees suitable for the urban environment and adapted for the regional climate.
Condition of publicly-owned trees (intensively managed)	Detailed understanding of the condition and risk potential of all publicly-owned trees.

Resource Management Approach

<i>Additional Criteria</i>	<i>New Key Objectives</i>
Tree inventory	Complete inventory of tree resource to direct management, including: age distribution, species mix, tree condition and risk assessment.
Canopy Cover inventory	High resolution assessments of the existing and <i>potential</i> canopy cover for the entire community.
Tree establishment planning and implementation	UF renewal is ensured through comprehensive tree establishment program driven by species diversity, distribution and canopy cover objectives.

C&I for Urban Forests



Example Revised Indicators

Vegetation Resource

Criterion	Indicators Revised
Canopy cover	New indicators provide quantifiable comparison between actual and potential canopy cover in a community.
Tree age distribution	<ul style="list-style-type: none"> New indicators consider city-wide and neighbourhood-level uneven age distribution. Introduce concept of Relative Diameter at Breast Height (RDBH) to assess if trees meeting genetic potential.

Community Framework

Criterion	Revised Indicators
Awareness of trees as a community resource	New indicators highlight importance of recognition of social benefits of trees – broadening the extent of potential supportive constituency.

C&I for Urban Forests



C&I Assessment

4. Determination of the current status of various components

The new and previous C&I's were used to assess where Oakville stood on urban forestry before a plan was developed.

Example Oakville C&I –based assessment: Vegetation Resource

Vegetation Resource					
Criteria	Performance Indicators				Key Objectives
	Low	Moderate	Good	Optimal	
Native vegetation	No program of integration	Voluntary use of native species on publicly and privately-owned lands.	The use of native species is <i>encouraged</i> on a project-appropriate basis in both intensively and extensively managed areas.	The use of native species is <i>required</i> on a project-appropriate basis in both intensively and extensively managed areas.	Preservation and enhancement of local natural biodiversity

Oakville – Case Study



C&I Assessment

Example Oakville C&I –based assessment: Community Framework

Community Framework					
Criteria	Performance Indicators				Key Objective
	Low	Moderate	Good	Optimal	
Neighbourhood action	No action	Isolated or limited number of active groups.	City-wide coverage and interaction.	All neighbourhoods organized and cooperating.	At the neighbourhood level, citizens understand and cooperate in urban forest management.
General awareness of trees as a community resource	Trees seen as a problem, a drain on budgets.	Trees seen as important to the community.	Trees acknowledged as providing environmental, social and economic services.	Urban forest recognized as vital to the communities environmental, social and economic well-being.	The general public understanding the role of the urban forest.
Regional cooperation	Communities cooperate independently.	Communities share similar policy vehicles.	Regional planning is in effect	Regional planning, coordination and /or management plans	Provide for cooperation and interaction among neighbouring communities and regional groups.

Oakville – Case Study



C&I Assessment

Example Oakville C&I –based assessment: Community Framework

Management Approach					
Criteria	Performance Indicators				Key Objective
	Low	Moderate	Good	Optimal	
Canopy Cover Inventory	No inventory	Visual assessment	Sampling of tree cover using aerial photos or satellite imagery.	Sampling of tree cover using aerial photographs or satellite imagery included in city-wide GIS	High resolution assessments of the existing and potential canopy cover for the entire community.
City-wide management plan	No urban forest management plan in place	Existing plan limited in scope and implementation	Comprehensive plan for publicly-owned trees accepted and implemented	Comprehensive plan for ALL components of the urban forest (private and public assets) accepted and implemented.	Develop and implement an urban forest management plan for private and public property.
Tree Protection Policy Development and Enforcement	No tree protection policy	Policies in place to protect public trees.	Policies in place to protect public and private trees with enforcement.	Integrated municipal wide policies that ensure the protection of trees on public and private land are consistently enforced and supported by significant deterrents	The benefits derived from large-stature trees are ensured by the enforcement of municipal wide policies.

Oakville – Case Study



C&I Gap Analysis

That's just **one way** to use C&I as planning tools.

5. Identifying gaps between vision and current status

Oakville's urban forest, an equal part of the community's infrastructure, contributes positively to the health of all residents.

Oakville is a proud leader in urban forest stewardship.

Criteria	Performance Indicators				Key Objective
	Low	Moderate	Good	Optimal	
General awareness of roads as a community resource	Roads seen as a problem, a drain on budgets.	Roads seen as important to the community.	Roads acknowledged as providing environmental, social and economic services.	Roads recognized as vital to the communities environmental, social and economic well-being.	The general public understanding the role of the urban forest.

Oakville – Case Study



C&I Gap Analysis

5. Identifying gaps between vision and current status

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City-wide management plan	No plan	Existing plan limited in scope and implementation	Comprehensive plan for publicly-owned trees accepted and implemented	Comprehensive plan for ALL components of the urban forest (private and public assets) accepted and implemented.	Develop and implement an urban forest management plan for private and public property.

Oakville – Case Study



C&I Gap Analysis

By applying the basic C&I framework, we could see there were gaps between where Oakville was (the current status) and where Oakville wanted to be (the vision).

Only then could we develop a plan to help Oakville *get there*.

Oakville – Case Study



C&I – Adaptive Management

8. Implementation and monitoring of the plan

A strategic urban forest management plan is now in place until 2027.

But what will Oakville's urban forest look like in 17 years?



Emerald Ash Borer

Kudzu (recent arrival in Canada)



Oakville – Case Study

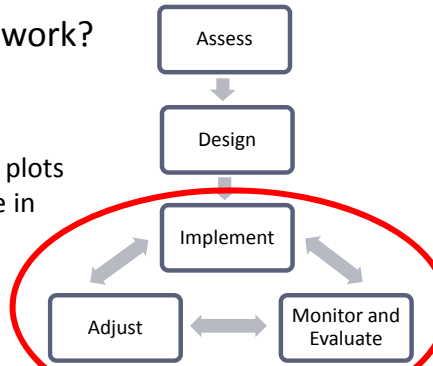


C&I – Adaptive Management

Remember the plan framework?

As:

- Oakville re-measures its UFORE plots
- invasive species and pests move in
- climate change continues
- urban populations grow
- etc. . . .



Criteria and Indicators will help managers reassess priorities, identify gaps and make the necessary changes in how they think about and manage the urban forest.

Oakville – Case Study



Adaptability of UFMP model

Several other communities have adopted or are beginning to adopt the 20-year strategic planning framework to their urban forest management planning:

- City of Burlington
- Town of Ajax
- City of Guelph
- City of Kitchener
- York Region
- Peel Region

Each community has adapted the framework to suit its needs and resources. Some have relied more on the C&I, others less. However, each has addressed the key issues identified in the overall framework.

Oakville – Case Study





QUESTIONS? COMMENTS?

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