

Urban Forestry, Pests & Diseases

The Bigger Picture

CECIL KONIJNENDIJK, PROFESSOR (UBC)

UFORIA – URBAN FORESTRY RESEARCH IN ACTION, UBC



Outline

- About disturbances and calamities in urban forests
- Not all pest and disease outbreaks are calamities
- What do we loose?
- Communication is key
- Change for the better
- Working in partnership



Sandra Ashton

DISTURBANCES, CALAMITIES & URBAN FORESTS



About 'Disturbance'

- The interruption of a settled and peaceful condition
- The disruption of healthy functioning



Oxford Online Dictionary



Disturbance in Biology & Ecology

Temporary change in environmental conditions causing **pronounced change** in an ecosystem.



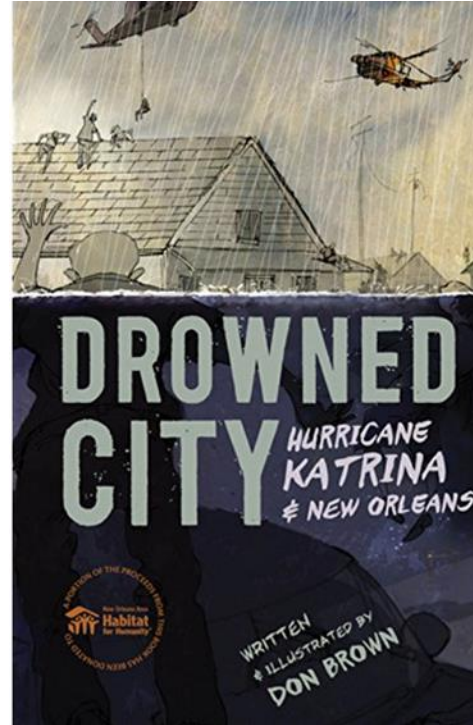
Often act **quickly** and with **great effect**, to **alter** the physical structure or arrangement of biotic and abiotic elements.

Pulse disturbance events: relative discrete events, such as extreme weather events, fire, earthquakes, tsunamis, floods, pest and disease outbreaks.

Devastating human impacts on the environment (e.g. introduction of invasive species).

A Few More Thoughts on Disturbance

- Scale and impact of ecological disturbances can differ widely
- Disturbances impact ecosystems, urban forests – but also humans and communities
- **Calamities:** an event causing great and often sudden **damage or distress**; a disaster (Oxford Online Dictionary)



Reproduced from a lithograph print published by Kurz & Allison Art Publishers, 76 & 78 Wabash Avenue, Chicago, Illinois. Originally imported on English Wikipedia by Hugh Manatee



When Things Become Really Bad...

- **Calamities:** an event causing great and often sudden **damage** or **distress**; a disaster
- In urban forestry: a **major loss** of urban forest **canopy** over a **short period of time**

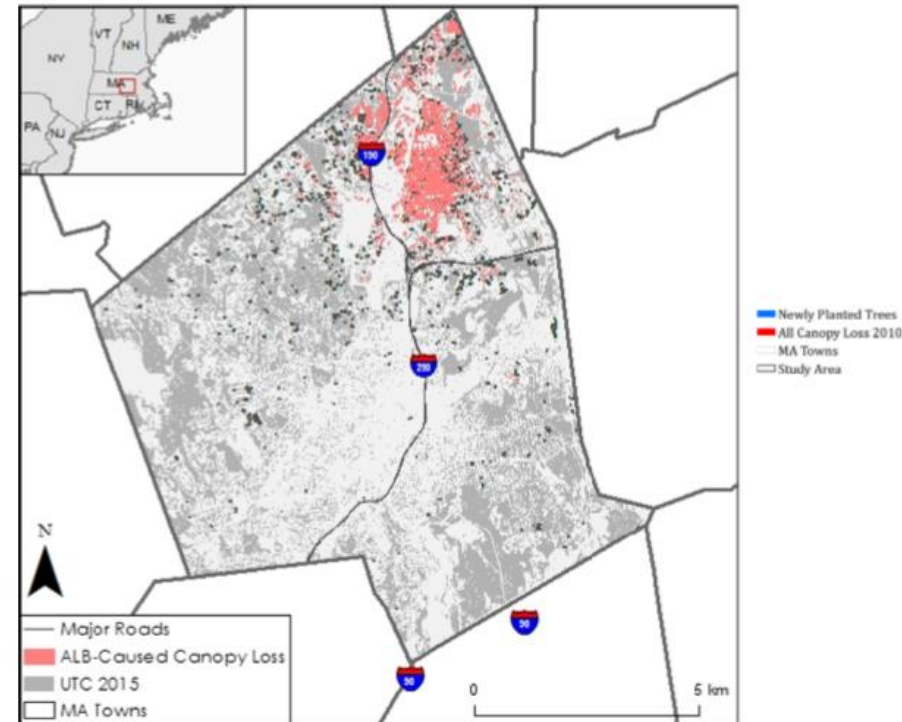
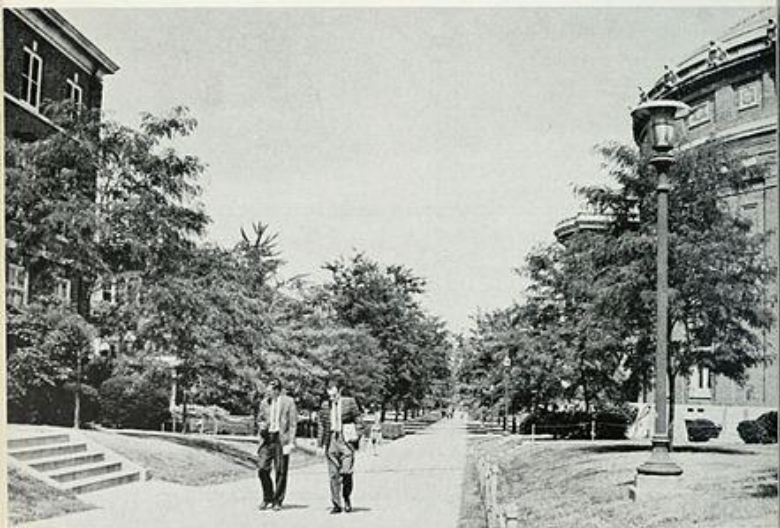
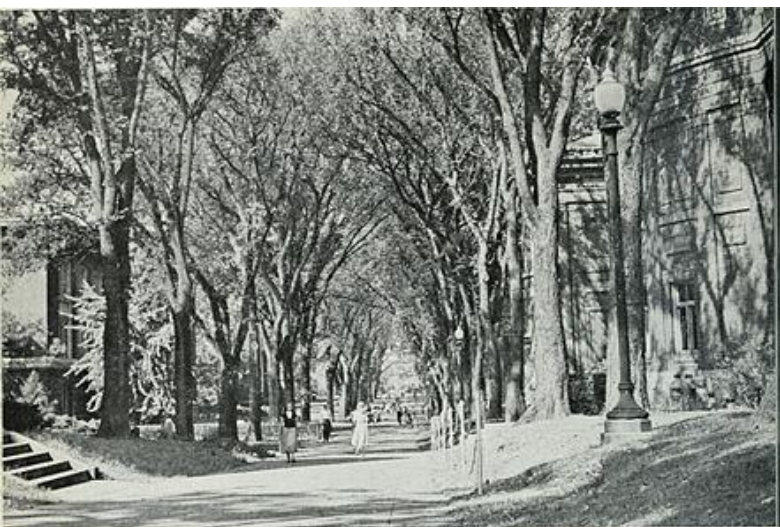


Fig. 1. Study area map, showing 2008–2010 Urban Tree Canopy (UTC) loss areas, created by Hostettler et al. (2013).

[https://commons.wikimedia.org/wiki/File:Dutch_elm_disease_in_Illinois_\(1967\)_\(20493912723\).jpg](https://commons.wikimedia.org/wiki/File:Dutch_elm_disease_in_Illinois_(1967)_(20493912723).jpg)

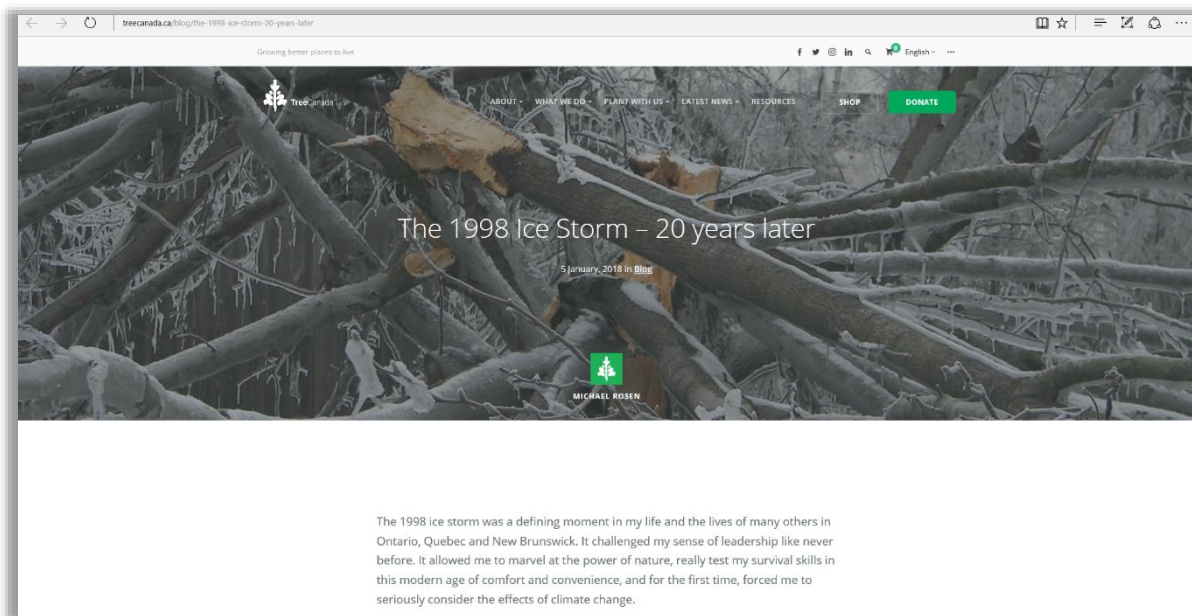
[Carter, J. Cedric \(James Cedric\), 1905-; Illinois. Natural History Survey Division](#)





J. Jensenius -

http://www.photolib.noaa.gov/noaa_products/noaa6198.htm



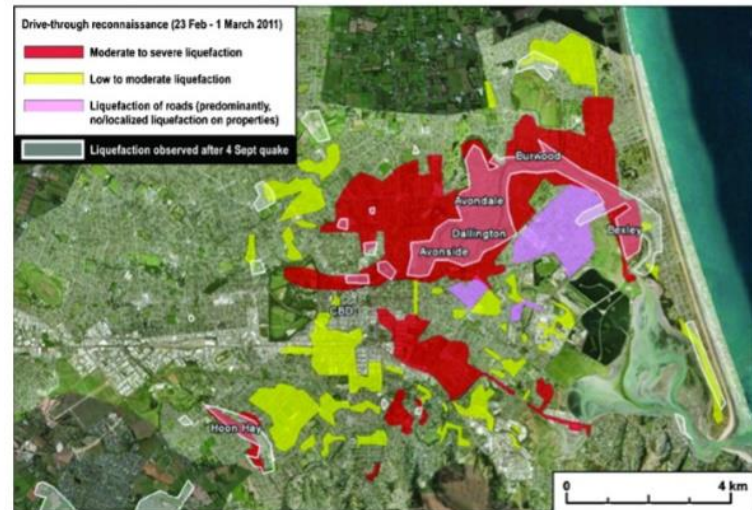
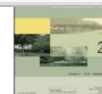


Fig. 1. Extent and severity of liquefaction following the February 2011 and September 2010 earthquakes in Christchurch, New Zealand. Based on drive-through reconnaissance and aerial imagery inspection (Cubrinovski and Taylor, 2011).



The impact of significant earthquakes on Christchurch, New Zealand's urban forest

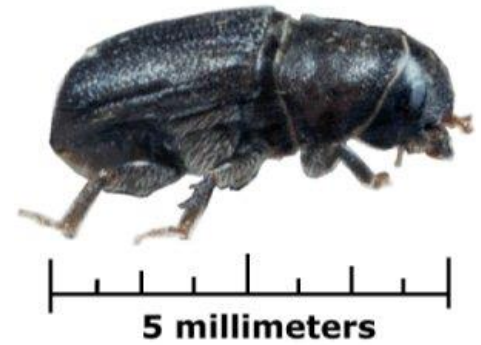
Justin Morgenroth^{a,*}, Tony Armstrong^b

^a New Zealand School of Forestry, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand

^b Christchurch City Council, New Zealand

By CPG1100 - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=57702057>





Results

There was an increase in mortality related to cardiovascular and lower-respiratory-tract illness in counties infested with the emerald ash borer. The magnitude of this effect was greater as infestation progressed and in counties with above-average median household income. Across the 15 states in the study area, the borer was associated with an additional 6113 deaths related to illness of the lower respiratory system, and 15,080 cardiovascular-related deaths.



American Journal of Preventive Medicine

Volume 44, Issue 2, February 2013, Pages 139-145



Research article

The Relationship Between Trees and Human Health: Evidence from the Spread of the Emerald Ash Borer

Geoffrey H. Donovan PhD ^{a,*,} David T. Butry PhD ^{b,} Yvonne L. Michael ScD ^{c,} Jeffrey P. Prestemon PhD ^{d,} Andrew M. Liebhold PhD ^{e,} Demetrios Gatzolis PhD ^{a,} Megan Y. Mao ^a

Show more

<https://doi.org/10.1016/j.amepre.2012.09.066>

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Vancouver council approves duplex zoning throughout the city

By **JEN ST. DENIS** StarMetro Vancouver
Thu., Sept. 20, 2018



VANCOUVER—Vancouver city council has voted to approve a zoning change to allow duplexes throughout the city after a two-day public hearing.

Dozens of residents spoke for or against the proposal, but the issue also showed how the city's political parties are positioning themselves either on the side of adding more density in single family neighbourhoods or strongly opposing the idea.



NOT ALL PEST DISTURBANCES
ARE CALAMITIES

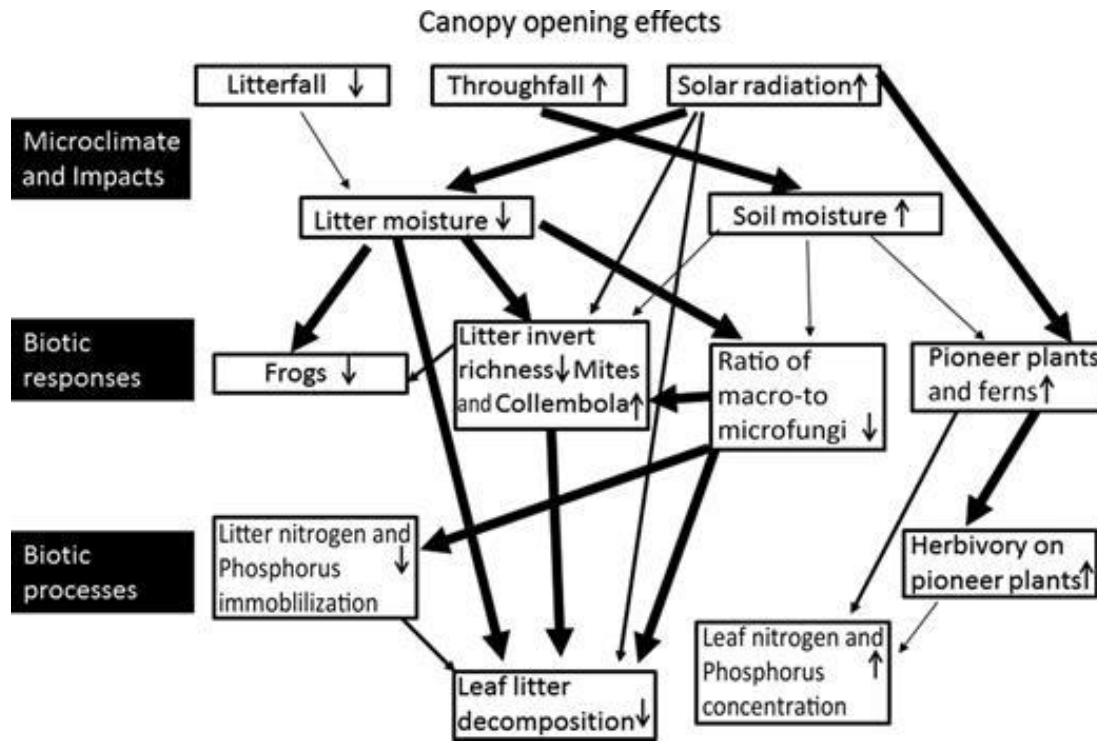


Impacts of Disturbances

- Impact on individual trees
- Loss of canopy
- Change in urban forest structure and composition
- Change in species diversity



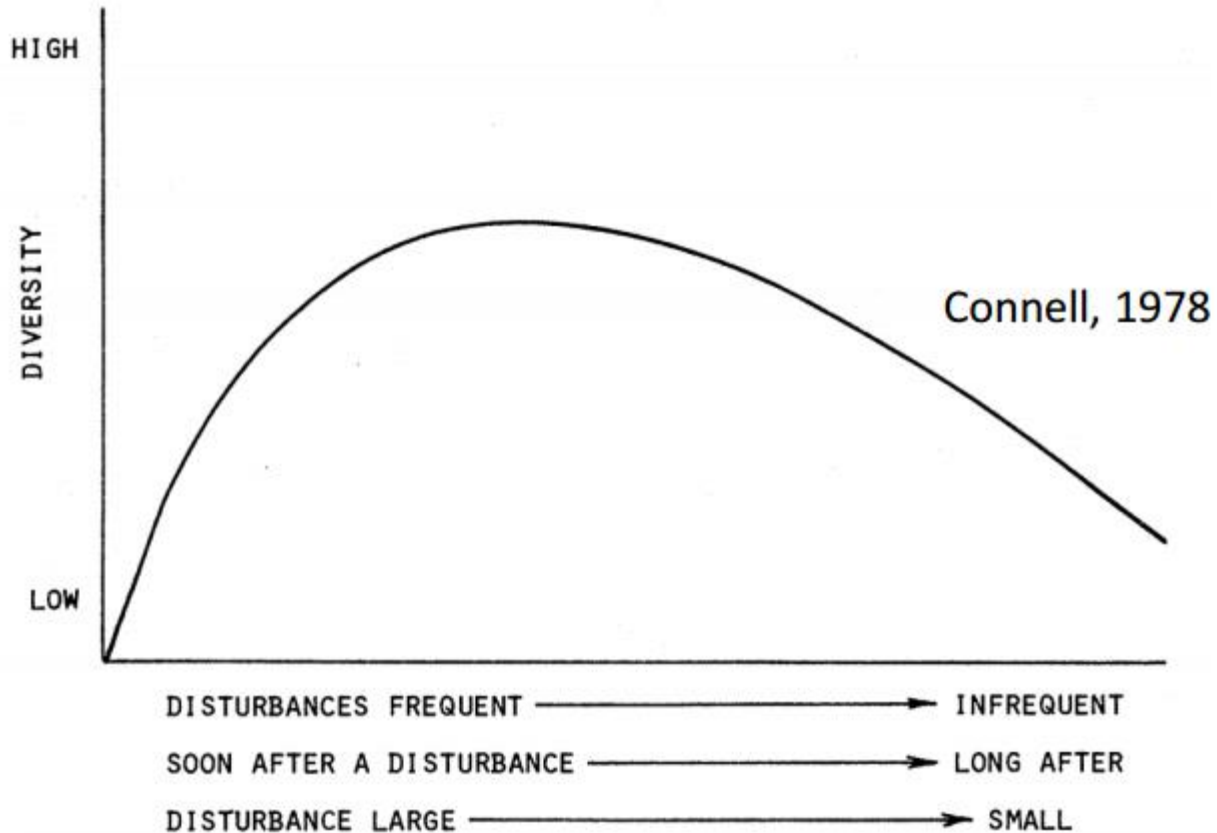
These all impact urban ecosystems, their functioning, and the ecosystem services provided



*Shields et al. (2015) –
work in Puerto Rico*

Cascading effects from canopy openness accounted for most of the shifts in the forest biota and biotic processes, which included **increased plant recruitment and richness**, as well as the **decreased abundance and diversity of several animal groups**. Canopy opening **decreased litterfall and litter moisture**, thereby inhibiting lignin-degrading fungi, which slowed decomposition.

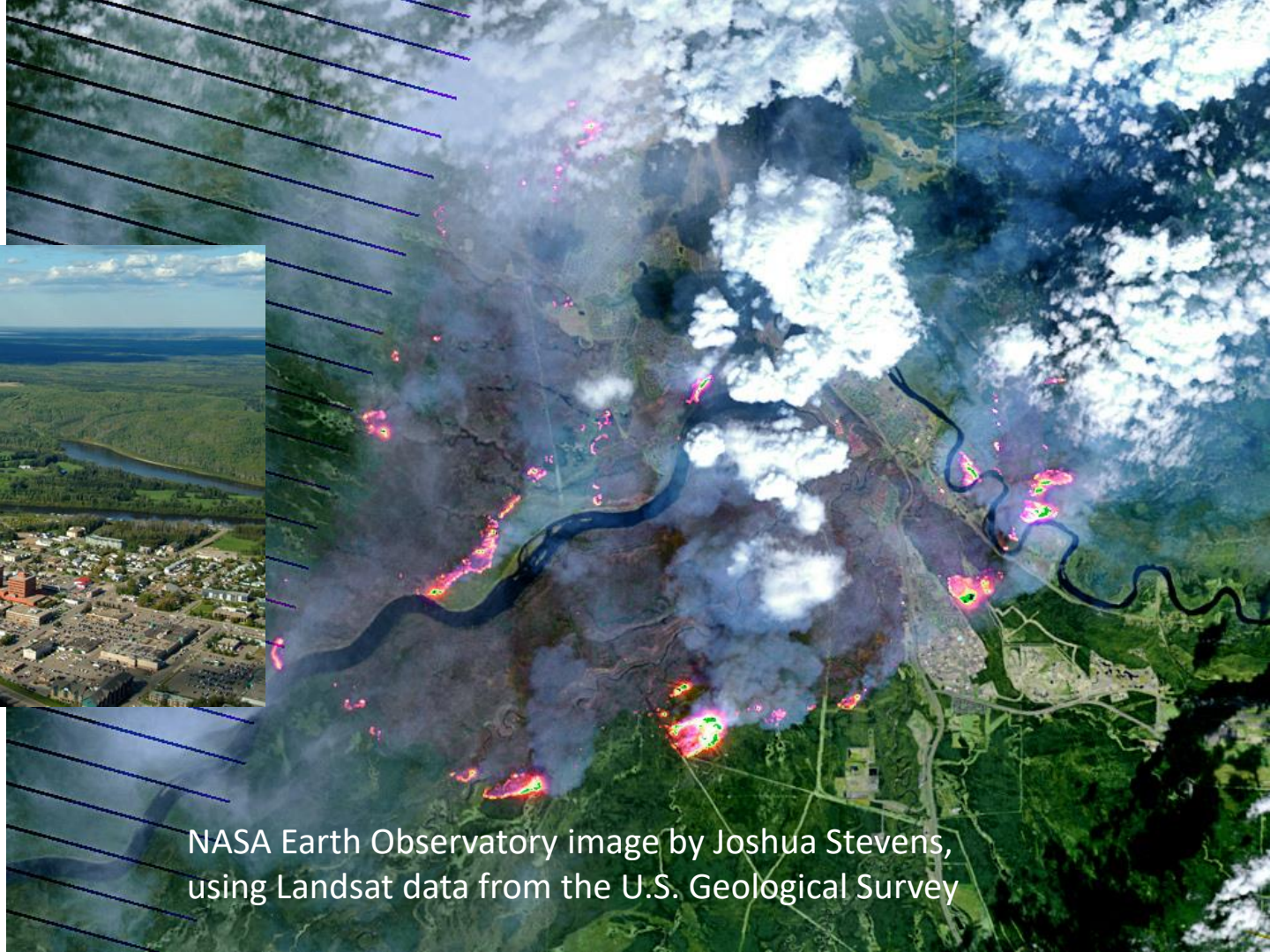
Intermediate Disturbance Hypothesis







Regional Municipality of Wood Buffalo / Wikimedia Commons



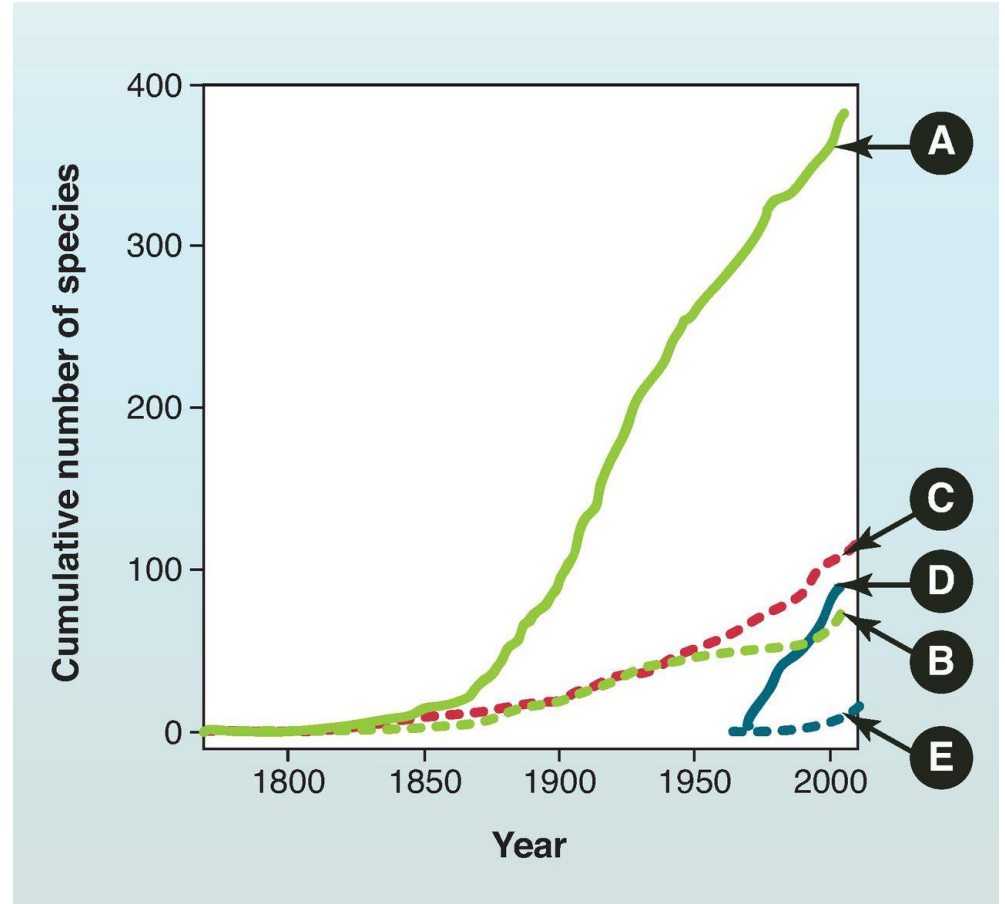
NASA Earth Observatory image by Joshua Stevens, using Landsat data from the U.S. Geological Survey

The Consequence of Tree Pests and Diseases for Ecosystem Services

I. L. Boyd^{1,*}, P. H. Freer-Smith², C. A. Gilligan³, H. C. J. Godfray⁴

+ See all authors and affiliations

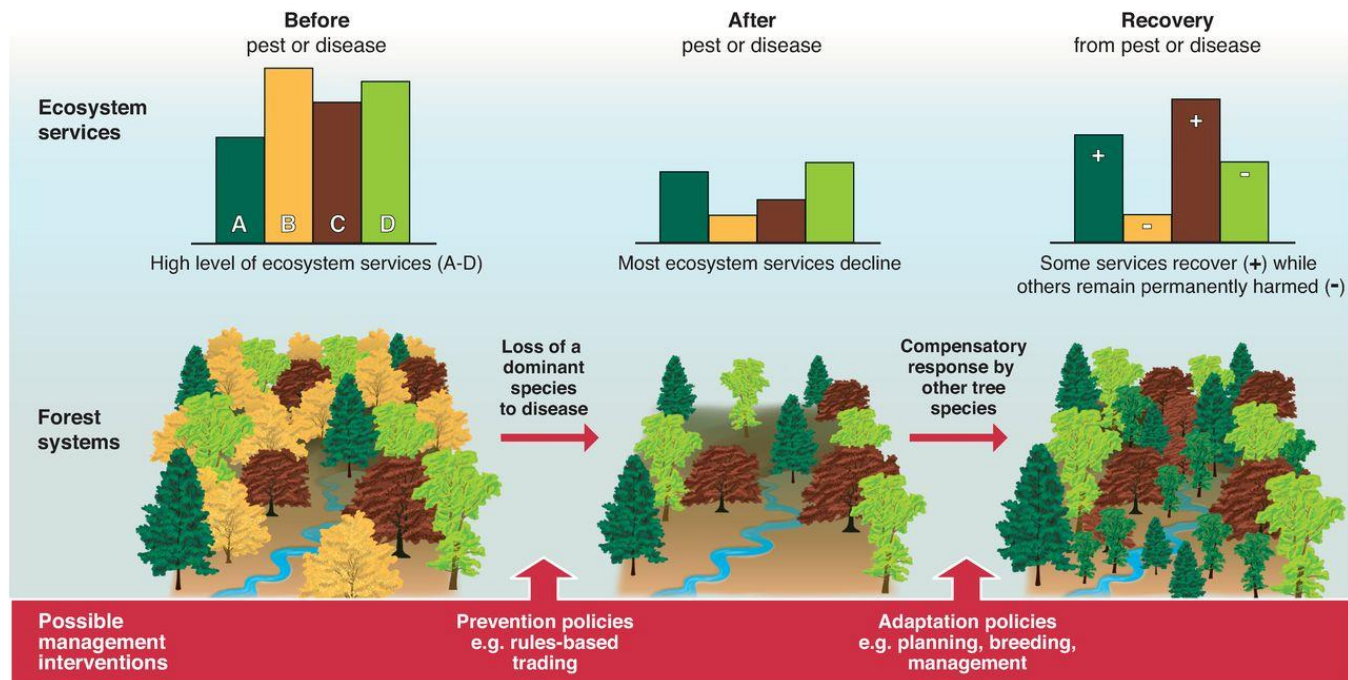
Science 15 Nov 2013;
Vol. 342, Issue 6160, 1235773
DOI: 10.1126/science.1235773



The Consequence of Tree Pests and Diseases for Ecosystem Services

I. L. Boyd^{1,*}, P. H. Freer-Smith², C. A. Gilligan³, H. C. J. Godfray⁴

* See all authors and affiliations



COMMUNICATION IS KEY



What's good and what's bad with current communication?



FIGHTING THE INVASION

THE ROOT OF THE COUNTRY'S TREE PEST PROBLEM



AMERICAN FORESTS

140 YEARS of Protecting and Restoring Forests

DO NOT DISTURB

The purple trap in this tree is for
emerald ash borer detection.

For more information:
emeraldashborer.wi.gov
1-800-462-2803

TRAP ID#: T. 020430



Wisconsin Department of Agriculture,
Trade and Consumer Protection

United States Department of Agriculture

THE EMERALD ASH BORER IS HERE! Now What?



A workshop for municipal, First Nation, commercial
and environmental decision makers and managers of
urban and natural forests threatened by EAB



March 28, 2017

Workshop 8:30 am – 5:00 pm

(sign-in begins at 7:30 am)

Public Open House 6:30 pm-9:00 pm

Bora Laskin Theatre
Lakehead University
Thunder Bay, Ontario

Know Your Enemy! THE EMERALD ASH BORER



Join The Garden Geeks of Facebook

Manitoba

City of Winnipeg looks for help managing Dutch elm, emerald ash borer



'Scope and urgency' of emerald ash borer control program expected to rapidly grow, city says



Laura Glowacki - CBC News - Posted: Mar 29, 2019 1:57 PM CT | Last Updated: March 29



Winnipeg is looking for consultants to develop a 20-year urban forest strategy that takes into account the impact of pests like Dutch elm and emerald ash borer. (Getty Images)



**DUMPING
YARD WASTE**

*in our
greenspaces*

It spreads **invasive species** and
smothers native forest plants.



Today's must read

P.E.I. Greens make history as Tories come out on top

By Justin Ling | April 23rd 2019

A small resistance starts to organize in Alberta against Jason Kenney's 'war room'

By Brenna Owen | April 24th 2019

Secrets of Government**EXCLUSIVE: Canadian pipeline regulator deleted message about security threat at Calgary office**

By Mike De Souza | April 24th 2019

Tragedy and politics on Prince Edward Island

By Justin Ling | April 22nd 2019

Want to save millions of migratory birds? Turn off your outdoor lights in spring and fall

By Dan Mennill | April 24th 2019

Canada's Clean Economy**New York City's Green New Deal is music to Quebec's ears**

By Carl Meyer | April 23rd 2019

Opinion**What is Canada's New Green Deal? We need to step up climate action but we don't need an American policy agenda**

By Andrea Reimer | April 23rd 2019

Bill McKibben likens climate change to Second World War

By Tracy Sherlock in [Features](#), [Energy](#), [Politics](#) | April 3rd 2019

#978 of 995 articles from the Special Report:

[Race Against Climate Change](#)





CHANGE FOR THE BETTER



The Complexity of Disturbance

- Different causes, levels, scales
- Different impacts
- Impact on urban forests, urban people, and their many relationships
- From disturbance and even disaster to opportunity



Resilience

The capacity to recover
quickly from difficulties;
toughness

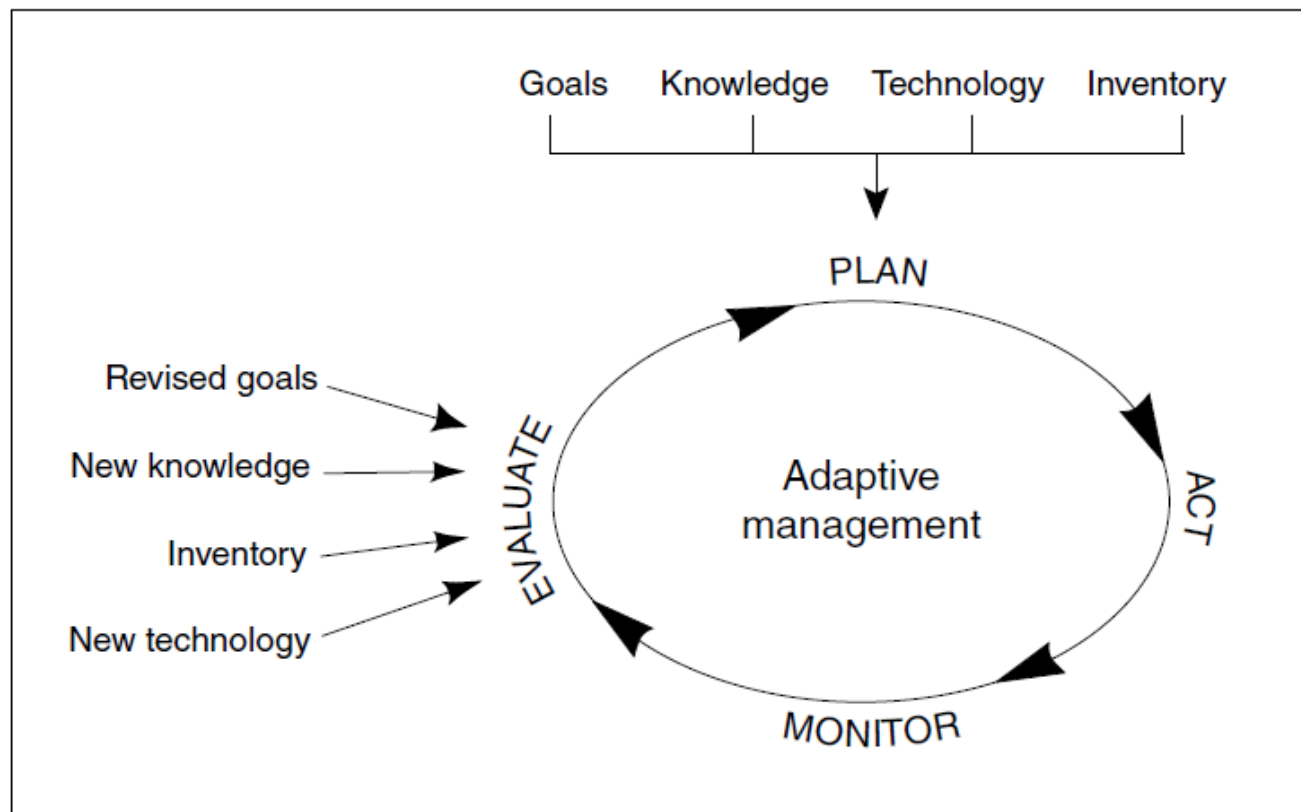
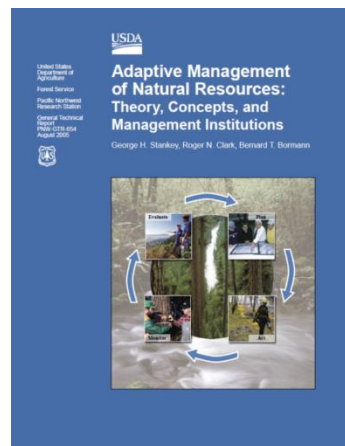


Figure 2—The adaptive management cycle (USDA USDI 1994: E-14).



What is IPM?

Integrated Pest Management is a science-based approach that combines a variety of techniques. By studying their life cycles and how pests interact with the environment, IPM professionals can manage pests with the most current methods to improve management, lower costs, and reduce risks to people and the environment.

IPM tools include:

- Alter surroundings
- Add beneficial insects/organisms
- Grow plants that resist pests
- Disrupt development of pest
- Prevention of pest problem developing
- Disrupt insect behaviors
- Use pesticides

1 IDENTIFY/MONITOR

Determine the causal agent and its abundance (contact your local extension agent for help).

2 EVALUATE

The results from monitoring will help to answer the questions: Is the pest causing damage? Do we need to act? As pest numbers increase toward the economic threshold further treatments may be necessary.

3 PREVENT

Some pest problems can be prevented by using resistant plants, planting early, rotating crops, using barriers against climbing pests, sanitation, and sealing cracks in buildings.

4 ACTION

IPM uses multiple tools to reduce pests below an economically damaging level. A careful selection of preventive and curative treatments will reduce reliance on any one tactic and increase likelihood of success.

5 MONITOR

Continue to monitor the pest population. If it remains low or decreases, further treatments may not be necessary, but if it increases and exceeds the action threshold, another IPM tool should be used.

WHERE CAN YOU PRACTICE IPM?



Buildings and Homes:

Inspect, identify pests, keep pests out, clean to deny pests food and water, vacuum, trap, or use low-risk pesticides.



Farms:

Check for pests/pest damage regularly, identify accurately, choose pest-resistant plant varieties, encourage/introduce beneficial insects, time planting to avoid pests, and if needed use low-risk pesticides.



Managed Natural Systems:

Identify the pest and use management options that have minimal risks to pollinators, humans, and pets.



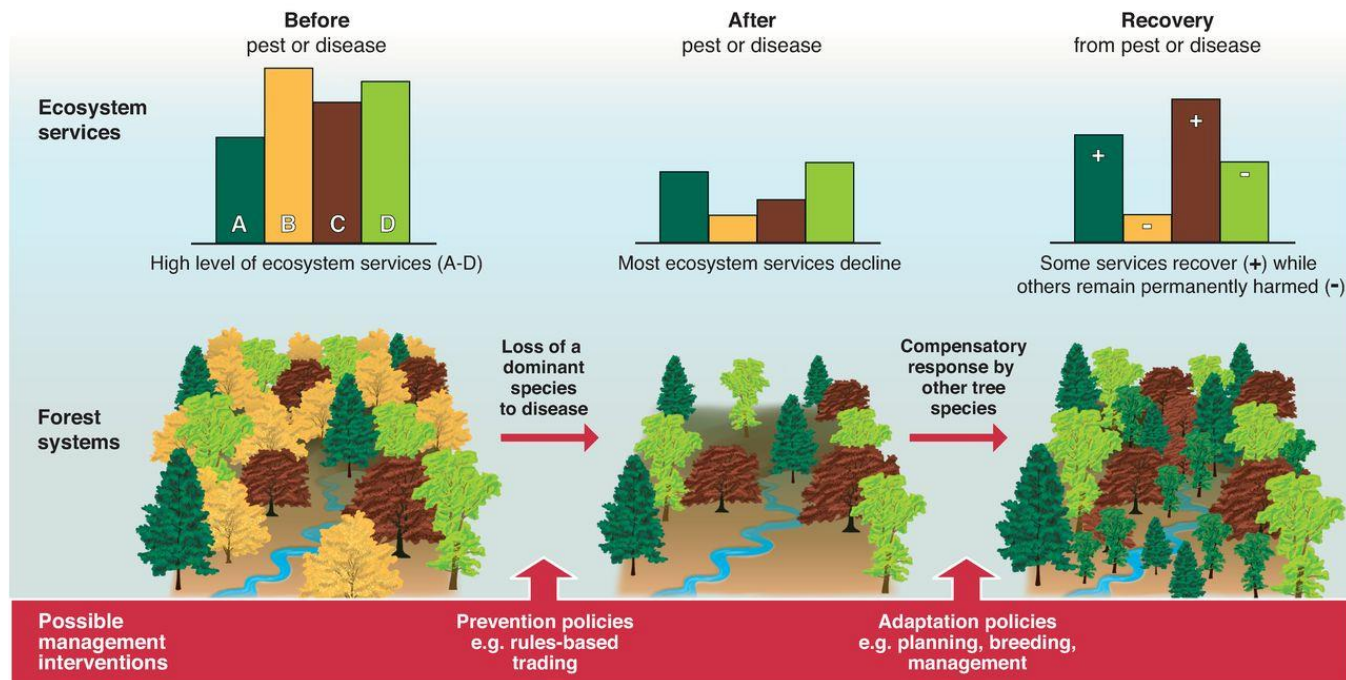
The Entomological Society of America is the largest organization in the world serving the needs of entomologists and other insect scientists. ESA stands as a resource for policymakers and the general public who seek to understand the importance and diversity of earth's most diverse life form— insects. Learn more at www.entsoc.org.

Acer	Citrus longhorn beetle (Anoplophora chinensis)	Citrus longhorn beetle is not yet in the UK. However, familiarisation with the symptoms is suggested and notification of relevant authorities essential in the event of a discovery.	Cut flowers or branches; Plants for planting (except seeds bulbs and tubers)	EU Annex 1	30
	Asian longhorn beetle (Anoplophora glabripennis)	Asian longhorn beetle is not yet in the UK. However, familiarisation with the symptoms is suggested and notification of relevant authorities essential in the event of a discovery.	Plants for planting (except seeds bulbs and tubers); Wood and wood products; Wood packaging material	EC IAI; EPPO A1	40
	Sweet chestnut blight (Cryphonectria parasitica)	Suppliers must be able to supply a Plant Passport. If possible, order plants early and quarantine in a low risk area for a period of time before planting	Plants for planting (except seeds bulbs and tubers)	Annex IIB (UK protected zone) and plant passporting reqs	30

The Consequence of Tree Pests and Diseases for Ecosystem Services

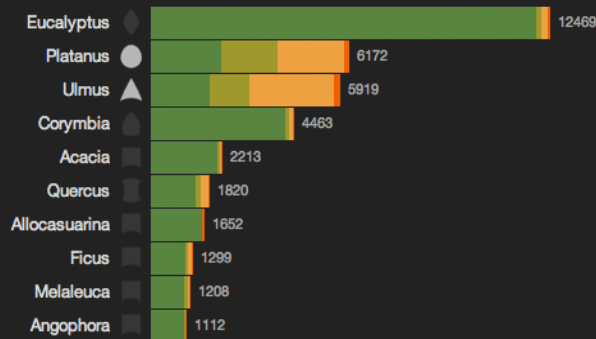
I. L. Boyd^{1,*}, P. H. Freer-Smith², C. A. Gilligan³, H. C. J. Godfray⁴

* See all authors and affiliations



Diversity Why is diversity important?

Melbourne's most common tree types - graphed by genus - coloured by useful lifetime



Increasing diversity

A lack of species diversity leaves the urban forest vulnerable to threats from pests, disease, and stress due to climate change. Currently our urban forest is dominated by eucalypts, planes, elms and gums (corymbias). Many of these trees were planted at the same time during condensed periods of planting activity, and large numbers of elms and planes are now reaching the end of their useful life expectancy.

● 37% of planes have a life expectancy of less than 10 years.

▲ 50% of elms have a life expectancy of less than 10 years.

Reducing Risk

Combined with the substantial losses associated with an ageing tree population, myrtle rust and sycamore lace bug are current threats to the Eucalyptus, Corymbia and Platanus genera. Diversification is a basic rule for reducing risk. A greater range of species will provide greater resilience and long-term stability for the forest as a whole.



URBAN TREE DIVERSITY FOR SUSTAINABLE CITIES



Policy brief
summarizing the
benefits of diverse
tree populations and
the actions required to
achieve high urban
tree diversity

Policy brief

Some species are better than others at providing any single ecosystem service, due to intrinsic (i.e. morphological and physiological) and temporal (diurnal or seasonal effects) characteristics. For example, the traditional Japanese custom of Hanami (a cultural service) is dependent upon the flowering of the cherry tree (*Prunus* spp.). So in order to optimise multiple ecosystem services, it is essential to promote species diversity, age and size diversity.

To optimise
one ecosystem
service, diversity is
unnecessary. But in
order to optimise multiple
ecosystem services, high
urban tree diversity is
essential.

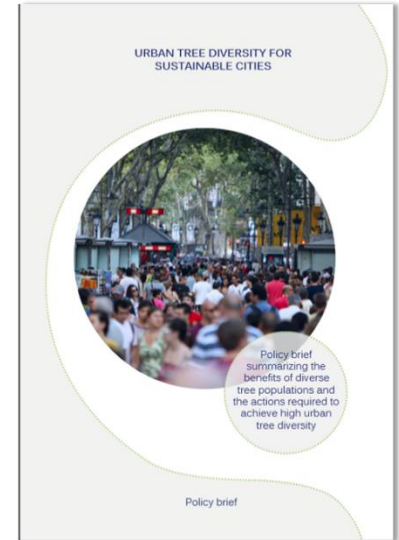
Diverse Urban Forests are Resistant and Resilient to Disturbance

Species diversity, diversity within a species, age and size diversity are also necessary for urban ecosystem adaptability – an adaptable ecosystem is resistant and resilient to disturbance. Such adaptability allows urban forests to provide long-term ecosystem services in the face of biotic and abiotic change. Recent pest outbreaks and the environmental changes resulting from climate change highlight the need for species diversity and within-species genetic diversity to achieve a resistant and resilient urban forest.

Urban
forest diversity
provides resistance
and resilience to
disturbances including
climate change and
pests and/or
disease.

5 Key Actions to Promote Diversity

- 1) Understand your city's tree diversity (and legacy!).
- 2) Establish locally-relevant species diversity goals.
- 3) Determine which species and cultivars are best suited for your urban environment (and remember to think ahead – future climate).
- 4) Include local actors in diversity action.
- 5) Develop a locally-relevant species prescription.




 OPEN ACCESS  PEER-REVIEWED

RESEARCH ARTICLE

Warming and drought combine to increase pest insect fitness on urban trees

Adam G. Dale , Steven D. FrankPublished: March 9, 2017 • <https://doi.org/10.1371/journal.pone.0173844>

Article	Authors	Metrics	Comments	Media Coverage
				

Abstract

Introduction

Materials and methods

Results

Discussion

Abstract

Urban habitats are characterized by impervious surfaces, which increase temperatures and reduce water availability to plants. The effects of these conditions on herbivorous insects are not well understood, but may provide insight into future conditions. Three primary hypotheses have been proposed to explain why multiple herbivorous arthropods are more abundant and damaging in cities, and support has been found for each. First, less complex vegetation may reduce biological control effects. Second, plant stress can increase plant quality for pests.

Tolerance

Fitness



Jehane Samaha
MSc student

Urban Tree Selection Study

- ✱ What tree selection criteria do various professional groups prioritize?
- ✱ What trees will be excellent to plant in future cities?
- ✱ Online **survey**: temperate North America.
- ✱ **Case study** interviews: Philadelphia area.



PHILADELPHIA URBAN FOREST.
PHOTO CREDIT: METROPOLIS

SURVEY DETAILS



- 979 professionals completed the online survey
- Largest groups: urban forestry (296), arboriculture (197), public horticulture (119)
- Differences in e.g. tree preferences and 'palette'

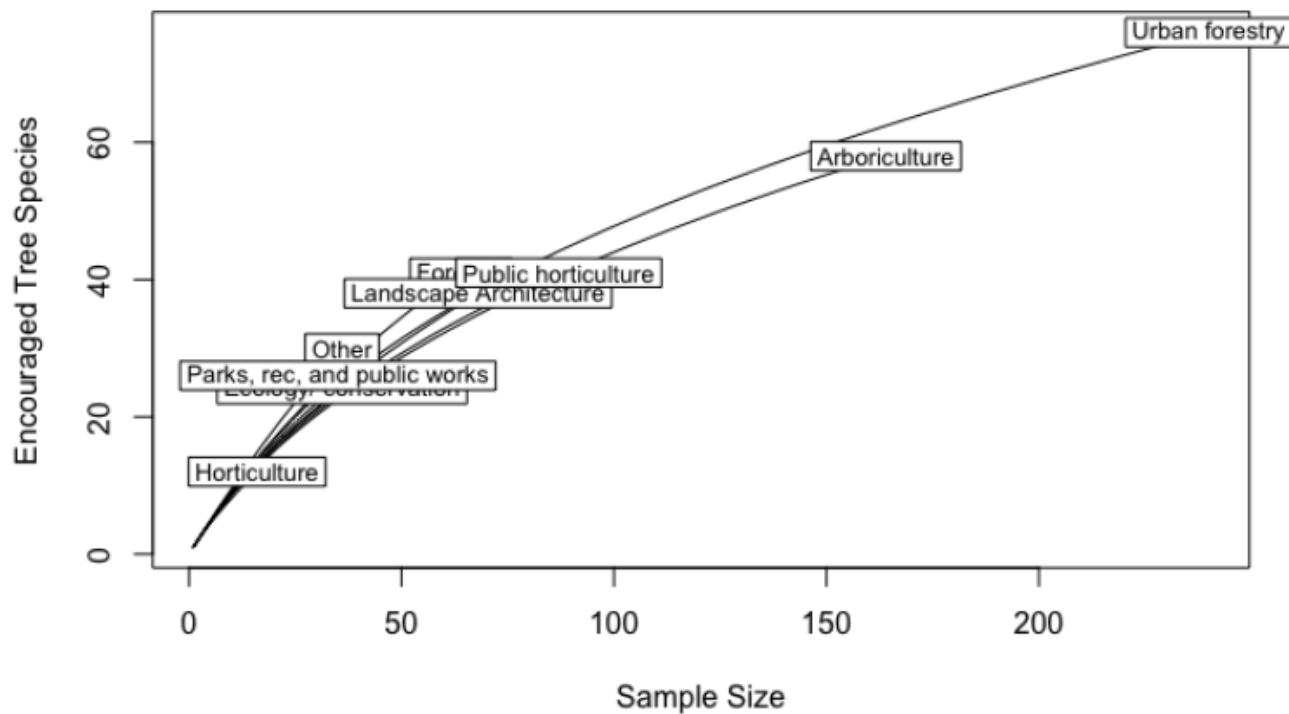


Figure 12: Rarefaction curves for the palettes of encouraged tree species identified by each professional field.

Key to Profiles

Contents page
Alphabetical Index

Tree Selector

Use potential
Mature size

Crown form
Crown density

Environmental tolerance
Ornamental qualities

Use potential



Park



Paved



SuDS



Small garden



Coastal



Transport corridor

Mature size



A massive tree (capable of reaching >25m)

>25M



A large tree (mature size of 15-25m)

15-25M



A medium tree (mature size of 10-15m)

10-15M



A small tree (mature size of <10m)

<10M

Crown form



Globular - rounded, circular form; vertical and horizontal axis about equal



Ovoid - elliptic to egg-shaped, broadest at the base, vertical axis exceeding horizontal axis



Obovoid - elliptic to egg-shaped, broadest at crown apex, vertical axis exceeding horizontal axis



Conical - approaching triangular in outline, broadest at base



Columnar - cylindrical, vertical axis greatly exceeding horizontal axis



Irregular - asymmetrical, uneven outline



Weeping - weeping branches



Vase shaped

Crown density



A dense crown



A moderately dense crown



An open crown

Natural habitat



Environmental tolerance



Tolerant to shade



Moderately tolerant to shade



Partially tolerant to shade



Intolerant to shade



Tolerant to drought



Moderately tolerant to drought



Moderately sensitive to drought



Sensitive to drought



Tolerant to waterlogging



Moderately tolerant to waterlogging



Moderately sensitive to waterlogging



Sensitive to waterlogging

Ornamental qualities



Peak flowering times



Peak fruiting times



Deciduous broadleaved



Evergreen broadleaved



Deciduous conifer



Evergreen conifer



Single-stemmed



Multi-stemmed

Issues to be aware of





Ginkgo biloba

(Maidenhair tree)

- Contents page
- Alphabetical index

Tree Selector

- Use potential
- Mature size
- Crown form
- Crown density
- Environmental tolerance
- Ornamental qualities

Use potential



Park



Paved



Transport corridor

Tree size and crown characteristics



15-25M

A massive tree, capable of reaching 30m. Typically smaller in cultivation.



Ovoid, becoming more irregular with age.



A moderately dense crown.

Natural habitat



Native of the Yangtze valley in China as part of the transitional mixed mesophytic deciduous forest bordering the subtropical evergreen broadleaved forest. Found in valleys 300-1100m, on acidic, well-drained, silty soil. However, *Ginkgo biloba* has proven highly adaptable to a range of soil types.

Environmental tolerance



Partially tolerant to shade.



Tolerant to drought.



Sensitive to waterlogging.

Ornamental qualities



EARLY SPRING

Male and female flowers are found on separate trees (dioecious). Both have little ornamental value.



LATE AUTUMN

Female trees produce drupe fruit, singly or in pairs which ripen by late autumn. Ripe fruits smell of rancid butter, for this reason male trees make better selections for urban environments.



Deciduous gymnosperm (botanically, *Ginkgo biloba* is not a conifer) with simple leaves. Autumn colouration is excellent with leaves turning a golden yellow.



Single-stemmed with greyish bark, becoming more deeply fissured with age.

Issues to be aware of



Ripe fruits smell of rancid butter so is undesirable for most urban plantings. The juice from the fruit can also cause skin irritation.

Notable varieties

Male clones

'Autumn Gold', 'Lakeview', 'Princeton Sentry'.

Male clones narrow

'Fastigiata', 'Fairmount'.

Notes

- A very robust tree that is also observed to have some tolerance to salt and air pollution.
- *Ginkgo* is known to be a high emitter of Biogenic Volatile Organic Compounds (BVOCs).

The tree and its features



Left: *Ginkgo biloba* provides excellent autumn colour and visual interest in a public square. © Andrew Hiron

Right: The simple leaves of *Ginkgo biloba* are highly distinctive. © Andrew Hiron



Left: The male flower of *Ginkgo biloba*. © Duncan Slater

Right: This drupe fruit from female *Ginkgo biloba* trees smell terrible when ripe. For this reason, it is best to use male clones.

© Duncan Slater



Design Guidebook

Maximizing Climate Adaptation Benefits with Trees

February 23, 2016, Updated: January 17, 2017

Submitted to:

Metro Vancouver

Submitted by:



3551 Commercial Street
Vancouver, BC
V5N 3E8

604 733-4886



Diamond Head Consulting Ltd. is certified by the BC Forest Safety Council

CHERRY BLOSSOMS

February 24, 2019 12:16 pm

Victoria may lose cherry blossoms as city pushes ahead with tree management plan

By Hina Alam The Canadian Press

Comments

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...



The B.C. legislature is framed by cherry blossoms as a pedestrian passes by in Victoria , B.C., on March 2, 2010. Victoria's trademark cherry blossoms may be lost in a few years as the city goes ahead with a plan to replace aging non-native trees with native species. On

Oakville's Urban Forest:

Our Solution to Our Pollution



Town of Oakville
Parks and Open Space Department, Forestry Section



MAJOR FINDINGS

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 (UFORE Grow-out Module simulation)	40%
Replacement value of the urban forest	\$878 million
Carbon sequestration	6,000 tonnes/year (\$141,000)
CO ₂ filtered by all trees	22,000 tonnes
CO ₂ filtered by Town trees	6,300 tonnes (28% of total CO ₂ filtered)
Criteria pollutants removed	172 tonnes (\$1.12 million)
Energy savings	\$840,000
Major pest damage threat	Emerald Ash Borer, \$86.1 million

WORKING IN PARTNERSHIP (AND BEING CREATIVE)



Who are the key partners?

Are there less conventional partner to involve?



Search Problems

PROBLEM

Dutch elm disease

OTHER NAMES:

Ceratocystis ulmi

NATURE:


Dutch elm disease is a fungal plant disease. The fungus is most frequently carried from tree to tree by female bark beetles. The leaves on one or more branches of a stricken tree suddenly wilt, turn dull green to yellow or brown then curl and finally drop off. On young trees the progress of the disease is rapid as the fungus spreads quickly through vascular tissue and the tree generally dies within two months; older, less vigorous trees take several years to die.




BROADER PROBLEMS:

[Fungal plant diseases](#)

[Pests and diseases of elm](#)

[Fungal plant diseases caused by ascomycetes](#)



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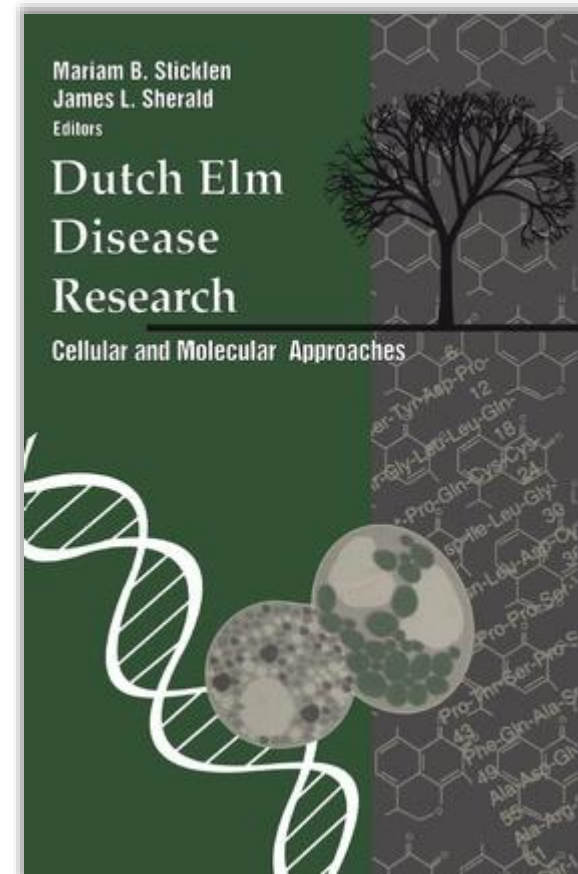
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Uof T News

U of T scientists map genome that causes Dutch Elm Disease



Cornell University
College of Agriculture and Life Sciences

Plant Disease Diagnostic Clinic
Plant Pathology and
Plant-Microbe Biology Section
334 Plant Science Building
Ithaca, NY 14853-5904

Dutch Elm Disease: *Ophiostoma novo-ulmi*; *O. ulmi*

Introduction

The rise of Dutch Elm Disease has been a devastating event in the history of tree diseases. It is caused by the fungi *Ophiostoma novo-ulmi* and *O. ulmi* and is vectored by bark beetles. The disease is referred to as "Dutch Elm Disease" because it was first reported in the Netherlands in 1919.

Symptoms and Signs

Symptoms develop quickly within a 4-5 week period and usually when the leaves have reached full size. The first visual symptom usually observed within the crown of the tree is referred to as "flagging". This



THE UNIVERSITY OF
WINNIPEG

| NewsCentre

PEOPLE

ATHLETICS

INDIGENOUS

ALUMNI

COMMUNITY

RES

City teams up with UWinnipeg for Dutch elm disease research

Posted on: 07/11/17 | Author: Communications | Categories: All Posts, Faculty of Science, Feature Story, Research



Early removal of "brood" trees a more targeted approach in the battle against Dutch elm disease

The City of Winnipeg's Urban Forestry Branch is collaborating with The University of Winnipeg on a research project to identify and prioritize the early removal of brood trees. Brood trees are trees that the female elm bark beetle uses to lay eggs and establish her brood (a new generation of beetles). These brood trees represent the small percentage of diseased elm trees that host the majority of elm bark beetle brood. The goal is to develop a simple, cost efficient and quick sampling technique to help prioritize trees for rapid removal. The pilot project will also assess the effectiveness of this approach.



United States
Department of
Agriculture

Cooperative Emerald Ash Borer Project

Initial county EAB detections in North America

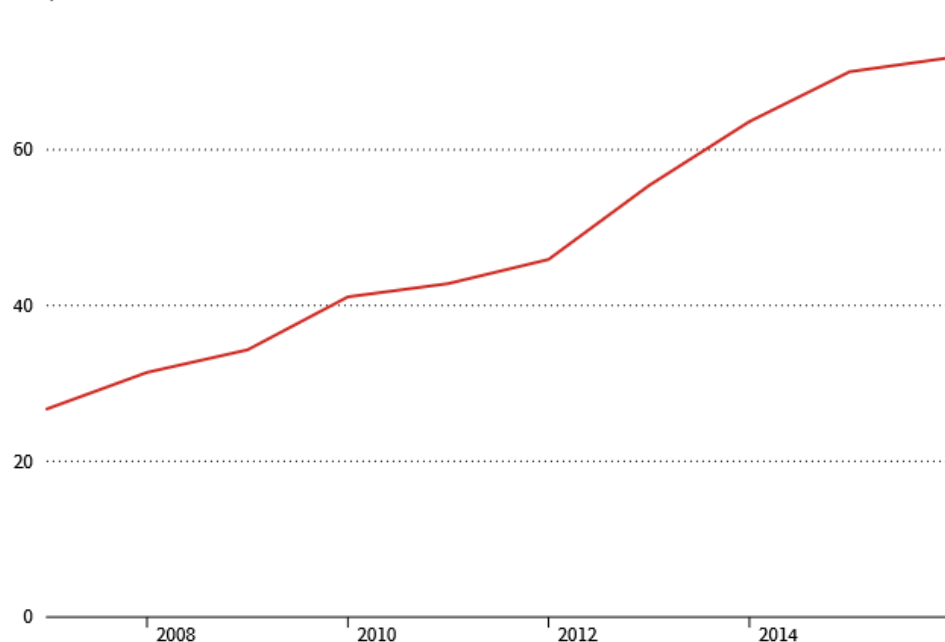
April 1, 2019



Over the past decade, the city has diverted more resources to urban forestry, with the department's gross operating budget increasing to \$71.8-million this year from \$26.7-million in 2007, with about two-thirds of the current funding going to maintenance. But millions more are needed to bring the city's tree maintenance in line with its objectives.

Gross operating budget for City of Toronto's Urban Forestry department

80 \$ in millions





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Emerald Ash Borer Information Network




This Website is part of a multinational effort to bring you the latest information about emerald ash borer.



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Lythrum salicaria
purple loosestrife

2015-12-23 11:13 AM

ATTACH IMAGES

No images

LOCATION


lat: 44.271567
lng: -78.320598
accuracy: 9.0 m

INFESTATION

Hectares

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Select one

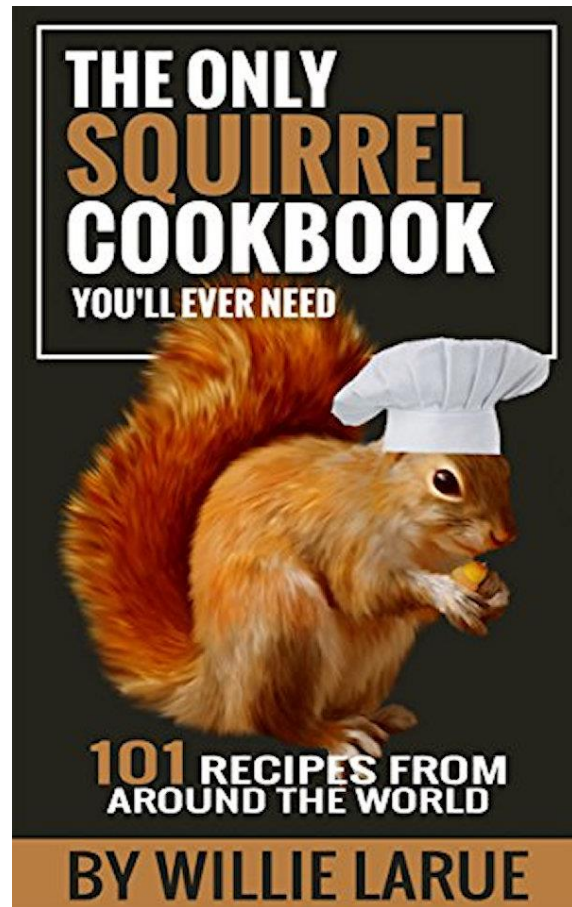




Ontario's Invading Species Awareness Program is a partnership between the Ontario Ministry of Natural Resources and Forestry (MNR), and the Ontario Federation of Anglers and Hunters (OFAH).



By Peter Trimming from Croydon, England - "I'm fine up here!", CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=76253837>

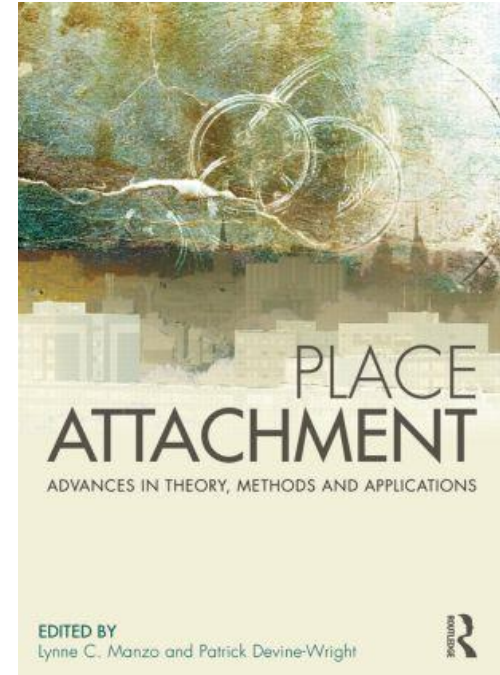


Place Attachment

Place attachments are the **positive bonds people form with places**, arising from affective, behavioural, and cognitive ties between individuals or groups and their sociophysical settings

Forming **profound attachments** to homes and neighbourhoods, which facilitate stability, identity, and positive experiences

From: Brown et al. (2012)





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BECOME A

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PETER SALTER Lincoln Journal Star 13 hrs ago

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All urban forest **data**
stored in the “cloud”




In the age of
smart cities




What should **smart**
urban forests
look like?




Social media images
continuously
tracked for citizen
values on urban
public spaces




Researchers use **big**
data to **quantify**
health outcomes from
exposure to forest
biodiversity



Concordia University and the
City of Montréal **team up** to
create **AR game for citizens** to
water newly planted trees



Tree “Fitbit®” **sensors monitor**
indicators in **real time**



Tree climbing robots
scan, identify, and prune
in higher risk areas



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About





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Australian School of Urban Forestry

Trees have always been a vital part of the urban fabric. They are now more important than ever for the multiple benefits they contribute to the liveability of cities faced by changing climate and urban densification.

Urban forestry is an integrated, evidence-based approach to maximising the benefits of trees and other vegetation in cities. Research shows that well-designed and well-managed urban forests provide multiple benefits, including:

industry, community advocacy, environmental health, and policy management with a desire to develop their skills and knowledge in the multi-disciplinary field of Urban Forestry.

A successful urban forest requires

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Program**

Venue: Rydges on
Swanston, Melbourne,



THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Forestry

MASTER *of* URBAN FORESTRY LEADERSHIP



Synopsis

- About disturbances and calamities in urban forests
- Not all pest and disease outbreaks are calamities
- What do we loose?
- Communication is key
- Change for the better
- Working in partnership

